RCRA Permit Renewal Application
Munitions Treatment Facility
EPA I.D. No.: AZ5213830991

Submitted to:

Arizona Department of Environmental Quality

Prepared by:

U.S. Army Garrison Yuma Proving Ground
Directorate of Public Works
Environmental Sciences Division

December 2016

Revised April 2017

RCRA Hazardous Waste
Part A Permit Application

ARIZONA HAZARDOUS WASTE MANAGEMENT PERMIT

EPA I.D. NO. AZ5213820991

U.S. ARMY GARRISON YUMA PROVING GROUND

RCRA HAZARDOUS WASTE PART A

PERMIT APPLICATION

United States
Environmental Protection
Agency

January 2015

RCRA Hazardous Waste Part A Permit Application

Instructions and Form

EPA Form 8700-23

(OMB #2050-0024; Expires 01/31/2017)

OMB# 2050-0024; Expires 01/31/2017

SEND COMPLETED FORM TO: The Appropriate State or Regional Office.	United States Environmental Protection Agency **RCRA SUBTITLE C SITE IDENTIFICATION FORM**	

1. Reason for Submittal MARK ALL BOX(ES) THAT APPLY	**Reason for Submittal:** ☐ To provide an Initial Notification (first time submitting site identification information / to obtain an EPA ID number for this location) ☐ To provide a Subsequent Notification (to update site identification information for this location) ☐ As a component of a First RCRA Hazardous Waste Part A Permit Application ☒ As a component of a Revised RCRA Hazardous Waste Part A Permit Application (Amendment #________) ☐ As a component of the Hazardous Waste Report (If marked, see sub-bullet below) ☐ Site was a TSD facility and/or generator of >1,000 kg of hazardous waste, >1 kg of acute hazardous waste, or >100 kg of acute hazardous waste spill cleanup in one or more months of the report year (or State equivalent LQG regulations)
2. Site EPA ID Number	**EPA ID Number** A Z 5 2 1 3 8 2 0 9 9 1
3. Site Name	**Name:** U.S. Army Yuma Proving Ground
4. Site Location Information	**Street Address:** 301 C Street IMYM-PWE **City, Town, or Village:** Yuma — **County:** Yuma **State:** Arizona — **Country:** United States — **Zip Code:** 85365
5. Site Land Type	☐ Private ☐ County ☐ District ☑ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other
6. NAICS Code(s) for the Site (at least 5-digit codes)	**A.** 9 2 8 1 1 — **C.** **B.** — **D.**
7. Site Mailing Address	**Street or P.O. Box:** 301 C Street IMYM-PWE **City, Town, or Village:** Yuma **State:** Arizona — **Country:** United States — **Zip Code:** 85365
8. Site Contact Person	**First Name:** Daniel — **MI:** M — **Last:** Steward **Title:** Chief - Environmental Sciences Division **Street or P.O. Box:** 301 C Street IMYM-PWE **City, Town or Village:** Yuma **State:** Arizona — **Country:** United States — **Zip Code:** 85365 **Email:** daniel.m.steward.civ@mail.mil **Phone:** (928) 328-2125 — **Ext.:** — **Fax:** 928-328-6696
9. Legal Owner and Operator of the Site	**A. Name of Site's Legal Owner:** U.S. Army Garrison Yuma (Public Land Order 858) — **Date Became Owner:** 5/26/1952 **Owner Type:** ☐ Private ☐ County ☐ District ☑ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other **Street or P.O. Box:** U.S. Army Yuma Proving Ground, IMSW-YMA-ZA, 301 C Street **City, Town, or Village:** Yuma — **Phone:** **State:** Arizona — **Country:** United States — **Zip Code:** 85365 **B. Name of Site's Operator:** U.S. Army Yuma Proving Ground — **Date Became Operator:** 5/26/1952 **Operator Type:** ☐ Private ☐ County ☐ District ☑ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other

10. Type of Regulated Waste Activity (at your site)
Mark "Yes" or "No" for all current activities (as of the date submitting the form); complete any additional boxes as instructed.

A. Hazardous Waste Activities; Complete all parts 1-10.

Y ☑ N ☐ **1. Generator of Hazardous Waste**
If "Yes," mark only one of the following – a, b, or c.

☑ a. LQG: Generates, in any calendar month, 1,000 kg/mo (2,200 lbs/mo.) or more of hazardous waste; **or** Generates, in any calendar month, or accumulates at any time, more than 1 kg/mo (2.2 lbs/mo) of acute hazardous waste; **or** Generates, in any calendar month, **or** accumulates at any time, more than 100 kg/mo (220 lbs/mo) of acute hazardous spill cleanup material.

☐ b. SQG: 100 to 1,000 kg/mo (220 – 2,200 lbs/mo) of non-acute hazardous waste.

☐ c. CESQG: Less than 100 kg/mo (220 lbs/mo) of non-acute hazardous waste.

If "Yes" above, indicate other generator activities in 2-10.

Y ☐ N ☑ **2. Short-Term Generator** (generate from a short-term or one-time event and not from on-going processes). If "Yes," provide an explanation in the Comments section.

Y ☐ N ☑ **3. United States Importer of Hazardous Waste**

Y ☐ N ☑ **4. Mixed Waste (hazardous and radioactive) Generator**

Y ☐ N ☑ **5. Transporter of Hazardous Waste**
If "Yes," mark all that apply.

☐ a. Transporter

☐ b. Transfer Facility (at your site)

Y ☑ N ☐ **6. Treater, Storer, or Disposer of Hazardous Waste** Note: A hazardous waste Part B permit is required for these activities.

Y ☐ N ☑ **7. Recycler of Hazardous Waste**

Y ☐ N ☑ **8. Exempt Boiler and/or Industrial Furnace**
If "Yes," mark all that apply.

☐ a. Small Quantity On-site Burner Exemption

☐ b. Smelting, Melting, and Refining Furnace Exemption

Y ☐ N ☑ **9. Underground Injection Control**

Y ☐ N ☑ **10. Receives Hazardous Waste from Off-site**

B. Universal Waste Activities; Complete all parts 1-2.

Y ☑ N ☐ **1. Large Quantity Handler of Universal Waste (you accumulate 5,000 kg or more) [refer to your State regulations to determine what is regulated]. Indicate types of universal waste managed at your site. If "Yes," mark all that apply.**

a. Batteries	☑
b. Pesticides	☑
c. Mercury containing equipment	☑
d. Lamps	☑
e. Other (specify) ______________	☐
f. Other (specify) ______________	☐
g. Other (specify) ______________	☐

Y ☐ N ☑ **2. Destination Facility for Universal Waste**
Note: A hazardous waste permit may be required for this activity.

C. Used Oil Activities; Complete all parts 1-4.

Y ☐ N ☑ **1. Used Oil Transporter**
If "Yes," mark all that apply.

☐ a. Transporter

☐ b. Transfer Facility (at your site)

Y ☐ N ☑ **2. Used Oil Processor and/or Re-refiner**
If "Yes," mark all that apply.

☐ a. Processor

☐ b. Re-refiner

Y ☐ N ☑ **3. Off-Specification Used Oil Burner**

Y ☐ N ☑ **4. Used Oil Fuel Marketer**
If "Yes," mark all that apply.

☐ a. Marketer Who Directs Shipment of Off-Specification Used Oil to Off-Specification Used Oil Burner

☐ b. Marketer Who First Claims the Used Oil Meets the Specifications

D. Eligible Academic Entities with Laboratories—Notification for opting into or withdrawing from managing laboratory hazardous wastes pursuant to 40 CFR Part 262 Subpart K

❖ You can ONLY Opt into Subpart K if:

- you are at least one of the following: a college or university; a teaching hospital that is owned by or has a formal affiliation agreement with a college or university; or a non-profit research institute that is owned by or has a formal affiliation agreement with a college or university; AND
- you have checked with your State to determine if 40 CFR Part 262 Subpart K is effective in your state

Y☐ N☑ 1. Opting into or currently operating under 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories **See the item-by-item instructions for definitions of types of eligible academic entities. Mark all that apply:**

☐ **a. College or University**

☐ **b. Teaching Hospital that is owned by or has a formal written affiliation agreement with a college or university**

☐ **c. Non-profit Institute that is owned by or has a formal written affiliation agreement with a college or university**

Y☐ N☑ 2. Withdrawing from 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories

11. Description of Hazardous Waste

A. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g., D001, D003, F007, U112). Use an additional page if more spaces are needed.

D001	D002	D003	D004	D005	D006	D007
D008	D009	D010	D011	D030	D032	D033
D035	D036					

B. Waste Codes for State-Regulated (i.e., non-Federal) Hazardous Wastes. Please list the waste codes of the State-Regulated hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed.

NA						

EPA ID Number | A | Z | 5 | 2 | 1 | 3 | 8 | 2 | 0 | 9 | 9 | 1 | OMB#: 2050-0024; Expires 01/31/2017

12. Notification of Hazardous Secondary Material (HSM) Activity

Y ☐ N ☑ Are you notifying under 40 CFR 260.42 that you will begin managing, are managing, or will stop managing hazardous secondary material under 40 CFR 261.2(a)(2)(ii), 40 CFR 261.4(a)(23), (24), or (25)?

If "Yes," you must fill out the Addendum to the Site Identification Form: Notification for Managing Hazardous Secondary Material.

13. Comments

14. Certification. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. For the RCRA Hazardous Waste Part A Permit Application, all owner(s) and operator(s) must sign (see 40 CFR 270.10(b) and 270.11).

Signature of legal owner, operator, or an authorized representative	Name and Official Title (type or print)	Date Signed (mm/dd/yyyy)
	Gordon K. Rogers **Garrison Manager**	

EPA ID Number A Z 5 2 1 3 8 2 0 9 9 1 OMB#: 2050-0024; Expires 01/31/2017

United States Environmental Protection Agency

HAZARDOUS WASTE PERMIT INFORMATION FORM

1. Facility Permit Contact

First Name: Daniel **MI:** M **Last Name:** Steward

Contact Title: Chief Environmental Sciences Division

Phone: (928) 328-2125 **Ext.:** **Email:** daniel.m.steward.civ@mail.mil

2. Facility Permit Contact Mailing Address

Street or P.O. Box: 301 C Street IMYM-PWE

City, Town, or Village: Yuma

State: Arizona

Country: United States **Zip Code:** 85365-9498

3. Operator Mailing Address and Telephone Number

Street or P.O. Box: U.S. Army Yuma Proving Ground, IMSW-YMA PWE, 301 C Street

City, Town, or Village: Yuma

State: Arizona **Phone:** (928) 328-2125

Country: United States **Zip Code:** 85365-9498

4. Facility Existence Date

Facility Existence Date (mm/dd/yyyy): 05/26/1952

5. Other Environmental Permits

A. Facility Type (Enter code)	B. Permit Number	C. Description
N	AZMSGP2010002	AZPDES Stormwater Multi-Sector General Permit
E	954051400	COE 404, JD for construction of new impact area
E	934077100	COE 404, Nationwide permit-fill in road crossing in wash
E	924055800	COE 404, JD for placement of flood control dikes
E	SMB-1411	NRC Materials license for low level
E	61405	ADEQ Air Quality Class II Synthetic Minor Permit
E	1001739	ADEQ Air Qual General Permit Portable Vapor Extr.
E	1000097	ADEQ Air Qual General Permit 2 Caterpillar Generators
E	100794	ADEQ APP Kofa Firing Range Sewage Lagoons
E	100795	ADEQ APP Laguna Army Airfield Lagoons
E	100796	ADEQ APP Main Admin. Area WWT Facility
E	100797	ADEQ APP Material Test Area Lagoon

6. Nature of Business:

Open Burning / Open Detonation (OB/OD) Munitions Treatment Facility operated at the U.S. Army Garrison Yuma Proving Ground in Yuma, Arizona.

Hazardous Waste Permit Information Form
Continuation

5. Other Environmental Permits

A. Facility Type	B. Permit Number	C. Description
E	101346	ADEQ APP for Fire Training Facility
E	102377	ADEQ General APP for Air Cargo Test Area
E	1402260	ADEQ General APP for Castle-Dome Annex Wash Rack Evaporation Pond
E	100793	ADEQ General APP for Castle Dome Heliport
E	20030324	ADEQ General APP for Building 3562
E	20020570	ADEQ General APP for Building 8900
E	20030421	ADEQ General APP for Phoenix Test Site
E	20030644	ADEQ General APP for Site 8
E	20030202	ADEQ General APP for Building 3125
E	105294	ADEQ General Permit Deflagration Test Site
E	14-361	Water Supply Permit Laguna Army Airfield
E	14-363	Water Supply Permit Material Test Area
E	14-364	Water Supply Permit Castle Dome Area
E	14-367	Water Supply Permit Kofa Firing Range
E	14-403	Water Supply Permit Kofa Sewage Lagoons
E	8120	ADEQ Dangerous Open Burn Permit

7. Process Codes and Design Capacities – Enter information in the Section on Form Page 3

A. PROCESS CODE – Enter the code from the list of process codes below that best describes each process to be used at the facility. If more lines are needed, attach a separate sheet of paper with the additional information. For "other" processes (i.e., D99, S99, T04 and X99), describe the process (including its design capacity) in the space provided in Item 8.

B. PROCESS DESIGN CAPACITY – For each code entered in Item 7.A; enter the capacity of the process.

1. **AMOUNT – Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process.**
2. **UNIT OF MEASURE – For each amount entered in Item 7.B(1), enter the code in Item 7.B(2) from the list of unit of measure codes below that describes the unit of measure used. Select only from the units of measure in this list.**

C. PROCESS TOTAL NUMBER OF UNITS – Enter the total number of units for each corresponding process code.

Process Code	Process	Appropriate Unit of Measure for Process Design Capacity
	Disposal	
D79	Underground Injection Well Disposal	Gallons; Liters; Gallons Per Day; or Liters Per Day
D80	Landfill	Acre-feet; Hectares-meter; Acres; Cubic Meters; Hectares; Cubic Yards
D81	Land Treatment	Acres or Hectares
D82	Ocean Disposal	Gallons Per Day or Liters Per Day
D83	Surface Impoundment Disposal	Gallons; Liters; Cubic Meters; or Cubic Yards
D99	Other Disposal	Any Unit of Measure Listed Below
	Storage	
S01	Container	Gallons; Liters; Cubic Meters; or Cubic Yards
S02	Tank Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S03	Waste Pile	Cubic Yards or Cubic Meters
S04	Surface Impoundment	Gallons; Liters; Cubic Meters; or Cubic Yards
S05	Drip Pad	Gallons; Liters; Cubic Meters; Hectares; or Cubic Yards
S06	Containment Building Storage	Cubic Yards or Cubic Meters
S99	Other Storage	Any Unit of Measure Listed Below
	Treatment	
T01	Tank Treatment	Gallons Per Day; Liters Per Day
T02	Surface Impoundment	Gallons Per Day; Liters Per Day
T03	Incinerator	Short Tons Per Hour; Metric Tons Per Hour; Gallons Per Hour; Liters Per Hour; BTUs Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Gallons Per Day; Metric Tons Per Hour; or Million BTU Per Hour
T04	Other Treatment	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Short Tons Per Day; BTUs Per Hour; Gallons Per Day; Liters Per Hour; or Million BTU Per Hour
T80	Boiler	Gallons; Liters; Gallons Per Hour; Liters Per Hour; BTUs Per Hour; or Million BTU Per Hour

Process Code	Process	Appropriate Unit of Measure for Process Design Capacity
	Treatment (Continued)	**(for T81 – T94)**
T81	Cement Kiln	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; BTU Per Hour; Liters Per Hour; Kilograms Per Hour; or Million BTU Per Hour
T82	Lime Kiln	
T83	Aggregate Kiln	
T84	Phosphate Kiln	
T85	Coke Oven	
T86	Blast Furnace	
T87	Smelting, Melting, or Refining Furnace	
T88	Titanium Dioxide Chloride Oxidation Reactor	
T89	Methane Reforming Furnace	
T90	Pulping Liquor Recovery Furnace	
T91	Combustion Device Used in the Recovery of Sulfur Values from Spent Sulfuric Acid	
T92	Halogen Acid Furnaces	
T93	Other Industrial Furnaces Listed in 40 CFR 260.10	
T94	Containment Building Treatment	Cubic Yards; Cubic Meters; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; BTU Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million BTU Per Hour
	Miscellaneous (Subpart X)	
X01	Open Burning/Open Detonation	Any Unit of Measure Listed Below
X02	Mechanical Processing	Short Tons Per Hour; Metric Tons Per Hour; Short Tons Per Day; Metric Tons Per Day; Pounds Per Hour; Kilograms Per Hour; Gallons Per Hour; Liters Per Hour; or Gallons Per Day
X03	Thermal Unit	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; BTU Per Hour; or Million BTU Per Hour
X04	Geologic Repository	Cubic Yards; Cubic Meters; Acre-feet; Hectare-meter; Gallons; or Liters
X99	Other Subpart X	Any Unit of Measure Listed Below

Unit of Measure	Unit of Measure Code
Gallons	**G**
Gallons Per Hour	**E**
Gallons Per Day	**U**
Liters	**L**
Liters Per Hour	**H**
Liters Per Day	**V**

Unit of Measure	Unit of Measure Code
Short Tons Per Hour	**D**
Short Tons Per Day	**N**
Metric Tons Per Hour	**W**
Metric Tons Per Day	**S**
Pounds Per Hour	**J**
Kilograms Per Hour	**X**
Million BTU Per Hour	**X**

Unit of Measure	Unit of Measure Code
Cubic Yards	**Y**
Cubic Meters	**C**
Acres	**B**
Acre-feet	**A**
Hectares	**Q**
Hectare-meter	**F**
BTU Per Hour	**I**

7. Process Codes and Design Capacities (Continued)

EXAMPLE FOR COMPLETING Item 7 (shown in line number X-1 below): A facility has a storage tank, which can hold 533.788 gallons.

Line Number		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	(2) Unit of Measure	C. Process Total Number of Units	For Official Use Only
X	**1**	**S**	**0**	**2**	**533.788**	**G**	**001**	
	1	X	0	1	2.0	N	008	
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
1	**0**							
1	**1**							
1	**2**							
1	**3**							

Note: If you need to list more than 13 process codes, attach an additional sheet(s) with the information in the same format as above. Number the line sequentially, taking into account any lines that will be used for "other" process (i.e., D99, S99, T04, and X99) in Item 8.

8. Other Processes (Follow instructions from Item 7 for D99, S99, T04, and X99 process codes)

Line Number (Enter #s in sequence with Item 7)		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	(2) Unit of Measure	C. Process Total Number of Units	For Official Use Only
X	**2**	**T**	**0**	**4**	**100.00**	**U**	**001**	

9. Description of Hazardous Wastes - Enter Information in the Sections on Form Page 5

A. EPA HAZARDOUS WASTE NUMBER – Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you will handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four-digit number(s) from 40 CFR Part 261, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.

B. ESTIMATED ANNUAL QUANTITY – For each listed waste entered in Item 9.A, estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in Item 9.A, estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE – For each quantity entered in Item 9.B, enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure, taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed hazardous waste: For each listed hazardous waste entered in Item 9.A, select the code(s) from the list of process codes contained in Items 7.A and 8.A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all listed hazardous wastes.

For non-listed waste: For each characteristic or toxic contaminant entered in Item 9.A, select the code(s) from the list of process codes contained in Items 7.A and 8.A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that possess that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES. IF MORE ARE NEEDED:

1. **Enter the first two as described above.**
2. **Enter "000" in the extreme right box of Item 9.D(1).**
3. **Use additional sheet, enter line number from previous sheet, and enter additional code(s) in Item 9.E.**

2. PROCESS DESCRIPTION: If code is not listed for a process that will be used, describe the process in Item 9.D(2) or in Item 9.E(2).

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER – Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. **Select one of the EPA Hazardous Waste Numbers and enter it in Item 9.A. On the same line complete Items 9.B, 9.C, and 9.D by estimating the total annual quantity of the waste and describing all the processes to be used to store, treat, and/or dispose of the waste.**
2. **In Item 9.A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In Item 9.D.2 on that line enter "included with above" and make no other entries on that line.**
3. **Repeat step 2 for each EPA Hazardous Waste Number that can be used to describe the hazardous waste.**

EXAMPLE FOR COMPLETING Item 9 (shown in line numbers X-1, X-2, X-3, and X-4 below) – A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operations. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter Code)									D. PROCESSES (2) PROCESS DESCRIPTION (If code is not entered in 9.D(1))
X	1	K	0	5	4	900	P	T	0	3	D	8	0				
X	2	D	0	0	2	400	P	T	0	3	D	8	0				
X	3	D	0	0	1	100	P	T	0	3	D	8	0				
X	4	D	0	0	2												Included With Above

9. Description of Hazardous Wastes *(Continued. Use additional sheet(s) as necessary; number pages as 5a, etc.)*

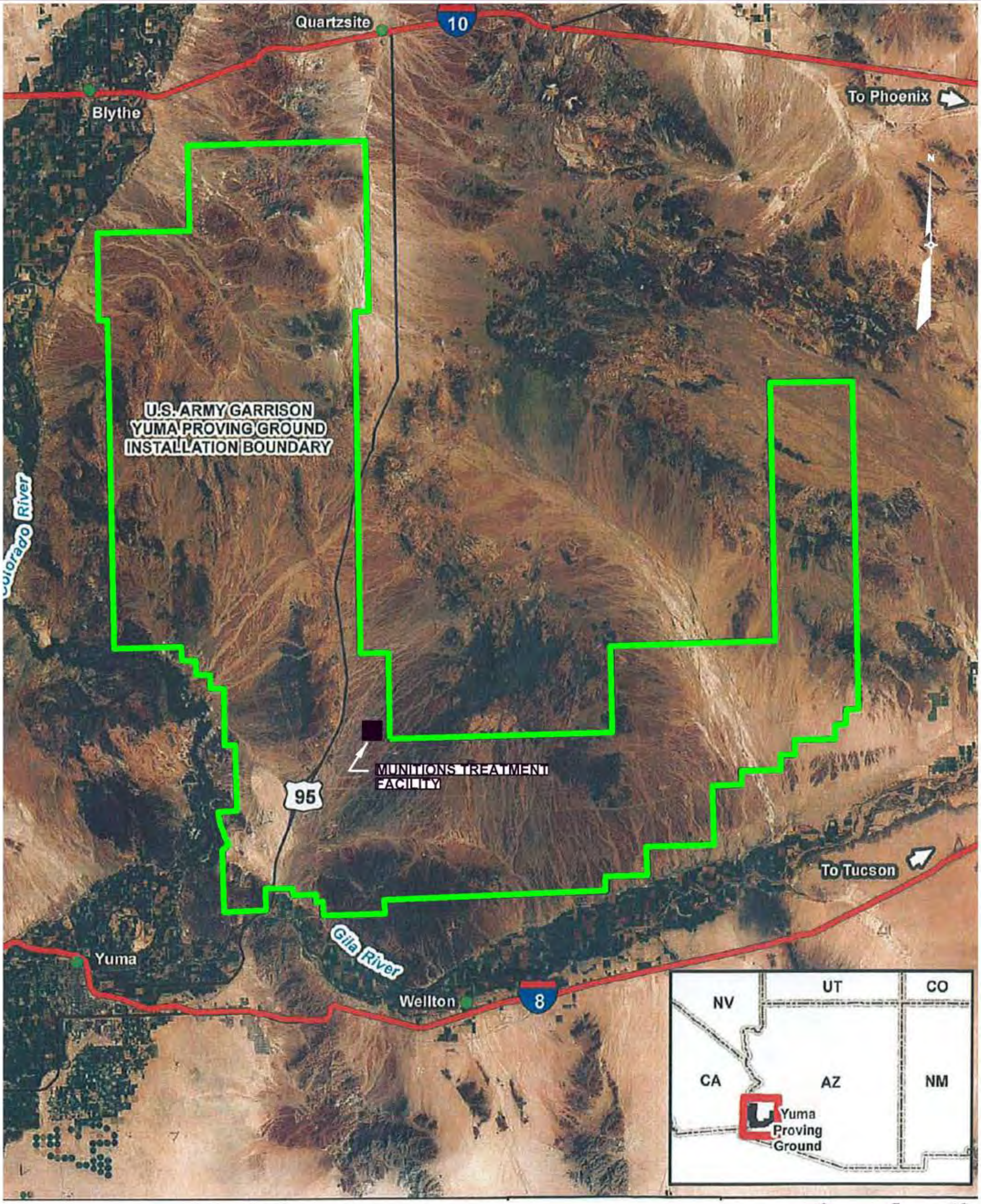
Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter Code)									D. PROCESSES (2) PROCESS DESCRIPTION (If code is not entered in 9.D(1))
	1	D	0	0	1	16,500	P	X	0	1							
	2	D	0	0	2	600	P	X	0	1							
	3	D	0	0	3	12,000	P	X	0	1							
	4	D	0	0	4	50	P	X	0	1							
	5	D	0	0	5	250	P	X	0	1							
	6	D	0	0	6	750	P	X	0	1							
	7	D	0	0	7	850	P	X	0	1							
	8	D	0	0	8	13,500	P	X	0	1							
	9	D	0	0	9	50	P	X	0	1							
1	0	D	0	1	0	50	P	X	0	1							
1	1	D	0	1	1	50	P	X	0	1							
1	2	D	0	3	0	50	P	X	0	1							
1	3	D	0	3	2	50	P	X	0	1							
1	4	D	0	3	3	50	P	X	0	1							
1	5	D	0	3	5	50	P	X	0	1							
1	6	D	0	3	6	50	P	X	0	1							
1	7																
1	8																
1	9																
2	0																
2	1																
2	2																
2	3																
2	4																
2	5																
2	6																
2	7																
2	8																
2	9																
3	0																
3	1																
3	2																
3	3																
3	4																
3	5																
3	6																

10.	**Map**
	Attach to this application a topographical map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all spring, rivers, and other surface water bodies in this map area. See instructions for precise requirements.
11.	**Facility Drawing**
	All existing facilities must include a scale drawing of the facility (see instructions for more detail).
12.	**Photographs**
	All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment, and disposal areas; and sites of future storage, treatment, or disposal areas (see instructions for more detail).
13.	**Comments**

ATTACHMENT 1

HAZARDOUS WASTE PERMIT INFORMATION FORM

ITEM 10: MAPS



LEGEND

- Interstate Highway
- U.S. Highway

APPROXIMATE SCALE
MILES
0 5 10

CTI and Associates, Inc.
28001 Cabot Drive, Ste. 250
Novi, Michigan 48377
248.486.5100 (fax)248.486.5050
www.cticompanies.com

FIGURE 1A-1
SITE LOCATION

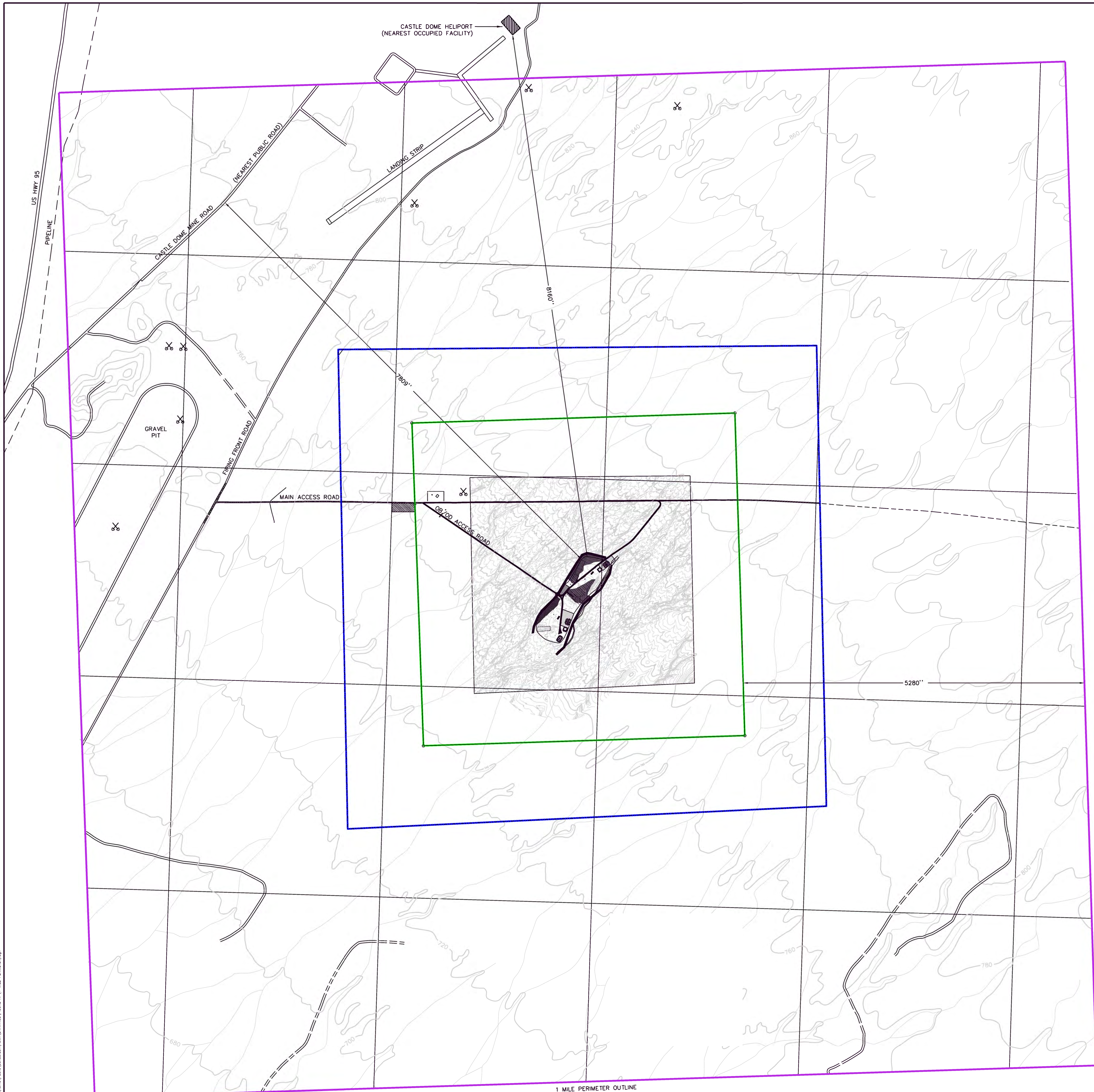
YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION

JULY 2016

1165010006.3

2:07:58 PM
7/28/2016
L:\Shared\home\Public\bonderson\YUMA\DRAWINGS\FIGURE A1.dgn

8.5"x11"



LEGEND:

USGS 20' CONTOUR

EXISTING FENCE LINE

PROPERTY BOUNDARY

1000' PERIMETER BOUNDARY

1 MILE PERIMETER BOUNDARY

GRAVEL PIT

N

NOTES:

1. THESE MAPS PREPARED USING DESIGN PACKAGE TITLED U.S. ARMY PROVING GROUND 100 YEAR FLOOD PLAIN PROTECTION DESIGN OB/OD SITE, SEALED 12/11/2002.

2. NO SURFACE WATERS EXIST ON THIS HAZARDOUS WASTE MANAGEMENT SITE.

3. SURROUNDING LAND USES ARE MILITARY RANGES.

4. THERE ARE NO INJECTION OR WITHDRAWAL WELLS ON THE SITE.

5. THERE ARE NO FENCES OR ACCESS GATES WITHIN 1000' OF THE ACTIVE HAZARDOUS WASTE MANAGEMENT AREA.

6. CONTOUR LINES ARE SHOWN AT 1' INTERVALS WITHIN THE AERIAL SURVEY BOUNDARY, AND AT 20' INTERVALS OUTSIDE THE AERIAL SURVEY BOUNDARY.

7. HORIZONTAL DATUM:
COORDINATES ARE IN UTM SYSTEM CONVERTED FROM METRIC TO FEET AS PROVIDED BY PREMIERE ENGINEERING ON LETTER DATED 2/20/02

VERTICAL DATUM:
ELEVATIONS ARE IN NAVD29. BACKGROUND CONTOURS FROM COOPER AERIAL SURVEY PROJECT NUMBER 6097-020602.

8. ENTIRE AREA SHOWN IS CLASSIFIED AS "ZONE D" PER FEMA PANEL 0427C1000E, EFFECTIVE AUGUST 28, 2008, AND IS NOT WITHIN A 100 YEAR OR 500 YEAR FLOOD PLAIN. THE ACTIVE MUNITIONS TREATMENT FACILITY IS PROTECTED BY A STORMWATER PROTECTION BERM.

9. THIS DRAWING WAS ADAPTED FROM USGS TOPOGRAPHIC MAPS - MIDDLE MOUNTAIN SOUTH AND RED BLUFF MOUNTAIN NW AND DRAWING No. 003

10. THIS DRAWING WAS CREATED USING THE GUTIERREZ CANALES ENGINEERING CAD DRAWING.

REGIONAL GROUNDWATER FLOW DATA

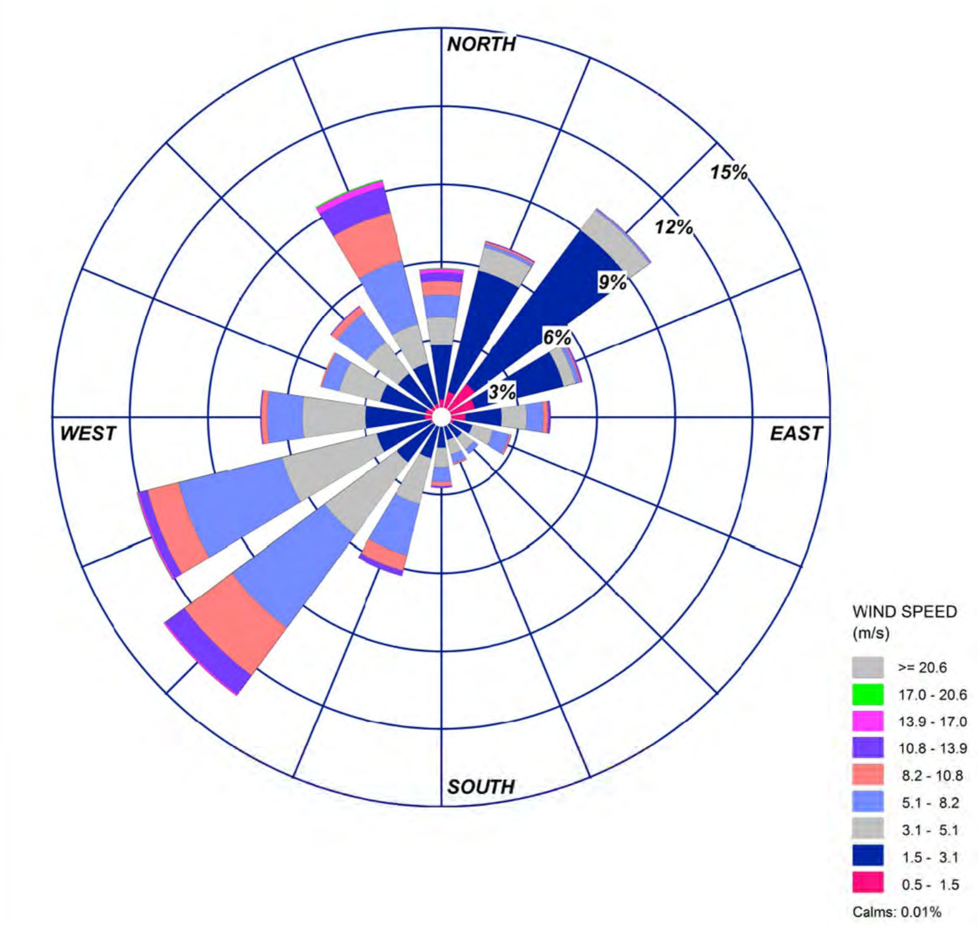
PROVIDED BY ENTECH ENGINEERS-
(HYDROLOGIC BOUNDARY AND POTENTIOMETRIC MAP 6-22-94)

GROUNDWATER FLOW DIRECTION

APPROXIMATE GROUNDWATER ELEVATION: 193' ABOVE MEAN SEA LEVEL.

WIND ROSE PLOT:
YUMA PROVING GROUNDS, AZ
YPG MET STATION AT 32.872 N; 114.33 W

DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Calms includes wind speeds between 0 and less than 0.5 m/s	Start Date: 1/1/2011 - 00:00 End Date: 12/31/2015 - 23:00	AECOM	
	CALM WINDS: 0.01%	TOTAL COUNT: 43823 hrs.	
	AVG. WIND SPEED: 4.35 m/s	DATE: 7/29/2016	PROJECT NO.: YPG RCRA PERMIT

WRPLOT View - Lakes Environmental Software

SCALE 0' 300' 600' 1,200'

DATE:
DESIGNED BY:
DRAWN BY:
CHECKED BY:
APPROVED BY:

CTI and Associates, Inc.
28001 Cabot Drive, Ste. 250
Novi, Michigan 48377
248.486.5100 (fax)248.486.5050
www.cticompanies.com

REV	DATE	REVISION DESCRIPTION	DRN	APP

YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION

MUNITIONS TREATMENT FACILITY
ONE MILE PERIMETER MAP

PROJECT NUMBER
1165010006.3

SCALE
FT=217

DRAWING NO
FIGURE 1A-3a

DRAWING SIZE: 30" x 42"

ATTACHMENT 2

HAZARDOUS WASTE PERMIT INFORMATION FORM

ITEM 11: FACILITY DRAWING

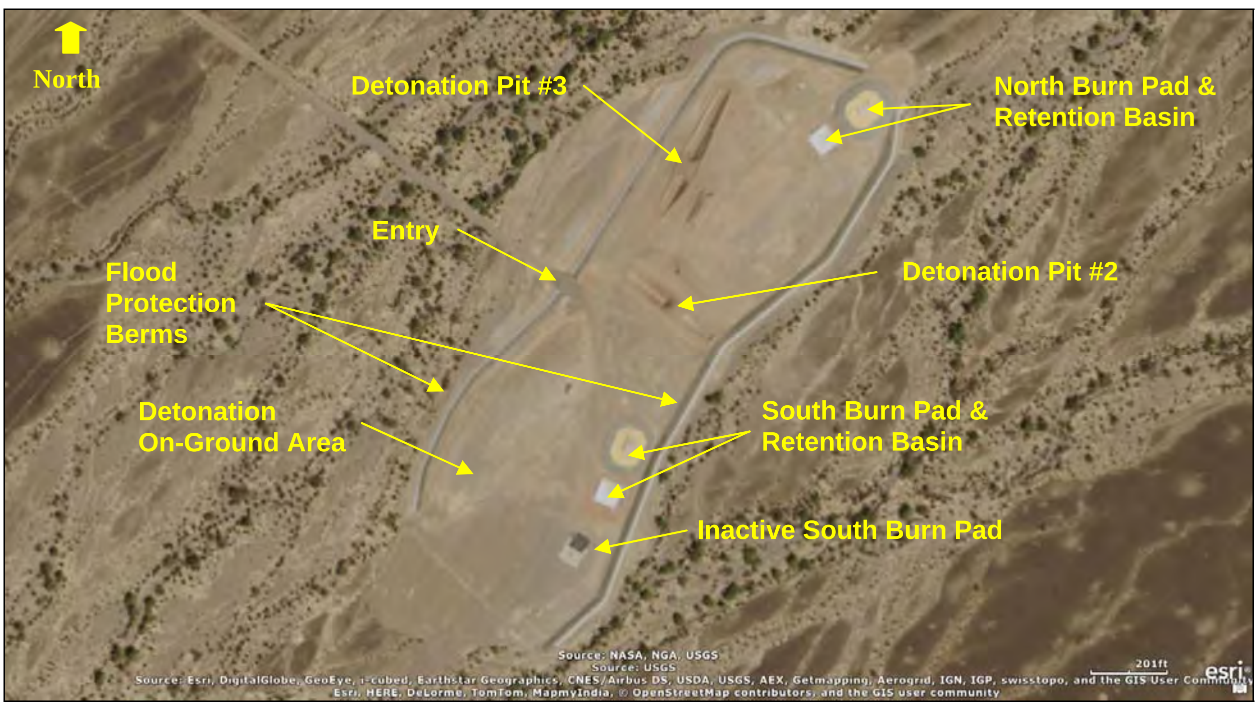
NORTH BURN PAD
NORTH BURN PAD RETENTION BASIN
DETONATION PIT #3
DETONATION PIT #2
MATERIALS PILE
GRAVEL ROAD (TYPICAL)
STORM WATER PROTECTION BERM (TYPICAL)
12" HIGH BERM CONSTRUCTED FROM NATIVE MATERIALS (BY OTHERS)
FORMER BURN ON GROUND AREA
SOUTH BURN PAD
SOUTH BURN PAD RETENTION BASIN
INACTIVE SOUTH BURN PAD
DETONATION ON-GROUND AREA
FOUND ⅝" REBAR (HV1) N: 11,975,580.690 E: 2,478,281.210 ELEV. = 774.257'
FOUND ⅝" REBAR (HV8) N: 11,974,055.680 E: 2,478,332.500 ELEV. = 763.651'
SET ⅝" REBAR N: 11,973,832.605 E: 2,479,441.071 ELEV. = 769.16'
1137.09' N77°08'25"W
LEGEND
WASH CENTERLINE
DRAINAGE PIPE
BERM (BY OTHERS)
RIP RAP SLOPE
CONCRETE PAVEMENT
DIRT ROAD
EXISTING CONTOUR
ELEVATION CONTOUR LINE
ELEVATION CONTOUR LINE (INDEX)
EXISTING SIGN
EXISTING TREE
GROUND ELEVATION
RIP-RAP ELEVATION
EDGE OF ROAD ELEVATION
TOP OF BERM ELEVATION
WASH CENTERLINE ELEVATION
CONCRETE ELEVATION
PAD SUMP
RETENTION BASIN SUMP
PROCESS UNITS:
1. DETONATION ON-GROUND AREA
2. DETONATION PIT #2 - EAST TRENCH
3. DETONATION PIT #2 - WEST TRENCH
4. DETONATION PIT #3 - SOUTH TRENCH
5. DETONATION PIT #3 - NORTH TRENCH
6. NORTH BURN PAD
7. SOUTH BURN PAD
8. INACTIVE SOUTH BURN PAD (currently undergoing closure)
PROCESS CODE X01 APPLIES TO ALL PROCESS UNITS IN THE MUNITIONS TREATMENT FACILITY
SCALE 0' 15' 30' 60'
CTI and Associates, Inc.
28001 Cabot Drive, Ste. 250
Novi, Michigan 48377
www.cticompanies.com
YUMA PROVING GROUND
MUNITIONS TREAMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION
SITE DETAIL DRAWING
PROJECT NUMBER 1165010006.3
SCALE AS SHOWN
DRAWING NO
FIGURE 1A-3c

ATTACHMENT 3

HAZARDOUS WASTE PERMIT INFORMATION FORM

ITEM 12: PHOTOGRAPHS

Aerial Image 1 – Munitions Treatment Facility Perimeter



Aerial Image 2 – Munitions Treatment Facility and Major Features

Approximate Photo Locations and Viewing Angles

Photo 1 – Entry Into The Munitions Treatment Facility and Flood Protection Berms

Photo 2 – Outside of Munitions Treatment Facility Flood Protection Berm Southwest of Entry

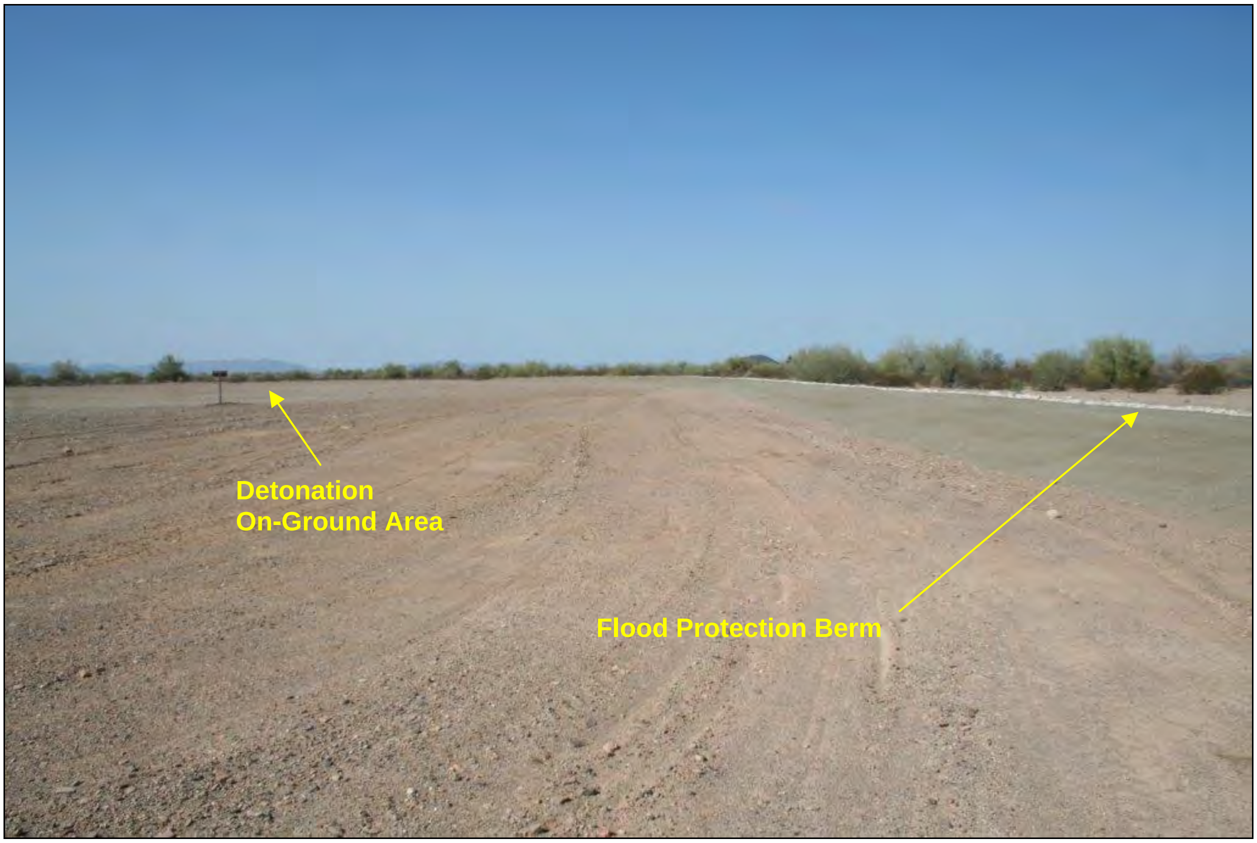


Photo 3 – Inside of Munitions Treatment Facility Flood Protection Berm Southwest of Entry and Location of Detonation On-Ground Area

Photo 4 – Outside of Munitions Treatment Facility Flood Protection Berm Northeast of Entry

Photo 5 – Inside of Munitions Treatment Facility Flood Protection Berm Northeast of Entry and Detonation Pit #3

Photo 6 – Munitions Treatment Facility Detonation Pit #3 Trench (1 of 2) Facing Northeast

Photo 7 – Munitions Treatment Facility Detonation Pit #3 Trench (2 of 2) Facing Southwest

Photo 8 – Munitions Treatment Facility Facing Northeast
Towards the North Burn Pad

Photo 9 – Munitions Treatment Facility Facing Northeast Towards the North Burn Pad and Retention Basin

Photo 10 – Munitions Treatment Facility Facing Southwest Towards the North Burn Pad and Burn Pans (3)

Photo 11 – Munitions Treatment Facility North Burn Pad Burn Pans (3)

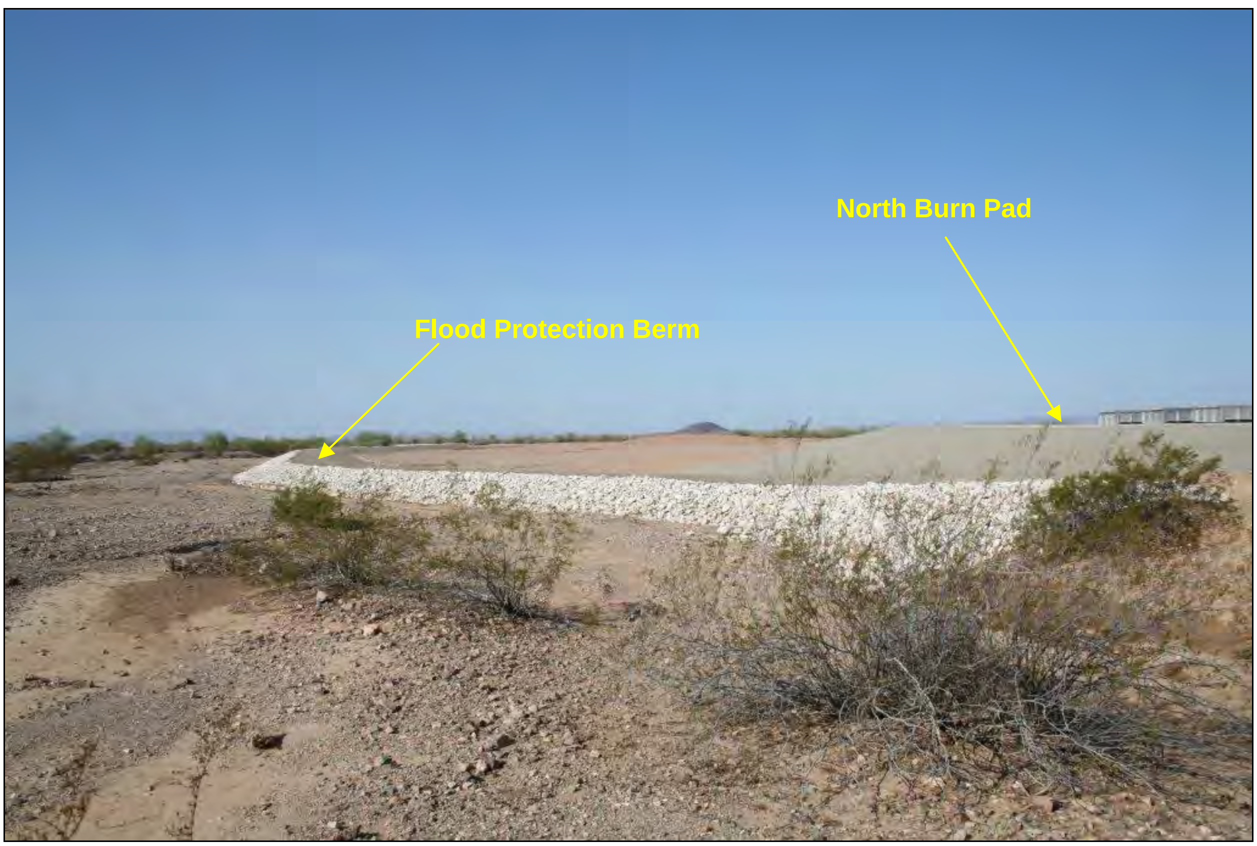


Photo 12 – Outside of Munitions Treatment Facility Flood Protection Berm Southwest of the North Burn Pad

Photo 13 – Munitions Treatment Facility Detonation Pit #2 Trench (1 of 2) Facing Southeast and Southeast Inside Edge of Flood Protection Berm

Photo 14 – Munitions Treatment Facility Detonation Pit #2 Trench (2 of 2) Facing Northwest and Inside of Entry

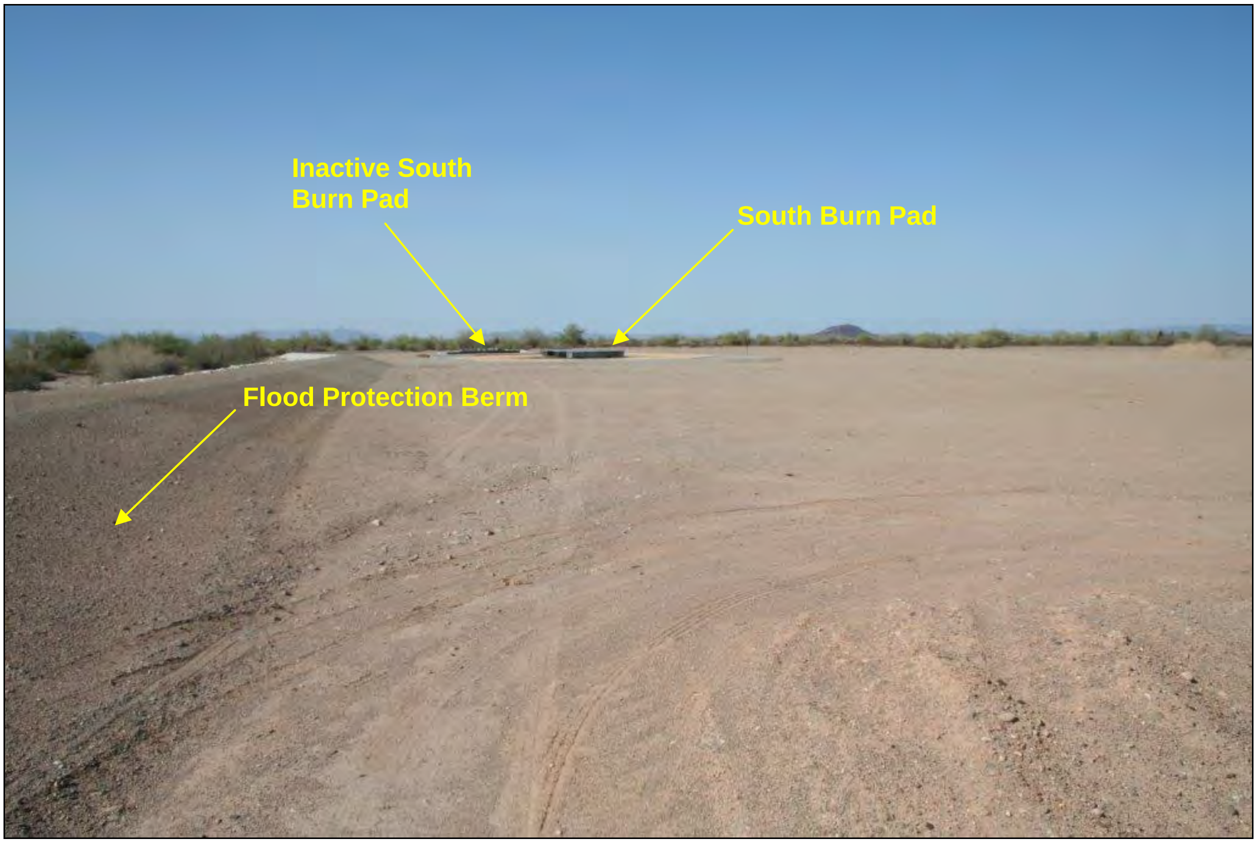


Photo 15 – Inside Southeast Edge of Munitions Treatment Facility Flood Protection Berm Facing Southeast to the South Burn Pad

Photo 16 – Outside Southeast Edge of Munitions Treatment Facility Flood Protection Berm Facing Northwest to the South Burn Pad

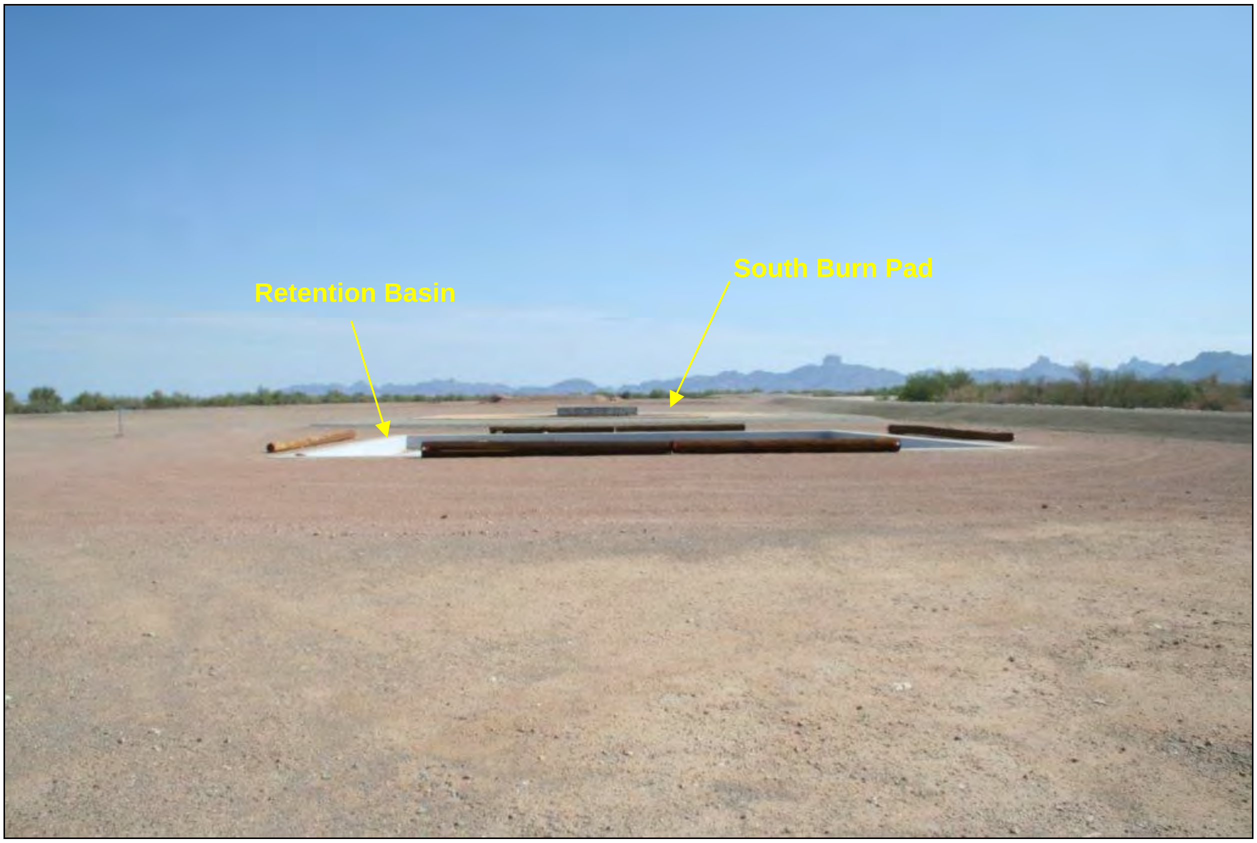


Photo 17 – Munitions Treatment Facility Facing North Towards the South Burn Pad and Retention Basin

Photo 18 – Munitions Treatment Facility Facing Southeast Towards the South Burn Pad, Retention Basin and Burn Pans (3)

Photo 19 – Munitions Treatment Facility South Burn Pad and Burn Pans (3)

Photo 20 – Munitions Treatment Facility Facing Southeast
Towards the Inactive South Burn Pad (currently undergoing closure)

RCRA Hazardous Waste
Part B Permit Application
Completeness Checklist

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

AHWMA/RCRA OPERATING PERMIT APPLICATION

COMPLETENESS/TECHNICAL EVALUATION CHECKLIST

DISCLAIMER: This checklist is not an official ADEQ policy document. This checklist is a tool used by ADEQ permit writers to evaluate hazardous waste permit applications. The checklist is periodically revised by ADEQ, following the adoption of new regulatory requirements.

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION A. PART A GENERAL INFORMATION REQUIREMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
A-1	Description of Activities Conducted which Require Facility to Obtain a Permit under the Resource Conservation and Recovery Act (RCRA), and Brief Description of Nature of the Business	270.13(a),(m)		Attch 1	
A-2	Name, Mailing Address, and Location of Facility for which the Application is Submitted, including a Topographic Map	270.13(b),(l)		Attch 1	
A-3	Up to Four Standard Industrial Classification Codes which Best Reflect the Products or Services Provided by the Facility	270.13(c)		Part A	
A-4	Operator/Owner's Name, Address, Telephone Number, and Ownership Status	270.13(d),(e)	Ownership status must include status as federal, state, private, public, or other entity.	Attch 1	
A-5	Facility is New, Existing, or Located on Indian Lands	270.13(f),(g)	Description must include information on whether this is a first or revised application with date of last signed permit application.	Attch 1	
A-6	Description of Processes to be Used for Treating, Storing, and Disposing of Hazardous Waste	270.13(i)	Description must include design capacity for these items.	Attch 6	
A-7	Specification of the Hazardous Wastes Listed or Designated Under 261	270.13(j)	Specifications must include estimate on quantity of waste to be treated, stored, or disposed of.	Part A, Attch 4 and 5	

Reviewer: ________________________

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION A. PART A GENERAL INFORMATION REQUIREMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
A-8	Listing of all Permits or Construction Approvals Received or Applied for	270.13(k)	Permits include the following programs: Hazardous Waste Management under RCRA; Underground Injection Control under the Solid Waste Disposal Act; Prevention of Significant Deterioration, Nonattainment Program, and National Emissions Standards for Hazardous Pollutants under the Clean Air Act; ocean dumping permits under the Marine Protection Research and Sanctuaries Act; dredge and fill permits under Section 404 of the Clean Water Act; or other relevant environmental permits including state permits.	Part A	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.
[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.
[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION B. FACILITY DESCRIPTION

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
B-1	General Description	270.14(b)(1)		Attch 1	
B-2	Topographic Map	270.14	Show a distance of 1,000 feet around the unit at a scale of 1 inch to not more than 200 feet (multiple maps may be submitted at this scale), and should be similar to Part A topographic map.	Attch 1	
B-2a	General Requirements	270.14(b)(19)		Attch 1	
	Scale and Date	270.14(b)(19)(i)	Other scales may be used if justified.	Attch 1	
	The 100-Year Flood Plain Area	270.14(b)(19)(ii)		NA	
	Surface Waters	270.14(b)(19)(iii)		Attch 1	
	Surrounding Land Use	270.14(b)(19)(iv)		Attch 1	
	Wind Rose	270.14(b)(19)(v)		Attch 1	
	Map Orientation	270.14(b)(19)(vi)		Attch 1	
	Legal Boundaries	270.14(b)(19)(vii)		Attch 1	
	Access Control	270.14(b)(19)(viii)		Attch 1, 8	
	Injection and Withdrawal Wells (On Site and Off Site)	270.14(b)(19)(ix)		NA	
	Buildings and Other Structures	270.14(b)(19)(x)	270.14(b)(19)(x) for example list.	Attch 1 and 2	
	Drainage and Flood Control Barriers	270.14(b)(19)(xi)		Attch 1 and 2	
	Location of the Treatment or Disposal Unit(s) and Decontamination Areas	270.14(b)(19)(xii)		Attch 1	
	Location of Solid Waste Management Units	270.14(d)(1)(i)		Draft Permit	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION B. FACILITY DESCRIPTION

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
B-2b	Additional Information on the Topographic Map for Land Disposal Facilities	270.14(c)(3)		Attch 1	
	Uppermost Aquifer and Hydraulically Connected Aquifers Beneath Facility Property	270.14(c)(2)		Attch 1	
	Groundwater Flow Direction	270.14(c)(2)		Attch 1	
	Waste Management Areas	270.14(c)(3)		Attch 1	
	Property Boundaries	270.14(c)(3)		Attch 1	
	Point of Compliance Location	270.14(c)(3); 264.95	Point of compliance is defined in 264.95.	Attch 1	
	Location of Groundwater Monitoring Wells	270.14(c)(3); 264.97		Attch 7	
	Extent of any Groundwater Contaminant Plume	270.14(c)(4)(i)		Attch 7	
B-3	Facility Location Information	270.14(b)(11); 264.18		Attch 1	
B-3a	Seismic Requirements	270.14(b)(11)(i), (ii); 264.18(a)	Seismic requirements applicable only to new facilities.	Attch 1	
	Political Jurisdiction in which Facility is Proposed to be Located	270.14(b)(11)(i)		Attch 1	
	Indication of Whether Facility is Listed in Appendix VI of 264 (New Facilities)	270.14(b)(11)(i)		NA	
	New Facility must be Located at Least 200 feet from a Fault which has had Displacement in Holocene Time	270.14(b)(11)(ii); 264.18(a)	If facility location is listed in Appendix VI of 264, this information is required.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION B. FACILITY DESCRIPTION

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
B-3b	Flood Plain Requirements	270.14(b)(11)(iii), (iv); 264.18(b)		NA	
	Copy of Federal Insurance Administration or other Flood Map	270.14(b)(11)(iii)	Reference source used to determine whether facility is located in 100-year flood plain.	Attch 1	
B-3b(1)	Demonstration that Facility is Designed, Constructed, Operated, and Maintained to Prevent Washout, or Detailed Description of Procedures to be Followed to Remove Hazardous Waste to Safety before Facility is Flooded	270.14(b)(11)(iv); 264.18(b)	Flood plain requirements applicable if facility is located in 100-year flood plain.	Attch 1 and 2	
B-3b(1)(a)	Engineering Analysis to Indicate the Various Hydrodynamic and Hydrostatic Forces Expected to Result from the 100-Year Flood Plain	270.14(b)(11)(iv); 264.18(b)	Flood plain requirements applicable if facility is located in 100-year flood plain.	Attch 1 and 2	
	Demonstration that no Adverse Effects will Result from Failure to Remove Waste by Providing:	270.14(b)(11)(iv); 264.18(b)(ii)	Flood plain requirements applicable if facility is located in 100-year flood plain.	NA	
	Volume and Physical and Chemical Characteristics of the Waste in the Facility	270.14(b)(11)(iv); 264.18(b)(ii)(A)	Flood plain requirements applicable if facility is located in 100-year flood plain.	NA	
	Concentration of Hazardous Constituents that Would Potentially Affect Surface Waters as a Result of Washout	270.14(b)(11)(iv); 264.18(b)(ii)(B)	Flood plain requirements applicable if facility is located in 100-year flood plain.	NA	
	Impact of such Concentration on Current or Potential uses of, and Water Quality Standards Established for, the Affected Surface Waters	270.14(b)(11)(iv); 264.18(b)(ii)(C)	Flood plain requirements applicable if facility is located in 100-year flood plain.	NA	

Reviewer: ____________________

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION B. FACILITY DESCRIPTION

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
	Impact of Hazardous Constituents on the Sediments of Affected Surface Waters, or the Soils of the 100-Year Flood Plain, that could Result from Washout	270.14(b)(11)(iv); 264.18(b)(ii)(D)	Flood plain requirements applicable if facility is located in 100-year flood plain.	NA	
	Plan and Schedule for Future Compliance	270.14(b)(11)(v)	Flood plain requirements applicable if facility is located in 100-year flood plain and not in compliance with 264.18(b).	Draft Permit	
B-4	Traffic Patterns	270.14(b)(10)	Show turns across traffic lanes and stacking lanes, if appropriate.	Attch 1	
	Estimate of Number and Types of Vehicles around the Facility	270.14(b)(10)		Attch 1	
	Traffic Control Signs and Signals	270.14(b)(10)		Attch 1	
	Road Surface Composition and Load-Bearing Capacity	270.14(b)(10)		Attch 1	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

Reviewer: ______________________

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION C. WASTE CHARACTERISTICS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
C-1	Chemical and Physical Analyses	270.14(b)(2); 264.13(a)	Data generated by testing the waste, published data on the waste, or data gathered from similar processes may be used.	Attch 3, 4 and 5	
C-1a	Containerized Waste	270.15(b)(1); 264.172	Demonstrate that waste is compatible with container construction materials.	NA	
C-1b	Waste in Tank Systems	270.16(a); 264.190(a); 264.191(b)(2); 264.192(a)(2)	Demonstrate that tank construction materials are compatible with waste stored in tank.	NA	
C-1c	Waste in Piles	270.18(a); 264.250(c)(1), (4)		NA	
C-1d	Landfilled Wastes	270.21(a) 264.13(c)(3); 264.314	Demonstrate that sorbent materials are non-biodegradable.	NA	
C-1e	Wastes Incinerated and Wastes used in Performance Tests	270.19(c); 270.62(b); 264.341		NA	
C-1f	Wastes to be Land Treated	270.20(b)(4); 264.271(a)(1), (2); 264.272; 264.276, Part 261 Appendix VIII	If food-chain crops will be grown in or on treatment zone, identify hazardous constituents reasonably expected to be in or derived from waste.	NA	
C-1g	Wastes in Miscellaneous Treatment Units	270.23(d)		NA	
C-1h	Wastes in Boilers and Industrial Furnaces	270.66(c); 266.102(b)		NA	
C-1i	Wastes on Drip Pads	270.26; 264.570		NA	

Reviewer: ____________________

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION C. WASTE CHARACTERISTICS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
C-2	Waste Analysis Plan	270.14(b)(3); 264.13(b),(c)		Attch 3 and 13	
C-2a	Parameters and Rationale	270.14(b)(3); 264.13(b)(1)		Attch 3	
C-2b	Test Methods	270.14(b)(3); 264.13(b)(2)		Attch 3	
C-2c	Sampling Methods	270.14(b)(3); 264.13(b)(3)	If a sampling method described in 261 Appendix I is not used, facility must provide detailed description of proposed method and demonstrate its equivalency.	Attch 3	
C-2d	Frequency of Analyses	270.14(b)(3); 264.13(b)(4)		Attch 3	
C-2e	Additional Requirements for Wastes Generated Off Site	270.14(b)(3); 264.13 (b)(5), (c); 264.73(b)	Describe statistical method used to determine a representative sample of incoming waste.	NA	
C-2f	Additional Requirements for Ignitable, Reactive, or Incompatible Wastes	270.14(b)(3); 264.13(b)(6); 264.17		Attch 3	
C-2g	Additional Requirements Pertaining to BIF Facilities	270.22; 266.102(e)(6)(ii)(C),(e)(6)(iii)		NA	
C-3	Waste Analysis Requirements Pertaining to Land Disposal Restrictions	270.14(b)(3); 264.13; 264.73; Part 268		Attch 3	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION C. WASTE CHARACTERISTICS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
C-3a	Waste Analysis	270.14(a); 264.13(a)(1); 268.1; 268.7; 268.9; 268.32 - 268.37; 268.41 - 268.43	Waste that was newly identified or newly listed as hazardous after 11/08/84 for which the U.S. Environmental Protection Agency has not promulgated land disposal prohibitions or treatment standards are not subject to land disposal provisions.	Attch 3	
C-3a(1)	Spent Solvent and Dioxin Wastes	270.14(a); 264.13(a)(1); 268.2(f)(1); 268.7; 268.30; 268.31		NA	
C-3a(2)	California List Wastes	270.14(a); 264.13(a)(1); 268.7; 268.32; 268.42(a); RCRA Section 3004(d)		NA	
C-3a(3)	Listed Wastes	270.14(a); 264.13(a)(1); 268.7; 268.33 - 268.36; 268.41 - 268.43	Arsenic-containing nonwastewater may use the extraction procedure (EP) toxicity test to determine compliance with treatment standards.	Attch 3	
C-3a(4)	Characteristic Wastes	270.14(a); 264.13(a)(1); 268.7, 268.9; 268.37; Part 268 Appendix I, IX	Characteristic D008 lead nonwastewater and D004 arsenic nonwastewater may use EP toxicity test to determine compliance with treatment standards.	Attch 3	
C-3a(5)	Radioactive Mixed Waste	270.14(a); 264.13(a); 268.7; 268.35(c),(d); 268.36(d); 268.42(d)	Hazardous debris containing radioactive waste must comply with treatment standards specified in 268.45.	NA	
C-3a(6)	Leachates	270.14(a); 264.13(a); 268.35(a)	Leachate that originates from newly identified waste is not coded as F039 waste, but is labeled with newly listed waste code from which it is derived.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS SECTION C. WASTE CHARACTERISTICS					
Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
C-3a(7)	Lab Packs	270.14(a); 264.13(a); 268.7(a)(7),(8); 268.42(c); Part 268 Appendix IV	Lab packs containing California list polychlorinated biphenyls (PCB) or dioxins must be treated according to special incineration requirements detailed in 268.42(a).	NA	
C-3a(8)	Contaminated Debris	270.13(n); 268.2(g); 268.7; 268.9; 268.36; 268.45		Attch 3	
C-3a(9)	Waste Mixtures and Wastes with Overlapping Requirements	270.14(a); 264.13(a)(1); 268.7; 268.9; 268.41; 268.43; 268.45(a)	Waste that carries more than one characteristic or listed waste code must be treated to the most stringent treatment requirement for each hazardous waste constituent of concern.	NA	
C-3a(10)	Dilution and Aggregation of Wastes	270.14(a); 268.3		NA	
C-3b	Notification, Certification, and Recordkeeping Requirements	270.14(a); 264.13; 264.73; 268.7; 268.9(d)		Attch 3, 13 and 15	
C-3b(1)	Retention of Generator Notices and Certifications	270.14(a); 264.13; 268.7(a)		Attch 3, 13 and 15	
C-3b(2)	Notification and Certification Requirements for Treatment Facilities	270.14(a); 264.13; 268.7(b)		Attch 3, 13 and 15	
C-3b(3)	Notification and Certification Requirements for Land Disposal Facilities	270.14(a); 264.13; 268.7(c)(1)		Attch 3, 13 and 15	
C-3b(4) C-3b(5)	Wastes Shipped to Subtitle C Facilities Wastes Shipped to Subtitle D Facilities	270.14(a); 264.13; 268.7(a),(b)(6) 270.14(a); 264.13; 268.7(d); 268.9(d)		Attch 3, 13 and 15	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION C. WASTE CHARACTERISTICS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
C-3b(6)	Recyclable Materials	270.14(a); 264.13; 268.7(b)(7)		NA	
C-3b(7)	Recordkeeping	270.14(a); 264.13; 264.73; 268.7(a)(5),(a)(6),(a)(7), (d)	Recycling facilities must keep records of name and location of each entity receiving hazardous waste-derived product.	Attch 3, 13 and 15	
C-3c	Requirement Pertaining to the Storage of Restricted Wastes	270.14(a); 264.73; 268.50		NA	
C-3c(1)	Restricted Wastes Stored in Containers	270.14(a); 264.73; 268.50(a)(2)(i)		NA	
C-3c(2)	Restricted Wastes Stored in Tanks	270.14(a); 264.73; 268.50(a)(2)(ii)		NA	
C-3c(3)	Storage of Liquid PCB Wastes	270.14(a); 264.73; 268.50(f)		NA	
C-3d	Exemptions, Extensions, and Variances to Land Disposal Restrictions			NA	
C-3d(1)	Case-by-Case Extensions to an Effective Date	270.14(b)(21); 268.5		NA	
C-3d(2)	Exemption from Prohibition	270.14(b)(21); 268.6		NA	
C-3d(3)	Variance from a Treatment Standard	270.14(a); 264.73; 268.7; 268.44		NA	
C-3d(4)	Requirements for Surface Impoundments Exempted from Land Disposal Restrictions	270.14(a); 264.13(b)(7); 268.4; 268.14		NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION C. WASTE CHARACTERISTICS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
C-3d(4)(a)	Exemption for Newly Identified or Listed Wastes	270.14(a); 264.13; 268.14	If owner/operator continues to treat newly listed or characteristic hazardous waste after 48 months from promulgation of new waste listing or characteristic, surface impoundment must be in compliance with 268.4.	NA	
C-3d(4)(b)	Treatment of Wastes	270.14(a); 264.13; 268.4(a)(1),(b)		Attch 6	
C-3d(4)(c)	Sampling and Testing	270.14(a); 264.13(b)(6); 268.4(a)(2)(i),(iv)		Attch 3	
C-3d(4)(d)	Annual Removal of Residues	270.14(a); 264.13(b)(7)(iii); 268.4(a)(2)(ii)		NA	
C-3d(4)(e)	Design Requirements	270.14(a); 264.13; 268.4(a)(3),(4)		Attch 2	

Notes:

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CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - CONTAINERS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-1	Containers	270.15; 264.170		NA	
D-la	Containers with Free Liquids	270.15; 264.175(a),(b)	Containers storing waste with free liquids must meet secondary containment requirements of 264.175(b).	NA	
D-1a(1)	Description of Containers	270.14(b)(1); 264.171,172	Specify numbers of containers, sizes, and specifications.	NA	
D-1a(2)	Container Management Practices	270.14(a); 264.173	Containers must be kept closed and must not be handled in any manner which could cause them to rupture or leak. Specify aisle space and stacking height.	NA	
D-1a(3)	Secondary Containment System Design and Operation	270.15(a)(1); 264.175(a),(d)	Provide detailed design and profile drawings showing container storage areas.	NA	
D-1a(3)(a)	Requirement for the Base or Liner to Contain Liquids	270.15; 264.175(b)(1)	Demonstrate that base is impervious to waste stored and precipitation.	NA	
D-1a(3)(b)	Containment System Drainage	270.15(a)(2); 264.175(b)(2)	Containment system must be designed and operated to remove liquids resulting from leaks, spills, or precipitation.	NA	
D-1a(3)(c)	Containment System Capacity	270.15(a)(3); 264.175(b)(3)	Containment system must have capacity to hold 10 percent of container volume or volume of the largest container, whichever is greater.	NA	
D-1a(3)(d)	Control of Runon	270.15(a)(4); 264.175(b)(4)	Runon from storm water must be prevented unless containment system has sufficient excess capacity.	NA	
D-1a(3)(e)	Removal of Liquids from Containment System	270.15(a)(5); 264.175(b)(5)	Accumulated liquids must be removed in timely manner to prevent containment system from overflowing.	NA	
D-1b	Containers without Free Liquids			NA	

Reviewer: ______

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - CONTAINERS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-1b(1)	Test for Free Liquids	270.15(b)(1)	Documentation that waste does not contain free liquids must be provided by test results or other information.	NA	
D-1b(2)	Description of Containers	270.14(a); 264.171; 264.172	Describe numbers, sizes, and specifications of containers.	NA	
D-1b(3)	Container Management Practices	270.14(a); 264.173	Same comment as D-1a(2).	NA	
D-1b(4)	Container Storage Area Drainage	270.15(b)(2); 264.175(c)	Same comment as D-1a(3)(b).	NA	

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CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS SECTION D. PROCESS INFORMATION - TANKS					
Section and Requirement		**Federal Regulation**	**Review Consideration[a]**	**Location in Application[b]**	**See Attached Comment Number[c]**
D-2	Tank Systems	270.16; 264.191 - 194		NA	
D-2a	Tank Systems Descriptions	270.14(b)(1)	Describe type (aboveground, underground) and specific location of each tank.	NA	
D-2a(1)	Dimensions and Capacity of each Tank	270.16(b)		NA	
D-2a(2)	Description of Feed Systems, Safety Cutoff, Bypass Systems, and Pressure Controls	270.16(c); 264.194(b)		NA	
D-2a(3)	Diagram of Piping, Instrumentation, and Process Flow	270.16(d)		NA	
D-2a(4)	Ignitable, Reactive, and Incompatible Wastes	270.16(j); 264.17(b); 264.198,199	Demonstrate that waste is stored or treated in a way that protects against ignition or reaction.	NA	
D-2b	Existing Tank Systems			NA	
D-2b(1)	Assessment of Existing Tank System's Integrity	270.16(a); 264.191	A written tank assessment must be certified by an independent, qualified, registered professional engineer.	NA	
D-2c	New Tank System			NA	
D-2c(1)	Assessment of New Tank System's Integrity	270.16(a),(e); 264.192(a)	A written tank assessment must be certified by an independent, qualified, registered professional engineer.	NA	
D-2c(2)	Description of Tank System Installation and Testing Plans and Procedures	270.16(f); 264.192(b) - (e)	A new tank installation must be inspected by an independent, qualified, installation inspector or registered professional engineer.	NA	
D-2d	Containment and Detection of Releases	270.16(g); 264.193	Leak detection system must be capable of detecting leaks within 24 hours.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - TANKS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-2d(1)	Plans and Description of the Design, Construction, and Operation of the Secondary Containment System	270.16(g); 264.193(b) - (f)		NA	
D-2d(1)(a)	Tank Age Determination	270.16(g); 264.193(a)	Age of each tank must be accurately determined to ascertain when secondary containment requirements apply.	NA	
D-2d(1)(b)	Requirements for Secondary Containment and Leak Detection	270.16(g); 264.193(b),(c); 264.1101(b)(3)(iii)	A detailed description of the construction, installation, and operation of the secondary containment system is required.	NA	
D-2d(1)(c)	Requirements for External Liner, Vault, Double-walled Tank or Equivalent Device	270.16(g); 264.193(d),(e)	Secondary containment must consist of liner, vault, double-walled tank, or equivalent device approved by regional administrator.	NA	
D-2d(1)(d)	Secondary Containment and Leak Detection Requirements for Ancillary Equipment	270.16(g); 264.193(f)	Secondary containment is required for ancillary equipment except as provided in 264.193(f).	NA	
D-2d(1)(e)	Containment Buildings Used as Secondary Containment for Tank Systems	270.16(g); 264.1101(b)(3)(iii)	A containment building can serve as secondary containment for a tank system provided it meets requirements of 264.193(b),(c)(1&2),(d)(1).	NA	
D-2d(2)	Requirements for Tank Systems until Secondary Containment is Implemented	270.16(h); 264.193(i)	Annual leak tests are required until secondary containment is provided.	NA	
D-2d(3)	Variance from Secondary Containment Requirements	270.16(h); 264.193(g)		NA	
D-2d(3)(a)	Variance Based on a Demonstration of Equivalent Protection of Groundwater and Surface Water	270.16(h)(1); 264.193(g)(1),(h)	Detailed plans and engineering and hydrogeologic reports are required to demonstrate equivalent protection of groundwater and surface water.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - TANKS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-2d(3)(b)	Variance Based on a Demonstration of No Substantial Present or Potential Hazard	270.16(h)(2); 264.193(g)(2),(h)	Provide detailed assessment of substantial present or potential hazards posed to human health or the environment, should a release enter the environment.	NA	
D-2d(3)(c)	Exemption Based on No Free Liquids and Location Inside a Building	270.16(h); 264.190(a)	Demonstrate that tanks used to treat or store hazardous waste contain no free liquid as defined by Paint Filter Test (SW-846 Method 9095).	NA	
D-2e	Controls and Practices to Prevent Spills and Overflows	270.16(i); 264.194(a),(b); 264.195	Provide detailed description of controls and practices used to prevent spills and overflows.	NA	

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CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - WASTE PILES

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-3	Waste Piles	270.18; 264.250 - 259		NA	
D-3a	List of Wastes	270.18(a)	List all hazardous waste to be placed in waste piles.	NA	
D-3b	Liner Exemption	270.18(b)		NA	
D-3b(1)	Enclosed Dry Piles	270.18(b); 264.250(c)	Demonstrate that neither runoff, nor leachate is generated from the pile.	NA	
D-3b(1)(a)	Protection from Precipitation	270.18(b); 264.250(c)	Demonstrate that pile is inside or under structure that provides complete protection from precipitation.	NA	
D-3b(1)(b)	Free Liquids	270.18(b); 264.250(c)(1)	Demonstrate that neither liquids, nor materials containing free liquids are placed in the pile.	NA	
D-3b(1)(c)	Runon Protection	270.18(b); 264.250(c)(2)	Demonstrate that pile is protected from surface water runon.	NA	
D-3b(1)(d)	Wind Dispersal Control	270.18(b); 264.250(c)(3)	Demonstrate that pile design and operation controls wind dispersal of waste.	NA	
D-3b(1)(e)	Leachate Generation	270.18(b); 264.250(c)(4)	Demonstrate that pile will not generate leachate through decomposition or other reactions.	NA	
D-3b(2)	Exemption for Monofills	270.18(b); 264.251(e)	This exemption applies only to waste generated from foundry furnace emission controls or metal casting molding sand that are not hazardous waste for reasons other than toxicity characteristics.	NA	
D-3b(3)	Alternate Design/No Migration	270.18(c)(1); 264.251(b)	This exemption from liner requirements is based on documenting that design, operating practices, and local aspects will prevent migration of hazardous constituents into groundwater or surface water in the future.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - WASTE PILES

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-3b(4)	Exemption Based on Alternative Design and Location	270.18(c)(1); 264.251(d)	Document that alternative design and operating practices, together with location characteristics, will prevent migration of any hazardous constituent into groundwater or surface water at least as effectively as a double liner with leachate detection system, and will allow detection of hazardous constituents through the top liner as least as effectively.	NA	
D-3b(5)	Exemption for Replacement Waste Piles	270.18(c); 264.251(f)	Demonstrate (1) that existing unit was constructed in compliance with design standards of Sections 3004(o)(1)(A)(i) and 3004(o)(5) of Resource Conservation and Recovery Act, and (2) there is no reason to believe that liner is not functioning as designed.	NA	
D-3c	Liner System	270.18(c)(1); 264.251(a)(1)(i),(c)	Describe liner system and demonstrate that flow of liquids through liner will be prevented.	NA	
D-3c(1)	Liner Description	270.18(c)(1); 264.251(a)(1)(i),(c)	Describe and draw liner system to demonstrate that any flow of liquids through the liner will be prevented.	NA	
D-3c(1)(a)	Synthetic Liners	270.18(c)(1); 264.251(a)(1),(c)(1)	Describe type, thickness, material, and brand name and manufacturer of liner.	NA	
D-3c(1)(b)	Soil Liner	270.18(c)(1); 264.251(a),(c)(1)(i)(B)	Describe bottom composite liner including its classification, thickness, and hydraulic conductivity.	NA	
D-3c(2)	Liner Location Relative to High Water Table	270.18(c)(1); 264.251(a)(1)(i)	Provide data showing seasonal fluctuations in depth to water table and the location of seasonal high water table in relation to liner system.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - WASTE PILES

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-3c(3)	Calculation of Required Soil Liner Thickness	270.18(c)(1); 264.251(a)(1)(i)	Calculations using either numerical simulation techniques (unsaturated flow conditions) or Darcy Law-derived transit time equations (saturated flow conditions) must be provided.	NA	
D-3c(4)	Liner Strength Requirements	270.18(c)(1); 264.251(a)(1)(i)	Provide calculations showing minimum strength requirements for liners considering pressure gradients, installation and operating stresses, and climatic change stresses.	NA	
D-3c(5)	Liner Strength Demonstration	270.18(c)(1); 264.251(a)(1)(i)	Demonstrate that liner exceeds minimum strength requirements.	NA	
D-3c(6)	Liner/Waste Compatibility Testing Results	270.18(c)(1); 264.251(a)(1)(i)	Demonstrate that liner material is compatible with both waste and leachate.	NA	
D-3c(7)	Liner Installation	270.18(c)(1); 264.251(a)(1)(i)	Describe procedures for installing liner.	NA	
D-3c(7)(a)	Synthetic Liner Seaming	270.18(c)(1); 264.251(a)(1)(i)	Describe techniques to be used to bond membrane liner seams and the strength and chemical compatibility of seams with waste and leachate.	NA	
D-3c(7)(b)	Soil Liner Compaction	270.18(c)(1); 264.251(a)(1)(i)	Describe procedures for installing soil liner and compacting liner to achieve desired permeability. Include maximum height of lifts to be placed.	NA	
D-3c(7)(c)	Installation Inspection/testing Programs	270.18(c)(1); 264.254(a)	Describe quality assurance/quality control procedures to be used during liner installation.	NA	
D-3c(8)	Liner Coverage	270.18(c)(1); 264.251(a)(1)(iii)	Demonstrate that liner will be installed to cover all surrounding earth likely to be in contact with waste or leachate.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - WASTE PILES

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-3c(9)	Liner Exposure Prevention	270.18(c)(1); 264.251(a)(1)(i)	Demonstrate that either the liner is protected from, or is resistant to, exposure to climatic conditions.	NA	
D-3c(10)	Synthetic Liner Bedding	270.18(c)(1); 264.251(a)(1)(i)	Demonstrate that sufficient bedding will be provided above and below liner to prevent rupture during installation and operation.	NA	
D-3d	Liner Foundation Report			NA	
D-3d(1)	Liner Foundation Design Description	270.18(c)(1); 264.251(a)(1)(ii)	Describe liner foundation design and materials of construction and ability to withstand expected static and dynamic loadings.	NA	
D-3d(2)	Subsurface Exploration Data	270.18(c)(1); 264.251(a)(1)(ii)	Verify engineering characteristics of foundation materials through subsurface exploration.	NA	
D-3d(3)	Laboratory Testing Data	270.18(c)(1); 264.251(a)(1)(ii)		NA	
D-3d(4)	Engineering Analyses	270.18(c)(1); 264.251(a)(1)(ii)		NA	
D-3d(4)(a)	Settlement Potential	270.18(c)(1); 264.251(a)(1)(ii)		NA	
D-3d(4)(b)	Bearing Capacity and Stability	270.18(c)(1); 264.251(a)(1)(ii)		NA	
D-3d(4)(c)	Potential for Bottom Heave or Blow-Out	270.18(c)(1); 264.251(a)(1)(ii)		NA	
D-3d(4)(d)	Construction and Operational Loading	270.18(c)(1); 264.251(a)(1)(ii)		NA	
D-3d(5)	Foundation Installation Procedures	270.18(c)(1); 264.251(a)(1)(ii)		NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - WASTE PILES

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-3d(6)	Foundation Installation Inspection Program	270.18(c)(1); 264.251(a)(1)(ii)	Describe quality assurance/quality control procedures to be used during foundation installation.	NA	
D-3e	Leachate Collection and Removal System	270.18(c); 264.251(a)(2),(c)(2)	Describe design and operation of system to collect and remove leachate from new portions of existing waste piles and from new waste piles.	NA	
D-3e(1)	Upper Leachate Collection and Removal System	270.18(c)(1); 264.251(a)(2),(c)(2)	Describe design and operating conditions to ensure that leachate depth over the liner does not exceed 1 foot.	NA	
D-3e(2)	Leachate Detection System	270.18(c)(1); 264.251(a)(2),(c)(3)	Describe design and operating features of leachate detection system.	NA	
D-3e(2)(a)	Grading and Drainage	270.18(c)(1); 264.251(a)(2); 264.221(c)(2)(ii)	Demonstrate that leak detection system design meets or exceeds specifications described in referenced regulations.	NA	
D-3e(3)	Chemical Resistance	270.18(c); 264.251(a)(2)(i)(A)(c)(3); 264.251(c)(3)	Demonstrate that all leachate collection and removal system components are chemically resistant to waste managed in the pile and the leachate expected to be generated.	NA	
D-3e(4)	Strength of Materials	270.18(c); 264.251(a)(2)(i)(B); 264.251(c)(3)	Demonstrate that system components are of sufficient strength and thickness to prevent collapse under expected static and dynamic loadings.	NA	
D-3e(5)	Prevention of Clogging	270.18(c); 264.251(a)(2)(ii); 264.251(c)(3)	Demonstrate that leachate collection and removal system's design and operation will prevent clogging throughout active life and post-closure period of waste pile.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - WASTE PILES

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-3e(6)	Installation	270.18(c); 264.251(a)(2)	Describe installation methods and construction quality assurance/quality control procedures.	NA	
D-3e(7)	Maintenance	270.18(c); 264.251(a)(2)	Describe anticipated maintenance activities that will be used to assure proper leachate management system operation throughout pile's expected active life.	NA	
D-3e(8)	Liquid Removal	270.18(c); 264.251(c)(3)	Describe leachate removal system, including sumps and other equipment, and fate of the collected leachate.	NA	
D-3e(9)	Location Relative to Water Table	270.18(c); 264.251(c)(4)	Demonstrate that operation of leak detection system will not be adversely affected by presence of groundwater.	NA	
D-3f	Action Leakage Rate	270.18(c)(1)(v); 264.252	Action leakage rate must be approved by regional administrator based on system design.	NA	
D-3f(1)	Determination of Action Leakage Rate	270.18(c)(1)(v); 264.252(a)	Determine action leakage rate for waste pile units subject to 264.251(c),(d). Include adequate safety margin to allow for uncertainties in design, construction, operation, and location of leak detection system, waste and leachate characteristics, sources of other liquids in system, and proposed response actions.	NA	
D-3f(2)	Monitoring of Leakage	270.18(c)(1)(v); 264.252(b)	Weekly leachate flow rate data must be converted to average daily flow rate.	NA	
D-3g	Leakage Response Action Plan	270.18(c)(1)(v); 264.253		NA	
D-3g(1)	Response Action	270.18(c)(1)(v); 264.253(a)	Provide response action plan to describe actions to be taken if flow rate into leak detection system exceeds action leakage rate.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - WASTE PILES

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-3g(2)	Leak and/or Remedial Determinations	270.18(c)(1)(v); 264.253(b),(c)	Response action plan must describe actions to be taken to comply with 264.223(b),(c) if the action leakage rate is exceeded.	NA	
D-3g(3)	Notifications	270.18(c)(1)(v); 264.253(b)	Response action plan must indicate that regional administrator will be (1) notified in writing within 7 days of determining that action leakage rate has been exceeded, (2) provided with preliminary assessment and action plan within 14 days of initial determination that action leakage rate has been exceeded, and (3) provided with status report within 30 days after original notification that action leakage rate has been exceeded. Regional administrator must receive monthly status reports for as long as flow rate exceeds action leakage rate.	NA	
D-3h	Runon Control System	270.18(c)(2); 264.251(g)	Describe system that will be used to prevent runon into active portions of piles.	NA	
D-3h(1)	Calculation of Peak Flow	270.18(c)(2); 264.251(g)	Identify peak surface water flow expected to result from 25-year design storm. Describe data sources and methods used to make peak flow calculation.	NA	
D-3h(2)	Design and Performance	270.18(c)(2); 264.251(g)	Demonstrate that runon control system design will prevent runon from reaching active portions of unit.	NA	
D-3h(3)	Construction	270.18(c)(2); 264.251(g)	Describe runon control system construction methods and any construction quality assurance/quality control procedures.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - WASTE PILES

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-3h(4)	Maintenance	270.18(c)(2); 264.251(g)	Describe any maintenance activities required to assure continued proper runon system operation throughout unit's active life.	NA	
D-3i	Runoff Control System	270.18(c)(3); 264.251(h)	Describe the runoff control system to be used to collect and control runoff from active portions.	NA	
D-3i(1)	Calculation of Peak Flow	270.18(c)(3); 264.251(h)	Identify the total runoff volume expected to result from a 24-hour, 25-year storm, and include data sources and methods used to make peak flow calculation.	NA	
D-3i(2)	Design and Performance	270.18(c)(3); 264.251(h)	Demonstrate that system has sufficient capacity to collect and hold total runoff volume calculated in D-3i(1).	NA	
D-3i(3)	Construction	270.18(c)(3); 264.251(h)	Describe runoff system construction methods and any construction quality assurance/quality control procedures.	NA	
D-3i(4)	Maintenance	270.18(c)(3); 264.251(h)	Describe any maintenance activities required to assure continued proper runoff system operation throughout unit's active life.	NA	
D-3j	Management of Collection and Holding Units	270.18(c)(4); 264.251(i)	Describe how collection and holding facilities will be managed to maintain system design capacity.	NA	
D-3k	Control of Wind Dispersal	270.18(c)(5); 264.251(j)	Describe how pile is covered or otherwise managed to control wind dispersal.	NA	
D-3l	Groundwater Monitoring Exemption	270.18(b); 264.90(b)(2)	To receive exemption from groundwater monitoring requirements of Subpart F, conditions specified in D-3l(1) through D-3l(7) must be met.	NA	

Reviewer: ____________________

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - WASTE PILES

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-3l(1)	Engineered Structure	270.18(b); 264.90(b)(2)(i)	Provide design data showing that unit is engineered structure.	NA	
D-3l(2)	No Liquid Wastes	270.18(b); 264.90(b)(2)(ii)	Describe procedures for ensuring that no liquid waste or waste containing free liquids will be received by, or contained in, unit.	NA	
D-3l(3)	Exclusion of Liquids	270.18(b); 264.90(b)(2)(iii)	Demonstrate how liquids, precipitation, and other runon and runoff will be excluded from unit.	NA	
D-3l(4)	Containment System	270.18(b); 264.90(b)(2)(iv)	Describe containment system (both inner and outer layers) that will enclose waste.	NA	
D-3l(5)	Leak Detection System	270.18(b); 264.90(b)(2)(v)	Describe design and operating data demonstrating leak detection system built into each containment layer.	NA	
D-3l(6)	Operation of Leak Detection System	270.18(b); 264.90(b)(2)(vi)	Demonstrate means for ensuring continuing operation and maintenance of leak detection systems during active life of unit and closure and post-closure care periods.	NA	
D-3(7)	No Migration	270.18(b); 264.90(b)(2)(vii)	Demonstrate to reasonable degree of certainty that unit will not allow hazardous constituents to migrate beyond outer layer of containment system prior to end of post-closure care period.	NA	
D-3m	Treatment Within the Pile	270.18(e)	If any treatment is conducted in pile, provide descriptions specified in D-3m(1) through D-3m(3).	NA	
D-3m(1)	Treatment Process Description	270.18(e)	Describe the process by which wastes are treated and the effect of the treatment on the wastes.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - WASTE PILES

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-3m(2)	Equipment Used	270.18(e)	Describe any equipment or other materials required to initiate or promote treatment.	NA	
D-3m(3)	Residuals Description	270.18(e)	Describe nature and quantity of waste remaining in pile after treatment is complete.	NA	
D-3n	Special Waste Management Plan for Piles Containing Wastes F020, F021, F022, F023, F026, and F027	270.18(i); 264.259	If waste pile is not enclosed, provide plan describing how pile will be designed, constructed, operated, and maintained in order to protect human health and environment.	NA	
D-3n(1)	Waste Description	270.18(i)(1); 264.259(a)(1)	Identify volume, physical, and chemical characteristics of waste, including potential to migrate through soil or volatilize or escape into atmosphere.	NA	
D-3n(2)	Soil Description	270.18(i)(2); 264.259(a)(2)	Describe attenuative properties of underlying and surrounding soils or other materials.	NA	
D-3n(3)	Mobilizing Properties	270.18(i)(3); 264.259(a)(3)	Describe mobilizing properties of other materials codisposed of with this waste.	NA	
D-3n(4)	Additional Management Techniques	270.18(i)(4); 264.259(a)(4)	Document effectiveness of additional treatment, design, operating, or monitoring techniques.	NA	
D-3o	Construction Quality Assurance Program	270.18(c)(iv); 264.19	Provide written construction quality assurance program to comply with regulations found in 264.19.	NA	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - SURFACE IMPOUNDMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-4	Surface Impoundments			NA	
D-4a	List of Wastes	270.17(a)	Provide list of all hazardous waste placed, or to be placed, in surface impoundments.	NA	
D-4b	Liner System Exemption Requests	270.17(b)		NA	
D-4b(1)	Exemption Based on Existing Portion	270.17(b)(1); 264.221(c)	Existing portions of surface impoundments with waste in place on November 8, 1994, and having only vertical expansion are exempted from liner system requirements. New units, lateral expansion of existing units, and replacement units at existing facilities are not exempt. Provide plan indicating limits of existing portions.	NA	
D-4b(2)	Exemption Based on Alternative Design and Location	270.17(b)(1); 264.221(d)		NA	
D-4b(3)	Exemption for Replacement Surface Impoundments	270.17(b); 264.221(f)		NA	
D-4c	Liner System, General Items	270.17(b)(1)	Provides discussion of the following items that apply to liner system as a whole.	NA	
D-4c(1)	Liner System Description	270.17(b)(1)	Provide detailed description of liner system, demonstrating that any flow of liquids into and through liners will be prevented. The liner system includes liner foundation, bottom composite liner, leachate detection system, top synthetic liner, and any protective layer placed to protect top synthetic liner.	NA	
D-4c(2)	Liner System Location Relative to High Water Table	270.17(b)(1), (3); 264.221(a)	Provide geological cross sections showing groundwater levels with seasonal fluctuations and liner foundation elevations.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - SURFACE IMPOUNDMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-4c(3)	Load on Liner System	270.17(b)(1); 264.221(a)(1),(b)	Provide results of calculations defining maximum loads or stresses that will be placed on liner system.	NA	
D-4c(4)	Liner System Coverage	270.17(b)(1); 264.221(a)(1), (b)	Demonstrate that liner system will be installed to cover all surrounding earth likely to be in contact with waste or leachate.	NA	
D-4c(5)	Liner System Exposure Prevention	270.17(b)(1); 264.221(a)(1), (b)	Demonstrate that liner system will not be exposed to elements, or that if exposed, exposure will not result in unacceptable degradation of system.	NA	
D-4d	Liner System Foundation			NA	
D-4d(1)	Foundation Description	270.17(b)(1); 264.221(a)(2)	Describe foundation for liner system, including materials, and indicate bearing elevations and any load-bearing embankments placed to support liner system.	NA	
D-4d(2)	Subsurface Exploration Data	270.17(b)(1); 264.221(a)(2)	The engineering characteristics of liner system foundation materials should be verified through subsurface explorations. Provide information to fully describe these efforts.	NA	
D-4d(3)	Laboratory Testing Data	270.17(b)(1); 264.221(a)(2)	Provide index testing results to classify site materials and lab test data to evaluate engineering properties of foundation materials. Provide references to standard test procedures.	NA	
D-4d(4)	Engineering Analyses	270.17(b)(1); 264.221(a)(2)	Provide engineering analyses based on subsurface exploration and laboratory testing data. Include discussion of methods used, assumptions, copies of calculations, and appropriate references.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - SURFACE IMPOUNDMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-4d(4)(a)	Settlement Potential	270.17(b)(1); 264.221(a)(2)	Provide estimates of total and differential settlement of liner system foundation.	NA	
D-4d(4)(b)	Bearing Capacity	270.17(b)(1); 264.221(a)(2)	Provide analysis of allowable bearing capacity of liner system foundation.	NA	
D-4d(4)(c)	Potential for Excess Hydrostatic or Gas Pressure	270.17(b)(1); 264.221(a)(2)	Provide estimates of potential or bottom heave or blow-out of liner system or line foundation due to unequal hydrostatic or gas pressures.	NA	
D-4e	Liner System, Liners			NA	
D-4e(1)	Synthetic Liners	270.17(b)(1); 264.221(a),(c)	For each synthetic liner in system or under consideration, provide the following general information: thickness; type; material; brand name; and manufacturer.	NA	
D-4e(1)(a)	Synthetic Liner Compatibility Data	270.17(b)(1); 264.221(a)(1)	Provide summary and discussion of test results and conclusions as to suitability of synthetic liner based on liner/waste compatibility testing.	NA	
D-4e(1)(b)	Synthetic Liner Strength	270.17(b)(1); 264.221(a)(1)	Provide data showing that synthetic liners, including seams, have sufficient strength after exposure to waste and waste leachate.	NA	
D-4e(1)(c)	Synthetic Liner Bedding	270.17(b)(1); 264.221(a)(2)	Demonstrate that sufficient bedding will be provided above and below the synthetic liners to prevent rupture during installation and operation. Synthetic membrane of bottom composite liner should be placed directly on soil portion.	NA	
D-4e(2)	Soil Liners	270.17(b)(1); 264.221(a); (c)(1)	Describe soil portion of bottom composite liner, including classification, thickness, hydraulic conductivity, and material specifications.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - SURFACE IMPOUNDMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-4e(2)(a)	Material Testing Data	270.17(b)(1); 264.221(c)	Provide complete results for index tests, laboratory and/or in situ permeability tests, strength tests, consolidation tests, and shrink-swell properties of soil liner material. Discuss potential for dispersion and piping of soil due to flow of liquid through soil liner layer.	NA	
D-4e(2)(b)	Soil Liner Compatibility Data	270.17(b)(1); 264.221(a)(1)	Provide complete results of permeability testing of soil liner material using representative of leachate from surface impoundment.	NA	
D-4e(2)(c)	Soil Liner Strength	270.17(b)(1); 264.221(a)(1)	Demonstrate that soil liner has sufficient strength to support loads/stresses computed in item D-4c(3).	NA	
D-4f	Liner System, Leachate Detection System	270.17(b)(1); 264.221(c)(2)		NA	
D-4f(1)	Systems Operation and Design	270.17(b)(1); 264.221(c)(2),(4)	Describe design features of leachate detection system and how system will function to detect any leakage through either liner in timely manner.	NA	
D-4f(2)	Drainage Material	270.17(b)(1); 264.221(c)(2)(ii)	Describe leachate detection system drainage material.	NA	
D-4f(3)	Grading and Drainage	270.17(b)(1); 264.221(c)(2)	Indicate slopes of leachate detection system and provide contour plan for system along with plan showing layout and spacing of piping system and any sumps, pumps, etc. Demonstrate that leak detection system is appropriately graded to assure that leakage at any point in liner system is detected in timely manner.	NA	
D-4f(4)	System Compatibility	270.17(b)(1); 264.221(c)(2)(iii)		NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - SURFACE IMPOUNDMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-4f(5)	System Strength			NA	
D-4f(5)(a)	Stability of Drainage Layers	270.17(b)(1); 264.221(c)(2)(iii)	Demonstrate that drainage layer of leachate detection system has sufficient soil-bearing capacity to support loads. Provide calculations showing that drainage layer placed on sloped surfaces of surface impoundment or foundations will be stable during construction.	NA	
D-4f(5)(b)	Strength of Piping	270.17(b)(1); 264.221(c)(2)(iii)	Demonstrate that pipes used in piping systems have sufficient strength to support loads as computed in item D-4c(3).	NA	
D-4f(6)	Prevention of Clogging	270.17(b)(1); 264.221(c)(2)(iv)		NA	
D-4f(7)	Liquid Removal	270.17(b)(1); 264.221(c)(2)(v), (c)(3)	Indicate fate of collected leachate, which is considered hazardous waste.	NA	
D-4f(8)	Location Relative to Water Table	270.17(b)(3); 264.221(c)(4)		NA	
D-4g	Liner System, Construction and Maintenance			NA	
D-4g(1)	Material Specifications	270.17(b)(1); 264.221(a)		NA	
D-4g(1)(a)	Synthetic Liners	270.17(b)(1); 264.221(a)	Provide detailed material specifications for specific synthetic liner(s) to be used.	NA	
D-4g(1)(b)	Soil Liners	270.17(b)(1); 264.221(a)	For soil liners constructed of borrowed material, provide specifications; for soil liners using in-place soil, provide specifications to be used to assure that all existing materials meet requirements of liner design.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - SURFACE IMPOUNDMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-4g(1)(c)	Leachate Detection System	270.17(b)(1); 264.221(a)	Provide material specifications for drainage layer material, filter fabric or filter layer, piping, and sumps.	NA	
D-4g(2)	Construction Specifications			NA	
D-4g(2)(a)	Liner System Foundation	270.17(b)(1); 264.221(a)	For installed foundations, provide construction specifications of foundation installation procedures. For units that use the in-place material for liner system foundation, provide construction specifications for preparation.	NA	
D-4g(2)(b)	Soil Liner	270.17(b)(1); 264.221(a),(a)(2)	Describe procedures for installing soil liner.	NA	
D-4g(2)(c)	Synthetic Liners	270.17(b)(1); 264.221(a); 264.226(a)(1)	Provide construction specifications for placement of synthetic liners.	NA	
D-4g(2)(d)	Leachate Detection System	270.17(b)(1); 264.221(a)	Provide construction specifications for placement of leachate detection system components, including drainage layers, piping, filter layers, sumps, pumps, etc.	NA	
D-4g(3)	Construction Quality Assurance (CQA) Program	270.17(b)(1),(4); 270.30(k)(2); 264.19; 264.226(a)	Provide complete details of CQA program to be used during construction of liner system to assure that it is built as designed.	NA	
D-4g(4)	Maintenance Procedures for Leachate Detection System	270.17(b)(1); 264.221(a)	Describe anticipated maintenance activities that will be used to assure proper operation of leachate detection systems throughout surface impoundment's expected life.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - SURFACE IMPOUNDMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-4g(5)	Liner Repairs During Operations	270.17(b)(1); 264.221(a)	Describe methods that will be used to repair any damage to liner that occurs while surface impoundment is in operation (such as a drag line ripping the liner during cleaning operations).	NA	
D-4h	Action Leakage Rate	270.17(b)(5); 264.222		NA	
D-4h(1)	Determination of Action Leakage Rate	270.17(b)(5); 264.222(a)	Identify action leakage rate for surface impoundment units subject to liner system provisions of 264.221(c) and 264.221(d).	NA	
D-4h(2)	Monitoring of Leakage	270.17(b)(5); 264.222(b)		NA	
D-4i	Leakage Response Action Plan	270.17(b)(5); 264.223		NA	
D-4i(1)	Response Action	270.17(b)(5); 264.223(a)		NA	
D-4i(2)	Leak and/or Remedial Determinations	270.17(b)(5); 264.223(b),(c)		NA	
D-4i(3)	Notifications	270.17(b)(5); 264.223(b)		NA	
D-4j	Prevention of Overtopping	270.17(b)(6); 264.221(g)	Describe design and/or operating procedures that will protect against impoundment overtopping/overflow.	NA	
D-4j(1)	Design Features	270.17(b)(6); 264.221(g)	Describe design features used to prevent overtopping, such as spillways or weirs for flow-through systems, automatic or manual controls, and sensors and alarms.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - SURFACE IMPOUNDMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-4j(2)	Operating Procedure	270.17(b)(6); 264.221(g)	If operating procedures are instrumental to preventing overtopping, describe those procedures.	NA	
D-4j(3)	Overtopping Prevention	270.17(b)(6); 264.221(g)	Unless foolproof controls are used to prevent overtopping, provide results of calculations showing that adequate freeboard will be available following 100-year, 24-hour storm event.	NA	
D-4j(4)	Freeboard Requirements	270.17(b); 264.221(g)	Freeboard requirements associated with normal and extreme wind activity should be determined unless automatic controls are used and freeboard equals or exceeds 2 feet.	NA	
D-4j(5)	Outflow Destination	270.17(b); 264.221(g)	Describe fate of liquids released through flow control devices. Identify location to which waste would be moved in event of emergency.	NA	
D-4k	Dike Stability			NA	
D-4k(1)	Engineer's Certification	270.17(d); 264.226(c)		NA	
D-4k(2)	Dike Design Description	270.17(b)(7); 264.221(h)	Provide data and/or drawings specifying design layout of the dikes and their components, including materials of construction. Determine capability of dikes to withstand failure from expected static and dynamic loadings and effects of erosion.	NA	
D-4k(3)	Erosion and Piping Protection	270.17(b); 264.221(h)	Demonstrate that dikes are designed and constructed to minimize erosion and piping, and to prevent failure due to excessive erosion. Describe procedures for correcting erosion problems identified during unit's operating life.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - SURFACE IMPOUNDMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-4k(4)	Subsurface Soil Conditions	270.17(b)(7); 264.221(h)	Engineering characteristics of dike foundation materials should be verified through testing and subsurface explorations, as necessary. These explorations may include: test borings; test pits or trenches; in situ tests; and geophysical exploration methods.	NA	
D-4k(5)	Stability Analysis	270.17(b); 264.221(h)	Describe stability analyses and results for the following conditions, as appropriate: foundation soil bearing failure of settlement; failure in dike slopes; failure of impoundment cut slopes; build-up of hydrostatic pressure due to failure of drainage system, dike cover, and liner; and rapid drawdown.	NA	
D-4k(6)	Strength and Compressibility Test Results	270.17(b); 264.221(h)	Provide results of strength and consolidation tests on dike materials together with description of sampling procedures and test methods.	NA	
D-4k(7)	Dike Construction Procedures	270.17(b); 264.221(h)	Describe methods to be used to construct dikes at new units.	NA	
D-4k(8)	Dike Construction Inspection Program	270.17(b); 264.221(h)	Describe inspection, monitoring, sampling and testing methods, and frequencies to be used during dike construction to assure that new dikes meet design requirements.	NA	
D-4l	Special Waste Management Plan for Surface Impoundments Containing Wastes F020, F021, F022, F023, F026, and F027	270.17(i); 264.231(a)		NA	

Notes:
[a] Considerations in addition to the requirements presented in the regulations.

Reviewer: ____________________

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - INCINERATORS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-5	Incinerators	270.19; 264.340 - 264.351		NA	
D-5a	Justification for Exemption	270.19(a)	To justify exemption under 264.340(b) or (c), document the following: (1) waste contains no, or insignificant, concentrations of Part 261, Appendix VIII materials; and (2) waste is considered hazardous solely because it is (a) ignitable and/or corrosive, or (b) reactive.	NA	
D-5b	Trial Burn	270.19(b)		NA	
D-5b(1)	Trial Burn Plan	270.19(b)	Submit trial burn plan or results of trial burn, including all required determinations.	NA	
D-5b(1)(a)	Detailed Engineering Description of Incinerator	270.62(b)(2)(ii)	Provide information per regulatory citation. Also, include process and instrumentation diagram.	NA	
D-5b(1)(b)	Sampling and Monitoring Procedures	270.62(b)(2)(iii)	Describe sampling and monitoring procedures during trial burn per regulatory citation. Sampling and analysis methods approved by the U.S. Environmental Protection Agency (EPA) must be used or, alternatively, a demonstration of equivalence with EPA-approved methods must be made.	NA	
D-5b(1)(c)	Trial Burn Schedule	270.62(b)(2)(iv)		NA	
D-5b(1)(d)	Test Protocols	270.62(b)(2)(v)		NA	
D-5b(1)(e)	Pollution Control Equipment Operation	270.62(b)(2)(vi)		NA	
D-5b(1)(f)	Shutdown Procedures	270.62(b)(2)(vii)		NA	
D-5c	Data Submitted in Lieu of Trial Burn	270.19(c)	Provide information per regulatory citation in lieu of trial burn plan.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - INCINERATORS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-5c(1)	Detailed Engineering Description of Incinerator	270.19(c)(2)	Provide information per regulatory citation. Also, include process and instrumentation diagram.	NA	
D-5c(2)	Expected Incinerator Operation	270.19(c)(6)		NA	
D-5c(3)	Design and Operating Conditions	270.19(c)(4)		NA	
D-5c(4)	Previous Trial Burn Results	270.19(c)(5)	Describe results from all previously conducted, approved trial burns.	NA	
D-5d	Determinations	270.62(b)(7)		NA	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.
[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.
[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - LANDFILLS

Section and	Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-6	Landfills	270.21; 264.300 - 264.317		NA	
D-6a	List of Wastes	270.21(a)		NA	
D-6b(1)	Exemption Based on Existing Portion	270.21(b)(1); 264.301(a)	Existing portions of landfills that have waste in place on November 8, 1984, and will have only vertical expansion are exempted from liner system requirements. Provide plan showing limits of existing portion.	NA	
D-6b(2)	Exemption Based on Alternative Design and Location	270.21(b)(1); 264.301(d)		NA	
D-6b(3)	Exemption for Replacement Landfill Unit	270.21(b)(1); 264.301(f)		NA	
D-6b(4)	Exemption for Monofills	270.21(b)(1); 264.301(e)		NA	
D-6b(5)	Groundwater Monitoring Exemption	270.21(c); 264.90(b)(2)	If exemption from Subpart F groundwater monitoring requirements is sought, provide data demonstrating that the following conditions are met.	NA	
D-6b(5)(a)	Engineered Structure	270.21(c); 264.90(b)(2)(i)	Provide design data showing that unit for which exemption is sought is an engineered structure.	NA	
D-6b(5)(b)	No Liquid Waste	270.21(c); 264.90(b)(2)(ii)	Describe procedures for ensuring that no liquid waste or waste containing free liquids will be received by, or contained, in the unit.	NA	
D-6b(5)(c)	Exclusion of Liquids	270.21(c); 264.90(b)(2)(iii)	Provide design and operating data demonstrating how liquids, precipitation, and other runon and runoff will be excluded from the unit.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - LANDFILLS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-6b(5)(d)	Containment System	270.21(c); 264.90(b)(2)(iv)	Describe containment system (both inner and outer layers) that will enclose waste.	NA	
D-6b(5)(e)	Leak Detection System	270.21(c); 264.90(b)(2)(v)	Describe design and operating data demonstrating leak detection system built into each containment layer.	NA	
D-6b(5)(f)	Operation of Leak Detection System	270.21(c); 264.90(b)(2)(vi)	Demonstrate means for ensuring continuing operation and maintenance of leak detection systems during active life of unit and closure and post-closure care periods.	NA	
D-6b(5)(g)	No Migration	270.21(c); 264.90(b)(2)(vii)	Demonstrate that unit will not allow hazardous constituents to migrate beyond outer layer of containment system prior to end of post-closure care period.	NA	
D-6c	Liner System, General Items	270.21(b)(1); 264.301(a),(c)	Discuss the items that apply to liner system as a whole.	NA	
D-6c(1)	Liner System Description	270.21(b)(1); 264.301(a),(c)	Provide detailed description of liner system, demonstrating that any flow of liquids into and through liners will be prevented. Liner system includes liner foundation, bottom composite liner, leachate detection system, top synthetic liner, and any protective layer placed to protect leachate collection system from damage.	NA	
D-6c(2)	Liner System Location Relative to High Water Table	270.21(b)(1); 264.301(a)(1)(i)	Provide geological cross sections showing groundwater levels with seasonal fluctuations and liner foundation elevations.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - LANDFILLS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-6c(3)	Loads on Liner System	270.21(b)(1); 264.301(a)(1)(i)	Provide results of calculations defining maximum loads or stresses that will be placed on liner system considering: C both static and dynamic loads C stresses due to installation or construction C stresses resulting from operating equipment C stresses due to maximum quantity of waste, cover, and proposed post-closure land use C stresses resulting from settlement, subsidence, or uplift C internal and external pressure gradients.	NA	
D-6c(4)	Liner System Coverage	270.21(b)(1); 264.301(a)(1)(iii)		NA	
D-6c(5)	Liner System Exposure Prevention	270.21(b)(1); 264.301(a)(1)(i)	Demonstrate that the liner system will not be exposed to wind or sunlight or, if exposure to any part of the system is to be permitted, that such exposure will not result in unacceptable degradation of that portion of the system.	NA	
D-6d	Liner System, Foundation			NA	
D-6d(1)	Foundation Description	270.21(b)(1); 264.301(a)(1)(ii)	Describe foundation for liner system, including foundation materials and indicate bearing elevations on geological and construction drawings. Indicate any load-bearing embankments placed to support liner system.	NA	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-6d(2)	Subsurface Exploration Data	270.21(b)(1); 264.301(a)(1)(ii)	Verify engineering characteristics of liner system foundation materials through subsurface explorations. Provide information to fully describe these efforts.	NA	
D-6d(3)	Laboratory Testing Data	270.21(b)(1); 264.301(a)(1)(ii)	Provide index testing results to classify site materials and lab test data to evaluate engineering properties of foundation materials. Provide references to standard test procedures.	NA	
D-6d(4)	Engineering Analyses	270.21(b)(1); 264.301(a)(1)(ii)	Provide engineering analyses based on subsurface exploration and laboratory testing data. Include discussion of methods used, assumptions, copies of calculations, and appropriate references.	NA	
D-6d(4)(a)	Settlement Potential	270.21(b)(1); 264.301(a)(1)(ii)	Provide estimates of total and differential settlement of liner system foundation. Consider stresses imposed by liner system and applicable stresses computed in item D-6c(3).	NA	
D-6d(4)(b)	Bearing Capacity	270.21(b)(1); 264.301(a)(1)(ii)	Provide analysis of allowable bearing capacity of liner system foundation.	NA	
D-6d(4)(c)	Stability of Landfill Slopes	270.21(b)(1); 264.301(a)(1)(ii)	Provide, as appropriate, analyses of stability of: C excavated slopes for units constructed below grade C embankment slopes for units constructed with earthen dikes or berms C landfill slopes consisting of liner system or cover system placed on waste.	NA	
D-6d(4)(d)	Potential for Excess Hydrostatic or Gas Pressure	270.21(b)(1); 264.301(a)(1)(ii)	Provide estimates of potential for bottom heave or blow-out of liner system due to unequal hydrostatic or gas pressures.	NA	
D-6e	Liner System, Liners			NA	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-6e(1)	Synthetic Liners	270.21(b)(1); 264.301(a)(1)(ii),(c)	For each synthetic liner in system or under consideration, provide following general information: thickness; type; material; brand name; and manufacturer.	NA	
D-6e(1)(a)	Synthetic Liner Compatibility Data	270.21(b)(1); 264.301(a)(1)(i)	Provide summary and discuss test results and conclusions as to suitability of synthetic liner based on liner/waste compatibility testing.	NA	
D-6e(1)(b)	Synthetic Liner Strength	270.21(b)(1); 264.301(a)(1)(i)	Provide data showing that synthetic liners, including seams, have sufficient strength after exposure to waste and waste leachate.	NA	
D-6e(1)(c)	Synthetic Liner Bedding	270.21(b)(1); 264.301(a)(1)(ii)	Demonstrate that sufficient bedding will be provided above and below synthetic liners to prevent rupture during installation and operation. Synthetic membrane of bottom composite liner should be placed directly on soil portion.	NA	
D-6e(2)	Soil Liners	270.21(b)(1); 264.301(a),(c)	Provide description of soil portion of bottom composite liner, including its classification, thickness, hydraulic conductivity, and material specifications.	NA	
D-6e(2)(a)	Material Testing Data	270.21(b)(1); 264.301(c)	Provide complete results for index tests, laboratory and/or in situ permeability tests, strength tests, consolidation tests, and shrink-swell properties of soil liner material. Discuss potential for dispersion and piping of soil due to flow of liquid through soil liner layer.	NA	
D-6e(2)(b)	Soil Liner Compatibility Data	270.21(b)(1); 264.301(a)(1)(i); 264.301(c)(3)(iii)	Provide complete test results of permeability testing of soil liner material using representative of leachate from surface impoundment.	NA	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-6e(2)(c)	Soil Liner Strength	270.21(b)(1); 264.301(a)(1)(i); 264.301(c)(3)(iii)	Demonstrate that soil liner has sufficient strength to support loads/stresses computed in item D-4c(3).	NA	
D-6f	Liner System, Leachate Collection/Detection Systems	270.21(b)(1); 264.301(a)(2); 264.301(c)(2),(3)		NA	
D-6f(1)	System Operation and Design	270.21(b)(1); 264.301(a)(2); 264.301(c)(2),(3)	Describe design features of leachate detection system and how system will function to detect any leakage through either liner in timely manner.	NA	
D-6f(2)	Drainage Material	270.21(b)(1); 264.301(a)(2),(c)(3)(ii)	Describe leachate detection system drainage material.	NA	
D-6f(3)	Grading and Drainage	270.21(b)(1); 264.301(a)(2),(c)(2), (3)	Indicate slopes of leachate detection system and provide contour plan for system along with plan showing layout and spacing of piping system and any sumps, pumps, etc. Demonstrate that leak detection system is appropriately graded to assure that leakage at any point in liner system is detected in timely manner.	NA	
D-6f(4)	Maximum Leachate Head	270.21(b)(1); 264.301(a)(2),(c)(2)		NA	
D-6f(5)	Systems Compatibility	270.21(b)(1); 264.301(a)(2)(i)(A), (c)(3)(iii)		NA	
D-6f(6)	Systems Strength	270.21(b)(1); 264.301(a)(2)(i)(B), (c)(3)(iii)		NA	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-6f(6)(a)	Stability of Drainage Layers	270.21(b)(1); 264.301(a)(2)(i)(B), (c)(3)(iii)		NA	
D-6f(6)(b)	Strength of Piping	270.21(b)(1); 264.301(a)(2)(i)(B), (c)(3)(iii)	Demonstrate that pipe used in piping systems have sufficient strength to support loads as computed in item D-6c(3).	NA	
D-6f(7)	Prevention of Clogging	270.21(b)(1); 264.301(a)(2)(ii), (c)(3)(iv)		NA	
D-6f(8)	Liquid Removal	270.21(b)(1); 264.301(c)(3)(v),(4)		NA	
D-6f(9)	Location Relative to Water Table	270.21(b)(1)(iii); 264.301(c)(5)		NA	
D-6g	Liner System, Construction and Maintenance			NA	
D-6g(1)	Material Specifications			NA	
D-6g(1)(a)	Synthetic Liners	270.21(b)(1); 264.301(a)(1)	Provide detailed material specifications for specific synthetic liner or liners to be used.	NA	
D-6g(1)(b)	Soil Liners	270.21(b)(1); 264.301(a)(1)	For soil liners constructed of borrowed material, provide specifications. For soil liners using in-place soil, provide specifications to be used to assure that all existing materials meet requirements of liner design.	NA	
D-6g(1)(c)	Leachate Collection/Detection Systems	270.21(b)(1); 264.301(a),(c)	Provide material specifications for drainage layer material, filter fabric or filter layer, piping, and sumps.	NA	
D-6g(2)	Construction Specifications			NA	

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Section and	Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-6g(2)(a)	Liner System Foundation	270.21(b)(1); 264.301(a)(1); 264.303(a)	Provide construction specifications of foundation installation procedures. For units that use in-place material for liner system foundation, provide construction specifications for preparation of foundation.	NA	
D-6g(2)(b)	Soil Liner	270.21(b)(1); 264.301(a)(1); 264.303(a)(2)	Describe procedures for installing soil liner.		
D-6g(2)(c)	Synthetic Liners	270.21(b)(1); 264.301(a)(1); 264.303(a)(1)	Provide construction specifications for placement of synthetic liners.	NA	
D-6g(2)(d)	Leachate Collection/Detection Systems	270.31(b)(1); 264.301(a),(c)	Provide construction specifications for placement of all components of leachate collection/detection systems.		
D-6g(3)	Certified Quality Auditor (CQA) Program	270.21(b)(1); 270.30(k)(2); 264.19; 264.303(a)	Provide complete details of CQA program to be used during construction of liner system to assure that it is built as designed.	NA	
D-6g(4)	Maintenance Procedures for Leachate Collection/Detection Systems	270.21(b)(1); 264.301(a),(c)	Describe anticipated maintenance activities that will be used to assure proper operation of leachate collection/detection systems throughout landfill's expected life.	NA	
D-6g(5)	Liner Repairs During Operations	270.21(b)(1); 264.301(a)	Describe methods that will be used to repair any damage to liner that occurs while landfill is in operation during placement of waste (such as a dozer ripping the liner).	NA	
D-6h	Action Leakage Rate	270.21(b)(1)(v); 264.302		NA	
D-6h(1)	Determination of the Action Leakage Rate	270.21(b)(1)(v); 264.302(a)		NA	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-6h(2)	Monitoring the Leakage	270.21(b)(1)(v); 264.302(b)	To determine if action leakage rate has been exceeded, owner/operator must convert required leachate flow rate monitoring data to average daily flow rate for each sump. This average daily flow rate must be calculated weekly during active life of facility and closure period, and monthly during post-closure care period.	NA	
D-6i	Leakage Response Action Plan	270.21(b)(1)(v); 264.304		NA	
D-6i(1)	Response Actions	270.21(b)(1)(v); 264.304(a)		NA	
D-6i(2)	Leak and/or Remedial Determinations	270.21(b)(1)(v); 264.304(b),(c)		NA	
D-6i(3)	Notifications	270.21(b)(1)(v); 264.304(b)		NA	
D-6j	Runon and Runoff Control Systems			NA	
D-6j(1)	Runon Control System	270.21(b)(2); 264.301(g)	Describe system that will be used to prevent runon onto active portions of landfills.	NA	
D-6j(1)(a)	Design and Performance	270.21(b)(2); 264.301(g)	Describe runon control system design and how that design prevents runon from reaching active portions of site. Provide plan view.	NA	
D-6j(1)(b)	Calculation of Peak Flow	270.21(b)(1); 264.301(g)	Identify peak surface water flow expected to result from 2-year design storm. Provide copies of calculations and data.	NA	
D-6j(2)	Runoff Control System	270.21(b)(3); 264.301(h)	Describe runoff control system to be used to collect and control runoff from active portions.	NA	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-6j(2)(a)	Design and Performance	270.21(b)(3); 264.301(h)	Describe runoff collection and control system design. Indicate fate of collected runoff that is considered hazardous waste until tested and/or treated.	NA	
D-6j(2)(b)	Calculation of Peak Flow	270.21(b)(3); 264.301(h)	Identify total runoff volume expected to result from at least a 24-hour, 25-year storm event. Provide copies of calculations and data.	NA	
D-6j(3)	Management of Collection and Holding Units	270.21(b)(4); 264.301(i)	Describe how collection and holding facilities associated with runon and runoff control systems will be emptied or otherwise managed expeditiously after storms to maintain system design capacity. Describe fate of liquids discharged from these systems.	NA	
D-6j(4)	Construction	270.21(b)(2),(3); 264.301(g),(h)	Provide detailed construction and material specifications for runon and runoff control systems.	NA	
D-6j(5)	Maintenance	270.21(b)(2),(3); 264.301(g),(h)	Describe any maintenance activities required to assure continued proper operations of runon and runoff control systems throughout active life of unit.	NA	
D-6k	Control of Wind Dispersal	270.21(b)(5); 264.301(j)		NA	
D-6L	Liquids in Landfills			NA	
D-6L(1)	Bulk or Noncontainerized Free Liquids	270.21(h); 264.314	Describe procedures that will be used to ensure that no bulk or noncontainerized liquid hazardous waste or waste with free liquids will be placed in landfill. Demonstrate, by paint filter test, Method 9095, that no free liquids will be placed in landfill.	NA	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-6L(2)	Containers Holding Free Liquids	270.21(h); 264.314(d)	For facilities that intend to dispose of containers holding free liquids, describe how free liquids will be removed from containers or stabilized within container before container is placed in landfill. If liquid is removed, container must be backfilled or crushed.	NA	
D-6L(3)	Restriction to Small Containers	270.21(h); 264.314(d)(2)	If small containers are to be disposed of in landfill, demonstrate by indicating container volume, that containers will be very small (such as ampules).	NA	
D-6L(4)	Nonstorage Containers	270.21(h); 264.314(d)(3)	If nonstorage containers are to be disposed of in landfill, demonstrate by describing the containers designed to hold free liquids for use other than storage (e.g., batteries, capacitors).	NA	
D-6L(5)	Lab Packs	270.21(h); 264.314(d)(4)	Describe how it will be assured that lab packs to be landfilled containing free liquids meet requirements for lab packs.	NA	
D-6L(5)(a)	Inside Containers	270.21(h); 264.314(d)(4); 264.316(a)		NA	
D-6L(5)(b)	Overpack	270.21(h); 264.314(d)(4); 264.316(b)	Demonstrate that overpacking consists of metal, Department of Transportation (DOT) containers, metal DOT containers, with open heads no larger than 110 gallons; and sufficient sorbent material determined to be non-biodegradable to completely sorb all liquid contents of inside container.	NA	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-6L(5)(c)	Sorbent Material	270.21(h); 264.314(d)(4),(e) 264.316	Demonstrate that sorbent materials used are no capable of reacting dangerously with, being decomposed by, or being ignited by contents of inside containers.	NA	
D-6L(5)(d)	Incompatible Wastes	270.21(h); 264.314(d)(4); 264.316(d)	Demonstrate that incompatible waste will not be placed in same outside containers.	NA	
D-6L(5)(e)	Reactive Wastes	270.21(h); 264.314(d)(4); 264.316(d)	Demonstrate that incompatible waste will not be placed in same outside containers.	NA	
D-6m	Containerized Wastes	270.21(i); 264.315		NA	
D-6n	Special Waste Management Plan for Landfills Containing Wastes F020, F021, F022, F023, F026, and F027	270.21(j); 264.317	Provide plan for waste management in this special facility. Plan must address the following factors.	NA	
D-6n(1)	Waste Descriptions	270.21(j)(1); 264.317(a)(1)	Identify volume, physical, and chemical characteristics of waste, including potential to migrate through soil or volatilize or escape into atmosphere.	NA	
D-6n(2)	Soil Description	270.21(j)(2); 264.317(a)(2)	Describe attenuative properties of underlying and surrounding soils or other materials.	NA	
D-6n(3)	Mobilizing Properties	270.21(j)(2); 264.317(a)(2)	Describe mobilizing properties of other materials codisposed of with this waste.	NA	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-7	Land Treatment	270.20; 264.270 - 264.283		NA	
D-7a	Treatment Demonstration	270.20(a); 264.272		NA	
D-7a(1)	Demonstration Wastes	270.20(a)(1); 264.272(a),(c)(1)(i)	Describe waste used in demonstration and waste to be treated during normal operation. Identify concentrations of all hazardous constituents reasonably expected to be present in both wastes.	NA	
D-7a(2)	Demonstration Data Sources	270.20(a)(2); 264.272(b)	Describe source of data used for treatment demonstration and provide available determinations.	NA	
D-7a(2)(a)	Existing Literature	270.20(a)(2); 264.272(b)	If existing literature is used to demonstrate treatment, submit brief written review of scientific literature and previous studies that contain pertinent information. Information sources should be properly referenced. In general, existing literature will not be acceptable as demonstration unless it can be shown that site and waste characteristics are identical to those in literature.	NA	
D-7a(2)(b)	Operating Data	270.20(a)(2); 264.272(b)	Provide any operating data gathered from units to be permitted, including application rate data and operating records.	NA	
D-7a(3)	Laboratory/Field Testing Programs	270.20(a)(3); 264.272(b),(c)	Field and laboratory tests to be used for demonstration must be thoroughly described. Include interpretive discussions as appropriate.	NA	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-7a(3)(a)	Toxicity Testing	270.20(a)(2); 264.272(b)	Describe acute toxicity test procedures used to estimate impact of waste application or waste constituents on soil biota responsible for waste treatment.	NA	
D-7a(3)(b)	Field Plot Testing	270.20(a)(2),(3); 264.272(b),(c)	Describe field plot studies used to demonstrate treatability of waste(s) or waste constituents.	NA	
D-7a(3)(c)	Laboratory Testing	270.20(b)(2),(3); 264.272(b),(c)	Describe laboratory test methods used to demonstrate treatability of waste(s) or waste constituents.	NA	
D-7b	Land Treatment Program	270.20(b); 264.271	Describe characteristics and operating conditions of land treatment unit(s) to be permitted.	NA	
D-7b(1)	List of Wastes	270.20(b)(1); 264.271(b)		NA	
D-7b(2)	Operating Procedures	270.20(b)(2); 264.273(a)	Describe operating procedures used to assure uniform and complete degradation, transformation, and immobilization.	NA	
D-7b(2)(a)	Waste Application Rates	270.20(b)(2)(i); 264.273(a)(1)	Identify rate and frequency of waste application and concentration of limiting constituents in waste.	NA	
D-7b(2)(b)	Waste Application Methods	270.20(b)(2)(i); 264.273(a)(1)	Describe method(s) used to apply and incorporate waste into treatment zone.	NA	
D-7b(2)(c)	Control of Soil pH	270.20(b)(2)(ii); 264.273(a)(2)	Identify acceptable limits of soil pH and describe rationale for those limits. Describe how soil pH will be measured and adjusted, including a schedule for the same.	NA	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-7b(2)(d)	Enhancement of Microbial or Chemical Reactions	270.20(b)(2)(iii); 264.273(a)(3)	Describe measures used to enhance treatment, including method and frequency of such measures (e.g., fertilization, microbial inoculations, soil aeration).	NA	
D-7b(2)(e)	Control of Soil Moisture	270.20(b)(2)(iv); 264.273(a)(4)	Identify limits on soil moisture content. Describe how soil moisture will be monitored and adjusted, if necessary.	NA	
D-7c	Unsaturated Zone Monitoring Plan	270.20(b)(3); 264.278	Submit unsaturated zone monitoring plan describing measures used to determine if hazardous wastes have migrated from treatment zone.	NA	
D-7c(1)	Soil-Pore Liquid Monitoring	270.20(b)(3); 264.278	Describe program for sampling and analysis of soil-pore liquid to detect migration of dissolved constituents below treatment zone.	NA	
D-7c(1)(a)	Sampling Location	270.20(b)(3)(ii); 264.278(b), (d)	Identify sampling locations and indicate that samples will be collected immediately below treatment zone.	NA	
D-7c(1)(b)	Sampling Frequency	270.20(b)(3)(i); 264.278(e)	Provide schedule for sampling soil-pore liquid.	NA	
D-7c(1)(c)	Sampling Equipment	270.20(b)(3)(i); 264.278(e)	Identify equipment used to obtain soil-pore liquid samples.	NA	
D-7c(1)(d)	Sampling Equipment Installation	270.20(b)(3)(i); 264.278(e)	Describe procedures used to install soil-pore liquid monitoring devices.	NA	
D-7c(1)(e)	Sampling Procedures	270.20(b)(3)(i); 264.278(e)(1),(2)		NA	
D-7c(1)(f)	Analytical Procedures	270.20(b)(3)(iii); 264.278(e)(3)	Identify analytical procedures used to determine concentration of hazardous constituents in soil-pore liquid samples.	NA	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-7c(1)(g)	Chain of Custody	270.20(b)(3)(iv); 264.278(e)(4)		NA	
D-7c(1)(h)	Background Values	270.20(b)(3)(v); 264.278(c)	Describe sampling and analytical program used to establish background soil-pore liquid concentrations of hazardous constituents. Provide background data, if available.	NA	
D-7c(1)(i)	Statistical Methods	270.20(b)(3)(vi); 264.278(f)	Describe statistical methods that will be used to determine differences between background and treatment zone concentrations of hazardous constituents.	NA	
D-7c(1)(j)	Justification of Principle Hazardous Constituents	270.20(b)(3)(vii); 264.278(a)(2)	Provide suggested list of 261 Appendix VIII hazardous constituents to be monitored for in soil-pore liquids.	NA	
D-7c(2)	Soil Core Monitoring	270.20(b)(3); 264.278	Describe program for monitoring soil cores to detect migration of hazardous constituents below treatment zone.	NA	
D-7c(2)(a)	Sampling Location	270.20(b)(3)(ii); 264.278(b),(d)	Identify sampling locations and indicate that soil cores will be collected immediately below treatment zone.	NA	
D-7c(2)(b)	Sampling Frequency	270.20(b)(3)(i); 264.278(e)	Provide schedule for sampling soil.	NA	
D-7c(2)(c)	Sampling Equipment	270.20(b)(3)(i); 264.278(e)	Identify equipment used to sample soil cores.	NA	
D-7c(2)(d)	Sampling Procedures	270.20(b)(3)(i); 264.278(e)(1),(2)		NA	
D-7c(2)(e)	Analytical Procedures	270.20(b)(3)(iii); 264.278(e)(3)	Identify analytical methods used to determine concentration of hazardous constituents in soil core samples.	NA	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-7c(2)(f)	Chain of Custody	270.20(b)(3)(iv); 264.278(e)(4)		NA	
D-7c(2)(g)	Background Values	270.20(b)(3)(v); 264.278(c)	Describe sampling and analytical program used to establish background soil core concentrations of hazardous constituents. Provide background data, if available.	NA	
D-7c(2)(h)	Statistical Methods	270.20(b)(3)(vi); 264.278(f)	Describe statistical methods that will be used to determine differences between background and treatment zone concentrations of hazardous constituents.	NA	
D-7c(2)(i)	Justification of Principal Hazardous Constituents	270.20(b)(3)(vii); 264.278(a)(2)	Provide suggested list of 261 Appendix VIII hazardous constituents to be monitored for in soil core samples.	NA	
D-7d	Treatment Zone Description	270.20(b)(5); 264.271(c)	Identify dimensions of treatment zone.	NA	
D-7d(1)	Horizontal and Vertical Dimensions	270.20(b)(5); 264.271(c)		NA	
D-7d(2)	Soil Survey	270.20(b)(2); 264.272(c)(1)(iv)	Provide map or plat plan delineating horizontal boundaries of treatment zone and all soil series occurring within treatment zone.	NA	
D-7d(3)	Soil Series Descriptions	270.20(b)(2); 264.272(c)(1)(iv)	Submit description of each soil series identified within treatment zone.	NA	
D-7d(4)	Soil Sampling Data	270.20(b)(2); 264.272(1)(iv)		NA	
D-7d(5)	Seasonal High Water Table	270.20(b); 264.271(c)(2)	Identify depth to seasonal high water table and source of that data.	NA	

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SECTION D. PROCESS INFORMATION - LAND TREATMENT

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-7e	Unit Design, Construction, Operation, and Maintenance	270.20(c); 264.273	Describe design, construction, operation, and maintenance of runon, runoff, and wind dispersal controls.	NA	
D-7e(1)	Runon Control	270.20(c)(1); 264.273(c)	Submit scale drawing of unit showing any runon controls used.	NA	
D-7e(2)	Runoff Control	270.20(c)(1); 264.273(c)	Describe runoff collection and control system.	NA	
D-7e(3)	Minimizing Hazardous Constituent Runoff	270.20(c)(3); 264.273(b)		NA	
D-7e(4)	Management of Accumulated Runon and Runoff	270.20(c)(4); 264.273(e)	Describe fate of collected surface water, including sampling and analysis protocols for determining contaminant levels.	NA	
D-7e(5)	Control of Wind Dispersal	270.20(c)(6); 264.273(f)		NA	
D-7f	Food-Chain Crops	270.20(d); 264.276	Demonstrate that there is no substantial risk to human health or environment caused by growth of food-chain crops on unit.	NA	
D-7f(1)	Food-Chain Crop Demonstration	270.20(d); 264.276(a)(1)		NA	
D-7f(1)(a)	Demonstration Basis	270.20(d)(1),(2); 264.276(a)(3)(i)	Show that demonstration results will be representative of unit to be permitted.	NA	
D-7f(1)(b)	Test Procedures	270.20(d)(3); 264.276(a)(3)(ii)	Describe procedures used in any tests referenced or conducted.	NA	
D-7f(2)	Cadmium-Bearing Wastes	270.20(e); 264.276(b)		NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - LAND TREATMENT

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-7f(2)(a)	Crops for Human Consumption	270.20(e); 264.276(b)(1)	If crops are to be grown for human consumption, provide: soil pH; soil pH controls; cadmium-loading rate; and soil cation exchange capacity.	NA	
D-7f(2)(b)	Animal Feed	270.20(e); 264.276(b)(2)	If only animal feed is to be grown, provide soil pH and soil pH controls. Provide copy of operating plan demonstrating how animal feed will be distributed to preclude ingestion by humans, including control of alternative land use.	NA	
D-7g	Special Waste Management Plan for Land Treatment Units Containing Wastes F020, F021, F022, F023, F026, and F027	270.20(i); 264.283	Provide plan describing how land treatment units containing referenced waste are, or will be, designed, constructed, operated, and maintained to protect human health and environment.	NA	
D-7g(1)	Waste Description	270.20(i)(1); 264.283(a)(1)		NA	
D-7g(2)	Soil Description	270.20(i)(2); 264.283(a)(2)		NA	
D-7g(3)	Mobilizing Properties	270.20(i)(3); 264.283(a)(3)		NA	
D-7g(4)	Additional Management Techniques	270.20(i)(4); 264.283(a)(4)		NA	
D-7h	Incompatible Wastes	270.20(h); 264.282	Indicate that incompatible waste will not be placed in, or on, the same treatment zone.	NA	

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CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - MISCELLANEOUS TREATMENT

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-8	Miscellaneous Units	270.23; 264.601	Identify all miscellaneous units that treat, store, or dispose of hazardous waste at facility, but do not fit current definition of container, tank, surface impoundment, etc. These units may include: C geologic repositories C deactivated missile silos C thermal treatment units other than incinerators, boilers, or industrial furnaces C units open burning and open detonating explosive waste C certain chemical/physical/biological treatment units.	Attch 2	
D-8a	Description of Miscellaneous Units	270.23(a)		Attch 2	
D-8b	Waste Characterization	270.23; 264.601(a)(1), (b)(1),(c)(1)	Provide information on volume and concentration of waste in order to determine release potential.	Attch 2	
D-8c	Treatment Effectiveness	270.23(d)		Attch 2	
D-8d	Environmental Performance Standards for Miscellaneous Units		Environmental performance standards must be established and maintained to protect human health and environment.	Attch 2	
D-8d(1)	Protection of Groundwater and Subsurface Environment	270.23(b),(c); 264.601(a)		Attch 1, 2 and 7	
D-8d(1)(a)	Environmental Assessment	270.23(b),(c); 264.601(a)	Applicant must conduct assessment of potential for releases to groundwater or the subsurface environment. Both saturated and unsaturated zones must be considered in evaluating potential for subsurface migration.	Attch 1, 2 and 7	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - MISCELLANEOUS TREATMENT

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-8d(1)(b)	Performance Standards	270.23(b); 264.601	Based on assessments, performance standards must be developed and maintained.	Attch 7	
D-8d(2)	Protection of Surface Water, Wetlands, and Soil Surfaces	270.23(b),(c); 264.601(b)		Attch 1 and 2	
D-8d(2)(a)	Environmental Assessment	270.23(b),(c); 264.601(b)	Applicant must conduct assessment of potential for releases to surface water, wetlands, or soil surface.	Attch 1 and 2	
D-8d(2)(b)	Performance Standards	270.23; 264.601	Based on assessments, performance standards must be developed and maintained.	Attch 1 and 2	
D-8d(3)	Protection of the Atmosphere	270.23(b),(c); 264.601		Attch 2I	
D-8d(3)(a)	Environmental Assessment	270.23(b),(c); 264.601(c)	Applicant must conduct assessment of potential for release to air.	Attch 2I	
D-8d(3)(b)	Performance Standards	270.23; 264.601	Based on assessments, performance standards must be developed and maintained.	Attch 2I	
D-8e	Monitoring, Analysis, Inspection, Response, Reporting, and Corrective Action	270.23(a); 264.602		Attch 3 and 7	
D-8e(1)	Elements of a Monitoring Program	270.23(a); 264.602	Monitoring program must include procedures for sampling, analysis, and evaluation of data, suitable response procedures, and a regular inspection schedule.	Attch 3 and 7	
D-8e(2)	Air Monitoring Alternatives	270.23(a); 264.602	For situations in which ambient air monitoring would be unsafe or impractical, possible alternatives may include analysis of waste, emissions measurements, and periodic monitoring with portable detectors.	NA	

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CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - BOILERS/INDUSTRIAL FURNACES

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-9	Boilers and Industrial Furnaces (BIF)			NA	
D-9a	Waivers/Exemptions	270.22(a)(2)(i); 266.104(a)(4); 266.110	If applying for waiver or exemption, provide information demonstrating compliance with requirements outlined in this section.	NA	
D-9a(1)	Waiver of Destruction and Removal Efficiency (DRE) Trial Burn for Boilers	270.22(a)(2)(i); 266.104(a)(4); 266.110		NA	
D-9a(2)	Low Risk Waste Exemption	270.22(a)(2)(ii); 266.104(a)(5); 266.109(a)	The DRE standard for a BIF may be waived provided certain criteria listed in regulatory citation are met and documented.	NA	
D-9a(3)	Waiver of Particulate Matter Standard	270.22(a)(4); 266.109(b)	The particulate matter standard of 266.105 and trial burn for particulate matter may be waived if: the BIF complies with Tier I or Adjusted Tier I metals feed rate screening limits under 266.106(b) or (e) and submits documentation showing conformance with trial burn waiver under checklist Section D-9a(4) below; and BIF meets requirements of low risk waste exemption under checklist Section D-9a(2) above.	NA	
D-9a(4)	Waiver of Trial Burn for Metals	270.22(a)(3); 266.106(b),(e)		NA	
D-9a(5)	Waiver of Trial Burn for Hydrogen Chloride (HCl)/Cl_2	270.22(a)(5); 266.107(b),(e)		NA	
D-9b	Pretrial Burn Requirements for New BIFs	270.66(b)(1); 266.102(d)(4)(i); 266.102(e)	Time required to bring new BIF to point of operational readiness for trial burn must be minimum necessary and cannot exceed 720 hours, or up to 1,440 hours if applicant shows good cause for requiring an extension.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - BOILERS/INDUSTRIAL FURNACES

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-9b(1)	Pretrial Burn Requirements for New BIFs - Organic Emission Standards	270.66(b)(1)(i); 266.102(e)(2); 266.104(d),(e)		NA	
D-9b(2)	Pretrial Burn Requirements for New BIFs - Particle Matter Emissions Standards	270.66(b)(1)(i); 266.105		NA	
D-9b(3)	Pretrial Burn Requirements for New BIFs - Metal Emissions Standards	270.66(b)(1)(i); 266.102(e)(4)(i), (ii); 266.106		NA	
D-9b(4)	Pretrial Burn Requirements for New BIFs - Alternative Metals Approach	270.66(b); 266.102(e)(4)(iii); 266.106(f)	For conformance with alternative metals approach, description of operating conditions must: describe approach that will be used to comply; specify how approach ensures compliance with metals emissions standards of 266.106(c) and (d); specify how approach can be effectively implemented and monitored; and provide such other information as necessary to ensure that the standards of 266.106(c) or (d) are met.	NA	
D-9b(5)	Pretrial Burn Requirements for New BIFs - Hydrogen Chloride/Chlorine Emission Standards	270.66(b)(1)(i); 266.102(e)(5)(i); 266.107		NA	
D-9b(6)	Pretrial Burn Requirements for New BIFs - Fugitive Emissions	270.66(b)(1)(i); 266.102(e)(7)(i)	Description of operating conditions must thoroughly describe method by which fugitive emissions will be controlled.	NA	
D-9b(7)	Pretrial Burn Requirements for New BIFs - Automatic Waste Feed Cutoff	270.66(b)(1)(i); 266.102(e)(7)(ii), (iii)		NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - BOILERS/INDUSTRIAL FURNACES

Section and	Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-9b(8)	Pretrial Burn Requirements for New BIFs - Monitoring Requirements	270.66(b)(1)(i); 266.102(e)(8),(10)		NA	
D-9c	Trial Burn Plan Requirements for All BIFs	270.66(b)(2),(c), (e); 266.102(d)(4)(ii)		NA	
D-9d	Trial Burn Results	270.22(a)(6); 270.66(d),(f)	Results of trial burn, as specified in regulatory citation, must be submitted within 90 days of completing trial burn. The submittal must be certified on behalf of applicant by signature of a person authorized to sign a permit application or a report under 270.11.	NA	
D-9e	Post-Trial Burn Requirements for New BIFs	270.66(b)(3)(ii); 266.102(d)(4)(iii),(e)	Post-trial burn requirements for new BIFs are the same as pretrial burn requirements for new BIFs with the following exceptions: • No documentation of total burn hours is required; no limit to length of time for burning. • Must submit statement identifying conditions necessary to operate in compliance. • Must submit statement specifying that BIF will stop burning when changes in combustion properties or feed rates or BIF design or operating conditions deviate from approved post-trial burn period.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - BOILERS/INDUSTRIAL FURNACES

Section and Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-9f Data in Lieu of Trial Burn	270.22(a)(6); 270.66(c)(3)	A BIF may seek exemption from trial burn requirements by submitting information provided by previous compliance testing of same device, or from compliance testing or trial or operational burns of similar BIFs burning similar hazardous waste under similar conditions.	NA	
D-9g Alternative Hydrocarbons (HC) Limit for Industrial Furnaces with Organic Matter in Raw Materials	270.22(b); 266.104(f)		NA	
D-9h Alternative Metals Implementation Approach	270.22(c); 266.106(f)	For conformance with an alternative metals implementation approach, the information must: C Describe approach that will be used to comply. C Specify how approach ensures compliance with the metals emissions standards of 266.106(c) and (d). C Specify how approach can be effectively implemented and monitored. C Provide such other information as necessary to ensure that standards are met.	NA	
D-9i Monitoring Requirements	270.22; 266.102(e)(6),(8)	Various parameters must be continuously monitored per 266.102(e)(6) while burning hazardous waste. Data must be maintained in operating record until closure of facility.	NA	
D-9j Automatic Waste Feed Cutoff System	270.22(d); 266.102(e)(7)(ii)	All facilities must submit description of automatic waste feed cutoff system, including any pre-alarm systems that may be used.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - BOILERS/INDUSTRIAL FURNACES

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-9k Direct Transfer Standards		270.22(e); 266.111; Part 264 Subparts I and J	BIFs that directly feed hazardous waste from a transport vehicle to a BIF without use of a storage unit must submit a description of the direct transfer procedures that will be used, along with other information as specified in regulatory citation.	NA	
D-9k(1)	Direct Transfer Standards - Containment System	270.22(e); 264.175	In areas where direct transfer vehicles are located, a complete description of containment system must be provided.	NA	
D-9k(2)	Direct Transfer Standards - Condition of Containers	270.22(e); 264.171		NA	
D-9k(3)	Direct Transfer Standards - Compatibility of Waste with Container	270.22(e); 264.172		NA	
D-9k(4)	Direct Transfer Standards - Management of Containers	270.22(e); 264.173		NA	
D-9k(5)	Direct Transfer Standards - Special Requirements of Ignitable or Reactive Waste	270.22(e); 264.176	Provide documentation of location of all containers holding ignitable/reactive waste.	NA	
D-9k(6)	Direct Transfer Standards - Special Requirements of Incompatible Wastes	270.22(e); 264.177	Provide statement and description of procedures to ensure compliance with management standards for incompatible waste.	NA	
D-9k(7)	Direct Transfer Standards - Closure	270.22(e); 264.178	Describe how all hazardous waste and hazardous waste residues will be removed from containment system at closure.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS SECTION D. PROCESS INFORMATION - BOILERS/INDUSTRIAL FURNACES					
Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-9k(8)	Direct Transfer Standards - Secondary Containment Requirements	270.22(e); 266.111(e)	Owners/operators must submit documentation demonstrating conformance with secondary containment requirements of 265.193(b),(c), and (f) - (h).	NA	
D-9L	Bevill Residues	270.22(f); 266.112; Part 266 Appendices VII and IX		NA	

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CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - CONTAINMENT BUILDINGS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-10	Containment Buildings	270.14(a),(b) 264.1100 - 264.1102		NA	
D-10a	Containment Building Description	270.14(a),(b) 264.1100(a); 264.1101(a)		NA	
D-10a(1)	Construction	270.14(a),(b) 264.1100(a); 264.1101(a)	Provide description of unit, include dimensions and materials of construction.	NA	
D-10a(2)	Strength Requirements	270.14(a),(b) 264.1100(a); 264.1101(a)	Provide results of calculations defining maximum loads or stresses that will be placed on containment building system.	NA	
D-10a(3)	Design Requirements for Units Not Managing Liquids	270.14(a),(b) 264.1100(b); 264.1101(d)		NA	
D-10a(3)(a)	Primary Barrier	270.14(a),(b) 264.1100(a),(b); 264.1101(a)(4)	Provide detailed description of primary barrier, and demonstrate that it is sufficiently durable to withstand movement of personnel, waste, and handling equipment within unit.	NA	
D-10a(4)	Design Requirements for Units Managing Liquids	270.14(a),(b) 264.1100(c); 264.1101(a)(4),(b)		NA	
D-10a(4)(a)	Primary Barrier	270.14(a),(b) 264.1100(c)(1); 264.1101(b)(1)	Describe how primary barrier is designed and constructed to prevent migration of hazardous constituents into barrier.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - CONTAINMENT BUILDINGS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-10a(4)(b)	Liquid Collection System	270.14(a),(b) 264.1100(c)(2); 264.1101(b)(3)	Describe in detail liquid collection system that must be designed and constructed of materials to minimize accumulation of liquid on primary barrier.	NA	
D-10a(4)(c)	Secondary Containment System	270.14(a),(b) 264.1100(c)(3)		NA	
D-10a(4)(c)(i)	Leak Detection System	270.14(a),(b) 264.1100(c)(3); 264.1101(a),(b)(3)	Describe design and operating features of leak detection system.	NA	
D-10a(4)(C)(ii)	Secondary Barrier	270.14(a),(b) 264.1100(b)(3); 264.1101(b)(3)	Describe how secondary barrier is designed and constructed to prevent migration of hazardous constituents into barrier.	NA	
D-10a(4)(d)	Temporary Variance from Secondary Containment Requirements	270.14(a),(b) 264.1101(b)(4)		NA	
D-10a(4)(e)	Waiver of Secondary Containment Requirements	270.14(a),(b) 264.1101(e)		NA	
D-10a(5)	Design of Units Managing Both Liquids and Nonliquids in the Same Unit	270.14(a),(b) 264.1101(d)	Identify areas of containment building that are constructed both with and without secondary containment, if applicable.	NA	
D-10a(6)	Compatibility of Structure with Wastes	270.14(a),(b) 264.1101(a)(2), (b)(3)(iii)	Demonstrate that all surfaces in contact with hazardous waste, collected liquids, or leachate must be chemically compatible with those waste.	NA	
D-10a(7)	Fugitive Dust Emissions	270.14(a),(b) 264.1100(d); 264.1101(c)(1)(iv); Part 60 Appendix A		NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - CONTAINMENT BUILDINGS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-10a(8)	Structural Integrity Requirements	270.14(a),(b) 264.1101(a)(2)		NA	
D-10a(9)	Certification of Design	270.14(a),(b) 264.1101(c)(2)		NA	
D-10b	Containment Building Operations	270.14(a),(b) 264.1101(c)		NA	
D-10b(1)	Primary Barrier Integrity	270.14(a),(b) 264.1101(b)(2)(ii), (c)(1)(i)		NA	
D-10b(2)	Volume of Waste	270.14(a),(b) 264.1101(c)(1)(ii)	Describe how owner/operator will maintain level of stored and/or treated hazardous waste within containment walls of unit so that height of any containment wall is not exceeded.	NA	
D-10b(3)	Tracking of Waste Out of Unit	270.14(a),(b) 264.1100(e); 264.1101(c)(1)(iii)		NA	
D-10b(4)	Liquids Removal	270.14(a),(b) 264.1101(b)(2)(ii), (b)(3)	Describe sumps and liquid removal methods for liquids collection and leak detection systems. Indicate fate of collected liquids and leachates, which are considered hazardous waste.	NA	
D-10b(5)	Management of Incompatible Wastes	270.14(a),(b) 264.1101(a)(3)	Indicate whether incompatible waste or treatment reagents will be placed in the unit or its secondary containment system.	NA	
D-10b(6)	Management of Liquids and Nonliquids in the Same Unit	270.14(a),(b) 264.1101(d)(2),(3)	For containment buildings that contain areas both with and without secondary containment, describe measures to prevent release of liquids or wet materials into areas without secondary containment.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - CONTAINMENT BUILDINGS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-10b(7)	Fugitive Dust Emissions	270.14(a),(b) 264.1100(d); 264.1101(c)(1)(iv); Part 60 Appendix A		NA	
D-10b(8)	Treatment of Wastes	270.14(a),(b) 264.1101(b)(3)(ii)	If treatment of waste is conducted in containment building, describe how treatment will be conducted to prevent release of liquids, wet materials, or liquid aerosols to other portions of building.	NA	
D-10b(9)	Equipment Decontamination	270.14(a),(b) 264.1101(c)(1)(iii)	Identify area used to decontaminate equipment and collect and manage any rinsate from decontamination. Identify fate of decontamination residues.	NA	
D-10c	Containment Buildings as Tank Secondary Containment	270.14(a),(b) 264.1101(b)(3)(iii)	Indicate whether containment building is intended to serve as a secondary containment system for a tank placed in the building. The unit must meet the requirements of 264.193(b), 264.193(c)(1), 264.193(c)(2), and 264.193(d)(1).	NA	

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CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - DRIP PADS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-11	Drip Pads	270.26; 264.570 - .575		NA	
D-11a	Drip Pad Description	270.26(c); 264.573(a)		NA	
D-11a(1)	Construction	270.26(c); 264.573(a)(1) - (4);264.573(b)(1) - (3)	Provide a description of the unit including dimensions and materials of construction. Drip pads must: be constructed of nonearthen materials; be sloped to free-drain treated wood drippage, rain and other waters or wastes to the associated collection system; and, have a curb or berm around the perimeter.	NA	
D-11a(1)(a)	Existing Drip Pads	270.26(c); 264.572(a); 264.573(a)(4)	Existing drip pads must have a hydraulic conductivity of less than or equal to $1x10^{-7}$ centimeters per second. Provide a copy of the most recent written assessment of the drip pad. This assessment must be reviewed and certified by an independent, qualified registered professional engineer (PE). The assessment must be reviewed, updated and recertified annually.	NA	
D-11a(1)(b)	New Drip Pads	270.26(c); 264.572(b); 264.573(b)	New drip pads must have a synthetic liner installed below the pad. The liner must be constructed of materials that will prevent waste from being absorbed into the liner. A leakage detection system and a leakage collection system are also required.	NA	
D-11b(1)	Preventive Maintenance	270.26(c); 264.573(c)	Drip pads must be maintained to remain free of cracks, gaps, corrosion, etc., that could cause a release of hazardous waste.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION D. PROCESS INFORMATION - DRIP PADS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-11b(2)	Prevent Runon and Runoff	270.26(c); 264.573(d), (e), (L)	The drip pad and associated collection system must be operated to prevent runoff. Unless protected by a structure, the runon and runoff control systems must have the capacity to prevent flow onto the drip pad from a 24-hour, 25-year storm. All collection systems must be emptied as soon as possible after storms to maintain design capacity.	NA	
D-11b(3)	Certification	270.26(c); 264.573(g)	Provide certification from a qualified, registered PE stating the drip pad meets the requirements of section 264.573.	NA	
D-11b(4)	Maintaining Collection System	270.26(c); 264.573(h)	Provide plan for removal of drippage and accumulated precipitation from collection system as necessary to prevent overflow.	NA	
D-11b(5)	Cleaning Drip Pad Surface	270.26(c); 264.573(i),(j)	Drip pad surface must be cleaned appropriately to allow weekly inspection of the entire surface and to minimize tracking of hazardous waste or hazardous waste constituents off the drip pad.	NA	
D-11b(6)	Recordkeeping	270.26(c); 264.573(k)	Maintain records sufficient to document that all treated wood is held on the pad following treatment in accordance with the requirements of this section.	NA	

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CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION E. GROUNDWATER MONITORING

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
E-1	Exemption from Groundwater Protection Requirements	270.14(c)		NA	
E-1a	Waste Piles	270.18(b); 264.90(b)(2), (5)		NA	
E-1b	Landfill	270.14(c); 264.90(b)(2)		NA	
E-1c	No Migration	270.14(c); 264.90(b)(4)		NA	
E-1d	Drip Pad	270.26(b); 264.90(b)(2)		NA	
E-2	Interim Status Groundwater Monitoring Data	270.14(c)(1)		Attch 7	
E-2a	Description of Wells	270.14(c)(1)	A copy of topographic map provided for 270.14(b) on which location and identification of each interim status monitoring well is indicated. Details of design and construction of each interim status monitoring well.	Attch 7	
E-2b	Description of Sampling and Analysis Procedures	270.14(c)(1); 265.92	A copy of facility's groundwater sampling and analysis plan.	Attch 7	
E-2c	Monitoring Data	270.14(c)(1); 265.92	Provide all interim status monitoring results.	Attch 7	
E-2d	Statistical Procedures	270.14(c)(1); 265.93	Provide information relating to statistical procedures.	Attch 7	
E-2e	Groundwater Assessment Plan	270.14(c)(1); 265.93(d)(2)	If required, based on statistical comparison results, provide specific plan for groundwater quality assessment program along with results obtained from implementation of plan.	Attch 7	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION E. GROUNDWATER MONITORING

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
E-3	General Hydrogeologic Information	270.14(c)(2)	Include description of regional and site-specific geologic and hydrogeological setting.	Attch 1 and 7	
E-4	Topographic Map Requirements	270.14(c)(2), (3),(4)(i)		Attch 1	
E-5	Contaminant Plume Description	270.14(c)(2), (4),(7)	In some cases, contaminant plumes may be defined under groundwater quality assessment programs carried out during interim status period which may not address complete list of Appendix VIII constituents as required under 270.14(c)(4). Additional monitoring may be required to identify concentration of each Appendix VIII constituent in plume.	Attch 7	
E-6	General Monitoring Program Requirements	270.14(c)(5); 264.90(b)(4); 264.97		Attch 7	
E-6a	Description of Wells	270.14(c)(5); 264.97(a),(b),(c)		Attch 7	
E-6b	Description of Sampling and Analysis Procedures	270.14(c)(5); 264.97(d),(e),(f)		Attch 7	
E-6c	Procedures for Establishing Background Quality	270.14(c)(5); 264.97(a)(1),(g)		Attch 7	
E-6d	Statistical Procedures	270.14(c)(5); 264.97(h), (i)(1),(5),(6)		Attch 7	
E-6d(1)	Parametric Analysis of Variance (ANOVA)	270.14(c)(5); 264.97(h)(1), (i)(2)		Attch 7	

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SECTION E. GROUNDWATER MONITORING

Section and	Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
E-6d(2)	Nonparametric ANOVA (based on ranks)	270.14(c)(5); 264.97(h)(2), (i)(2)		Attch 7	
E-6d(3)	Tolerance or Prediction Interval Procedure	270.14(c)(5); 264.97(h)(3), (i)(4)		Attch 7	
E-6d(4)	Control Chart Approach	270.14(c)(5); 264.97(h)(4), (i)(3)		Attch 7	
E-6d(5)	Alternative Approach	270.14(c)(5); 264.97(h)(5),(i)		NA	
E-7	Detection Monitoring Program	270.14(c)(6); 264.91(a)(4); 264.98		Attch 7	
E-7a	Indicator Parameters, Waste Constituents, Reaction Products to be Monitored	270.14(c)(6)(i); 264.98(a)		Attch 7	
E-7b	Groundwater Monitoring System	270.14(c)(6)(ii); 264.97(a)(2),(b),(c); 264.98(b)	Identify number, location, and depth of each well, and describe well construction materials.	Attch 7	
E-7c	Background Groundwater Concentration Values for Proposed Parameters	270.14(c)(6)(iii); 264.97(g); 264.98(c), (d)		Attch 7	
E-7d	Proposed Sampling and Analysis Procedures	270.14(c)(6)(iv); 264.97(d),(e),(f); 264.98(d),(e), (f)		Attch 7	

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SECTION E. GROUNDWATER MONITORING

Section and	Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
E-7e	Statistically Significant Increase in any Constituent or Parameter Identified at any Compliance Point Monitoring Well	270.14(c)(6); 264.98(g); Part 264 Appendix IX		Attch 7	
E-8	Compliance Monitoring Program	270.14(c)(7); 264.99		Attch 7	
E-8a	Waste Description	270.14(c)(7)(i)	Description must include historical records of volumes, types, and chemical composition of waste placed in units in waste management areas.	Attch 7	
E-8b	Characterization of Contaminated Groundwater	270.14(c)(7)(ii)	For each well at point of compliance and for each background well, provide concentrations of each constituent in 261 Appendix VIII, major cations and anions, and constituents listed in Table 1 of 264.94, if not already mentioned above.	Attch 7	
E-8c	Hazardous Constituents to be Monitored in Compliance Program	270.14(c)(7)(iii); 264.98(g)(3); 264.99(a)(1)		Attch 7	
E-8d	Concentration Limits	270.14(c)(7)(iv); 264.94, 264.97(g),(h); 264.99(a)(2)		Attch 7	
E-8e	Alternate Concentration Limits	270.14(c)(7)(iv); 264.94(b); 264.99(a)(2)	Provide justification for establishing alternate concentration limits. Justification must address the following two factors.	NA	
E-8e(1)	Adverse Effects on Groundwater Quality	270.14(c)(7)(iv); 264.94(b)(1)		Attch 7	

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SECTION E. GROUNDWATER MONITORING

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
E-8e(2)	Potential Adverse Effects	270.14(c)(7)(iv); 264.94(b)(2)		Attch 7	
E-8f	Engineering Report Describing Groundwater Monitoring Systems	270.14(c)(7) (v); 264.95; 264.97(a)(2), (b),(c); 264.99(b)	Provide details supporting representative nature of groundwater quality at background monitoring points and compliance monitoring point.	Attch 7	
E-8g	Proposed Sampling and Statistical Analysis Procedures for Groundwater Data	270.14(c)(7) (vi); 264.97 (d),(e),(f); 264.99(c) - (g)		Attch 7	
E-8h	Groundwater Protection Standard Exceeded at Compliance Point Monitoring Well	270.14(c)(8); 264.99(h),(i)		NA	
E-9	Corrective Action Program	270.14(c)(8); 264.99(j); 264.100		Attch 7	
E-9a	Characterization of Contaminated Groundwater	270.14(c)(8)(i)	For each well at point of compliance and for each background well, provide concentrations of each constituent in 261 Appendix VIII, major cations and anions, and constituents listed in Table 1 of 264.94, if not already determined by the above.	Attch 7	
E-9b	Concentration Limits	270.14(c)(8) (ii); 264.94; 264.100(a)(2)		Attch 7	
E-9c	Alternate Concentration Limits	270.14(c)(8) (ii); 264.94(b); 264.100(a)(2)	Provide justification for establishing alternate concentration limits. Justification must address the following two factors.	NA	

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SECTION E. GROUNDWATER MONITORING

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
E-9c(1)	Adverse Effects on Groundwater Quality	270.14(c)(8); 264.94(b)(1)		Attch 7	
E-9c(2)	Potential Adverse Effects	270.14(c)(8); 264.94(b)(2)		Attch 7	
E-9d	Corrective Action Plan	270.14(c)(8) (iii); 264.100 (b)	Provide detailed plans and engineering report on corrective actions proposed for facility, including maps of engineered structures, construction details, plans for removing waste, description of treatment technologies, effectiveness of correction program, description of reinjection system, additional hydrogeologic data, operation and maintenance plans, and closure and post-closure plans.	Attch 7	
E-9e	Groundwater Monitoring Program	270.14(c)(8) (iv); 264.100 (d)		Attch 7	
E-9e(1)	Description of Monitoring System	270.14(c)(7) (v),(8)		Attch 7	
E-9e(2)	Description of Sampling and Analysis Procedures	270.14(c)(7) (v),(8)		Attch 7	
E-9e(3)	Monitoring Data and Statistical Analysis Procedures	270.14(c)(7) (v),(8)		Attch 7	
E-9e(4)	Reporting Requirements	270.14(c)(7); 264.100(g)		Attch 7	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the

information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-1	Security	270.14(b)(4); 264.14		Attch 8	
F-1a	Security Procedures and Equipment	270.14(b)(4); 264.14	Unless waiver is granted, facility must have surveillance system or a barrier to entry.	Attch 8	
F-1a(1)	24-Hour Surveillance System	270.14(b)(4); 264.14	Monitor/camera, guards, or personnel must continuously monitor or control access to active parts of facility.	Attch 8	
F-1a(2)(a)	Barrier	270.14(b)(4); 264.14	This item required if 24-hour surveillance system is not feasible. Describe artificial or natural barrier.	Attch 8	
F-1a(2)(b)	Means to Control Entry	270.14(b)(4); 264.14	This item required if 24-hour surveillance system is not feasible.	Attch 8	
F-1a(3)	Warning Signs	270.14(b)(4); 264.14	Signs in english must be posted at each entrance, and be legible from 25 feet.	Attch 8	
F-1b	Waiver	270.14(b)(4); 264.14	Owner/operator must prevent unknowing entry, and minimize unauthorized entry of persons or livestock unless can demonstrate:	NA	
F-1b(1)	Injury to Intruder	270.14(b)(4); 264.14	Assure physical contact with waste, structure, or equipment will not injure unknowing intruder.	Attch 8	
F-1b(2)	Violation Caused by Intruder	270.14(b)(4); 264.14	Assure disturbance of waste or equipment by unauthorized intruder will not cause a violation.	Attch 8	
F-2	Inspection Schedule	270.14(b)(5); 264.15	Inspection is required for monitoring equipment, safety emergency equipment, communication and alarm systems, decontamination equipment, security devices, and operating and structural equipment.	Attch 8 and 11	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-2a	General Inspection Requirements	270.14(b)(5); 264.15(a),(b); 264.33		Attch 11	
F-2a(1)	Types of Problems	270.14(b)(5); 264.15(b)(3)	Inspection checklist must identify types of problem.	Attch 11	
F-2a(2)	Frequency of Inspections	270.14(b)(5); 264.15(b)(4)	Based on rate of deterioration of equipment and probability of environmental or human health incident.	Attch 11	
F-2a(3)	Schedule of Remedial Action	270.14(b)(5); 264.15(c)	Owner/operator must immediately remedy any deterioration or malfunction of equipment or structures to ensure problem does not lead to environmental or human health hazard.	Attch 11	
F-2a(4)	Inspection Log	270.14(b)(5); 264.15(d)	Provide example log or summary.	Attch 11	
F-2b	Specific Process Inspection Requirements	270.14(b)(5)		Attch 6 and 11	
F-2b(1)	Container Inspection	270.14(b)(5); 264.174	Inspect at least weekly.	NA	
F-2b(2)	Tank System Inspection	270.14(b)(5); 264.195	Owner/operator must develop schedule and inspect at least once daily.	NA	
F-2b(2)(a)	Tank System External Corrosion and Releases	270.14(b)(5); 264.195(b)(1)	Owner/operator must inspect that aboveground portion and check for corrosion.	NA	
F-2b(2)(b)	Tank System Construction Materials and Surrounding Area	270.14(b)(5); 264.195(b)(3)	Observe construction materials and area around external portion for signs of release of hazardous waste.	NA	
F-2b(2)(c)	Tank System Overfilling Control Equipment	270.14(b)(5); 264.195(a)	Develop and follow schedule for inspection of overfill controls.	NA	
F-2b(2)(d)	Tank System Monitoring and Leak Detection Equipment	270.14(b)(5); 264.195(b)(2)	Analyze data gathered from monitoring equipment to ensure tank is operating according to design.	NA	

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-2b(2)(e)	Tank System Cathodic Protection	270.14(b)(5); 264.195(c)	Inspect according to schedule.	NA	
F-2b(3)	Waste Pile Inspection	270.14(b)(5); 270.18(d); 264.254(b)	Describe how waste pile will be inspected daily and after storms.	NA	
F-2b(3)(a)	Runon and Runoff Control System	270.14(b)(5); 264.254(b)(1)	Inspections should identify deterioration, malfunction, or improper operation of control system.	NA	
F-2b(3)(b)	Wind Dispersal System	270.14(b)(5); 264.254(b)(2)	Facility should inspect proper function of wind dispersal system.	NA	
F-2b(3)(c)	Leachate Collection and Removal System	270.14(b)(5); 270.18 (d); 264.254(b)(3), (c)	Determine whether there is leachate present in functioning double liner system.	NA	
F-2b(4)	Surface Impoundment Inspection	270.14(b)(5); 270.17(c); 264.226(b),(c)	Describe how each surface impoundment will be inspected to meet requirements of monitoring and inspection and waiver requirement.	NA	
F-2b(4)(a)	Condition Assessment	270.14(b)(5); 264.226(b)	Describe how surface impoundment will be inspected weekly and after storms.	NA	
F-2b(4)(a)(1)	Overtopping Control System	270.14(b)(5); 264.226(b)(1)	Inspect for deteriorating, malfunction, or improper operation of control system.	NA	
F-2b(4)(a)(2)	Impoundment Contents	270.14(b)(5); 264.226(b)(2)	Inspect for sudden drop in level of impoundment contents.	NA	
F-2b(4)(a)(3)	Dikes and Containment Devices	270.14(b)(5); 264.226(b)(3)	Inspect for severe erosion in containment devices.	NA	
F-2b(4)(b)	Structural Integrity	270.14(b)(5); 264.226(c)	Specify procedure for assessing integrity of surface impoundments.	NA	

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-2b(4)(c)	Leak Detection System	270.14(b)(5); 270.17(c); 264.226(d)	Describe how double liner system and leak detection system will be inspected.	NA	
F-2b(5)(a)	Incinerator and Associated Equipment	270.14(b)(5); 264.347(b)	Describe procedures for daily visual inspection of incinerator and associated equipment.	NA	
F-2b(5)(b)	Incinerator Waste Feed Cutoff System and Alarms	270.14(b)(5); 264.347(c)	Describe procedure and frequency of testing emergency waste feed cutoff system.	NA	
F-2b(6)	Landfill Inspection	270.14(b)(5); 264.303(b)	For operating landfill, describe how it will be inspected weekly and after storms.	NA	
F-2b(6)(a)	Runon and Runoff Control System	270.14(b)(5); 264.303(b)(1)	Deterioration, malfunction, or improper operation of runon and runoff control system.	NA	
F-2b(6)(b)	Wind Dispersal Control System	270.14(b)(5); 264.303(b)(2)	Proper functioning of wind dispersal control systems, where present.	NA	
F-2b(6)(c)	Leachate Collection and Removal System	270.14(b)(5); 264.303(b)(3), (c)	In properly functioning double liner system, is there a presence of leachate? Leak detection required under 264.301(c) or 264.301(d) must record amount of leakage from each system weekly.	NA	
F-2b(7)	Land Treatment Facility Inspection	270.14(b)(5); 264.273(g)	Describe how land treatment facility will be inspected weekly and after storms.	NA	
F-2b(7)(a)	Runon and Runoff Control System	270.14(b)(5); 264.273(g)(1)		NA	
F-2b(7)(b)	Wind Dispersal Control System	270.14(b)(5); 264.273(g)(2)		NA	
F-2b(8)	Miscellaneous Unit Inspections	270.14(b)(5); 264.602	Provide inspection program that ensures compliance with standards in 264.601 and 270.23.	Attch 6 and 11	

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and	Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-2b(9)	Boilers and Industrial Furnaces (BIF) Inspection	270.14(b)(5); 264.15; 266.102(a)(2)(ii),(e)(8); 266.111(e)(3)	Demonstrate that BIF will be visually inspected daily, automatic waste feed cutoff inspected at least weekly, and direct transfer area at least once an hour when waste is being transferred.	NA	
F-2b(10)	Containment Building Inspection	270.14(b)(5); 264.1101(c)(3), (4)	Demonstrate owner/operator will inspect and document at least weekly, monitoring equipment, leak detection equipment, containment building, and surrounding areas for waste releases.	NA	
F-2b(11)	Drip Pad Inspection	270.14(b)(5); 264.574	Demonstrate that the drip pad owner/operator will inspect and document at least weekly and after storms, the leak detection and collection equipment, the drip pad surface, and the runon and runoff control systems for evidence of deterioration, malfunction, improper operation, or leakage of hazardous waste.	NA	
F-3	Waiver or Documentation of Preparedness and Prevention Requirements	270.14(b)(6) 264.32(a) - (d)	Facility must submit justification for any waiver to requirements of this section.	NA	
F-3(a)	Equipment Requirements	270.14(b); 264.32		Attch 9 and 10	
F-3(a)(1)	Internal Communication	270.14(b); 264.32(a)	Describe internal communication or alarm system used to provide immediate emergency instruction to personnel.	Attch 9 and 10	
F-3(a)(2)	External Communication	270.14(b); 264.32(b)	Describe device for summoning emergency assistance from local police, fire, or state/local emergency response.	Attch 9 and 10	
F-3(a)(3)	Emergency Equipment	270.14(b); 264.32(c)	Demonstrate that portable fire extinguishers, fire control equipment, spill control equipment, and decontamination equipment are available.	Attch 9 and 10	

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and	Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-3(a)(4)	Water and Fire Control	270.14(b); 264.32(d)	Demonstrate facility has adequate fire control systems, water volume and pressure, foaming equipment, automatic sprinklers, etc.	Attch 9 and 10	
F-3(a)(5)	Testing and Maintenance of Equipment	270.14(b); 264.33	Demonstrate communication, alarm, fire control equipment, spill control equipment, and decontamination equipment are tested and maintained.	Attch 9 and 10	
F-3(a)(6)	Access to Communication or Alarm System	270.14(b); 264.34	When waste is being hauled, all personnel must have access to internal alarm or communication device.	Attch 9 and 10	
F-3(b)	Aisle Space Requirement	270.14(b); 264.35	Aisle space is required for unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment in case of emergency.	Attch 9	
F-3(c)	Documentation of Arrangements with:	270.14(b); 264.37	Owner/operator must make arrangements, as appropriate, with type of waste and hazard potential, for the potential need for services.	Attch 10	
F-3(c)(1)	Police/Fire Department	270.14(b); 264.37(a)(1)	Arrange to familiarize local fire department and police with facility.	Attch 10	
F-3(c)(2)	Emergency Response Teams	270.14(b); 264.37(a)(2), (a)(3)		Attch 10	
F-3(c)(3)	Local Hospitals	270.14(b); 264.37(a)(4)	Arrange to familiarize local hospital with properties of hazardous waste and possible types of injury or illness to expect.	Attch 10	
F-3(c)(4)	Document Agreement Refusal	270.14(b); 264.37(b)	Document refusal to enter into a coordination agreement.	NA	
F-4	Prevention Procedures, Structures, and Equipment	270.14		Attch 6	

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-4(a)	Unloading Procedures	270.14(b)(8)(i)	Describe procedure used to prevent hazards in unloading operations. Identify possible loading and unloading hazards, and document steps taken to minimize or eliminate possibility of these hazards.	Attch 6	
F-4(b)	Runoff	270.14(b)(8)(ii)	Describe procedure used to prevent runoff from hazardous waste handling areas.	Attch 6 and 9	
F-4(c)	Water Supplies	270.14(b)(8)(iii)	Describe procedure, structures, equipment used to prevent contamination of water supply.	Attch 2 and 9	
F-4(d)	Equipment and Power Failure	270.14(b)(8)(iv)	Describe procedure used to mitigate the effects of equipment failure and power outages.	Attch 9	
F-4(e)	Personnel Protection Procedures	270.14(b)(8)(v)	Describe procedure, structures, equipment used to prevent contamination of personnel to hazardous waste.	Attch 9	
F-4(f)	Procedures to Minimize Releases to the Atmosphere	270.14(b)(8)(vi)	Describe procedure, structures, equipment used to prevent hazardous waste releases to the atmosphere.	NA	
F-5	Prevention of Reaction of Ignitable, Reactive, and Incompatible Waste	270.14(b)(9)		Attch 6	
F-5a	Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Wastes	270.14(b)(9); 264.17(a),(b)	Waste must be protected from sources of ignition or reaction. Describe precautions taken by facility to prevent actual ignition, including sources of spontaneous ignition and radiant heat. Owner/operator must designate safe areas for smoking and open flames. Post signs where hazard exists.	Attch 6	
F-5b	General Precautions for Handling Ignitable or Reactive Waste and Mixing of Incompatible Waste	270.14(b)(9); 264.17(a)	Describe precautions taken by facility to prevent reactions that generate heat, produce flammable byproducts, cause risk of fire or explosion, threaten structural integrity, or pose threat to human life or the environment.	Attch 6	

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and	Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-5b(1)	Documentation of Adequacy of Procedures	270.14(b); 264.17(c)	Published literature, trial test, waste analyses, or similar processes may be used.	Attch 3 and 6	
F-5c	Management of Ignitable or Reactive Wastes in Containers	270.15(c); 264.176	Demonstrate that ignitable containers are at least 15 meters from facility property line.	NA	
F-5d	Management of Incompatible Wastes in Containers	270.15(d); 264.177	Describe procedures that ensure incompatible wastes and materials are not placed in same container.	NA	
F-5e	Management of Ignitable or Reactive Wastes in Tank Systems	270.16(j); 264.198	Describe operation procedures and how facility treats waste so it is no longer ignitable or how facility stores ignitable or reactive waste.	NA	
F-5f	Management of Incompatible Wastes in Tank Systems	270.16(j); 264.199	Demonstrate that incompatible waste and materials are not stored in same tank.	NA	
F-5g	Management of Ignitable or Reactive Wastes Placed in Waste Piles	270.18(g); 264.256	If waste is reactive or ignitable, describe how handling process will render waste pile nonreactive and/or nonignitable.	NA	
F-5h	Management of Incompatible Wastes Placed in Waste Piles	270.18(h); 264.257	Document how hazardous waste piles of incompatible materials are separated to render them nonreactive.	NA	
F-5i	Management of Ignitable or Reactive Wastes in Surface Impoundments	270.17(h); 264.229	If waste is reactive or ignitable, describe how handling process will render surface impoundments nonreactive and/or nonignitable.	NA	
F-5j	Management of Incompatible Wastes in Surface Impoundments	270.17(h); 264.230	Document how hazardous surface impoundments of incompatible materials are separated to render them nonreactive.	NA	
F-5k	Management of Ignitable or Reactive Wastes Placed in Landfills	270.21(f); 264.312	If waste is reactive or ignitable, describe how handling process will prevent reaction or ignition to landfills.	NA	

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-5l	Management of Incompatible Wastes Placed in Landfills	270.21(g); 264.313	Document how hazardous landfills of incompatible materials are separated to render them nonreactive.	NA	
F-5m	Management of Ignitable or Reactive Wastes Placed in Land Treatment Units	270.20(g); 264.281	If waste is reactive or ignitable, describe how handling process will render land treatment units nonreactive and/or nonignitable.	NA	
F-5n	Management of Incompatible Wastes Placed in Land Treatment Units	270.20(h); 264.282	Document how land treatment unit piles of incompatible materials are separated to render them nonreactive.	NA	
F-5o	Management of Incompatible Wastes Placed in Containment Buildings	270.14(a); 264.1101(a)(3)	Subsections include design, primary and secondary containment, barriers to prevent migration, leak detection, and facility logs.	NA	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION G. CONTINGENCY PLAN

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
G-1	Contingency Plan	270.14(b)(7)		Attch 10	
G-2	Emergency Coordinators	270.14(b)(7); 264.52(d); 264.55	There must at least be one primary emergency coordinator available at all times.	Attch 10	
G-3	Implementation	270.14(b)(7); 264.52(a); 264.56(d)	Emergency coordinator to determine that facility has had a release, fire, or explosion that could threaten human health or the environment outside facility.	Attch 10	
G-4	Emergency Actions	270.14(b)(7); 264.56		Attch 10	
G-4a	Notification	270.14(b)(7); 264.56(a)	Describe the method for immediate notification of facility personnel and necessary state and local agencies.	Attch 10	
G-4b	Identification of Hazardous Materials	270.14(b)(7); 264.56(b)	Observation, records or manifest, or chemical analysis may be used by emergency coordinator.	Attch 4 and 5	
G-4c	Assessment	270.14(b)(7); 264.56(c),(d)	Direct and indirect effects must be considered.	NA	
G-4d	Control Procedures	270.14(b)(7); 264.52(a)	Contingency plan must describe actions facility personnel must take in response to fires, explosions, or any unplanned release of hazardous waste to air, soil, or surface water.	Attch 10	
G-4e	Prevention of Recurrence of Spread of Fires, Explosions, or Releases	270.14(b)(7); 264.56(e)	Measures must include stopping processes and operations, collecting and containing release of waste, and removing or isolating containers.	Attch 10	
G-4e(1)	Monitor for Leaks, Pressure Buildup, Gas Generation or Ruptures of Released Material	270.14(b)(7); 264.56(f)	This item applies if facility stops operations.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION G. CONTINGENCY PLAN

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
G-4f	Storage, Treatment, and Disposal of Released Material	270.14(b)(7); 264.56(g)	After emergency, emergency coordinator must provide for treating, storing, and disposing of recovered waste.	NA	
G-4g	Incompatible Waste	270.14(b)(7); 264.56(h)(1)	Until cleanup is complete, assure that incompatible waste is not stored together.	Attch 10	
G-4h	Post-Emergency Equipment Management	270.14(b)(7); 264.56(h)(2)	Decontamination is required for emergency equipment.	Attch 10	
G-4h(1)	Notification of Federal, State and Local Authorities before Resuming Operations	270.14(b)(7); 264.56(i)	Federal or state authorities must be notified within 15 days of occurrence.	Attch 10	
G-4i	Container Spills and Leakage	270.14(b)(7); 264.52; 264.71	Specify procedures to be used when responding to container spills and leakage.	NA	
G-4j	Tank Spills and Leakage		For a tank or containment system from which there has been a leak or spill:	NA	
G-4j(1)	Stopping Waste Addition	270.14(b)(7); 264.196(a)	Document that the owner/operator will immediately stop the flow of hazardous waste.	NA	
G-4j(2)	Removing Waste	270.14(b)(7); 264.196(b)	Owner/operator will, within 24 hours after leak detected, remove waste and allow inspection and repair of the tank system to be performed.	NA	
G-4j(3)	Containment of Visible Releases	270.14(b)(7); 264.196(c)	Specify that a visual inspection of a release will be conducted, demonstrate further mitigation of leak will be prevented, and visible contamination will be removed and disposed of properly.	NA	
G-4j(4)	Notification Reports	270.14(b)(7); 264.196(d)	Demonstrate that any release to the environment will be reported to regional administrator within 24 hours of detection.	Attch 10	

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CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION G. CONTINGENCY PLAN

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
G-4j(5)	Provisions of Secondary Containment, Repair, or Closure	270.14(b)(7); 264.196(e)	Provision of secondary containment repair, otherwise closure is required.	NA	
G4-k	Surface Impoundment Spills and Leakage	270.14(b)(7); 264.227	Surface impoundments must be removed from service when:	NA	
G4-k(1)	Emergency Repairs	270.14(b)(7); 264.227	Describe procedures for removing surface impoundments from service.	NA	
G4-k(1)(a)	Stopping Waste Addition	270.14(b)(7); 264.227(b)(1)	Procedures for stopping waste addition to the impoundment.	NA	
G4-k(1)(b)	Containing Leaks	270.14(b)(7); 264.227(b)(2)	Procedures for containing leak.	NA	
G4-k(1)(c)	Stopping Leaks	270.14(b)(7); 264.227(b)(3)	Procedures for stopping leak.	NA	
G4-k(1)(d)	Preventing Catastrophic Failure	270.14(b)(7); 264.227(b)(4)	Procedures to stop or prevent catastrophic failure.	NA	
G4-k(1)(e)	Emptying the Impoundment	270.14(b)(7); 264.227(b)(5)	Procedures for emptying impoundment, if necessary.	NA	
G4-k(2)	Certification	270.14(b)(7); 264.226 (c); 264.227(d)(1)	Procedures for recertifying a dike's structural integrity if impoundment is removed from service due to actual or imminent failure.	NA	
G4-k(3)	Repairs as a Result of Sudden Drop	270.14(b)(7); 264.227(d)(2)	Procedures to follow if impoundment is removed from service due to sudden drop in liquid level of the following:	NA	
G4-k(3)(a)	Existing Portions of Surface Impoundment	270.14(b)(7); 264.227(d)(2)(i)	Installation of liner for any existing portion of impoundment.	NA	
G4-k(3)(b)	Other Portions of the Surface Impoundment	270.14(b)(7); 264.227(d)(2)(ii)	Certification by qualified engineer for other than existing portions of the impoundment.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS SECTION G. CONTINGENCY PLAN					
Section and Requirement		**Federal Regulation**	**Review Consideration[a]**	**Location in Application[b]**	**See Attached Comment Number[c]**
G4-l	Containment Building Leaks	270.14(b)(7); 264.1101(c)(3)	Through active life of building if owner/operator detects condition that could lead to release of hazardous waste.	NA	
G-4l(1)	Repair of Containment Building	270.14(b)(7); 264.1101(c)(3)	Within 7 days of detection, owner/operator must contact regional administrator. Enter record of discovery, remove contaminated portion of building from service, determine repair steps, and establish schedule for repair.	NA	
G-4l(2)	Certification Following Repair	270.14(b)(7); 264.1101(c)(3)(iii)	Upon completion of repairs owner/operator must notify regional administrator.	NA	
G-4m	Drip Pad Spills and Leakage	270.14(b)(7); 264.573(m)	Throughout the active life of the drip pad, if a condition is detected that may have or has caused a release of hazardous waste, it must be repaired within a reasonably prompt period of time.	NA	
G-4m(1)	Stopping Waste Addition	270.14(b)(7); 264.573(m)(1)(ii)	Upon detection of leakage in the leak detection system, immediately remove the affected portion of the drip pad from service.	NA	
G-4m(2)	Determine Appropriate Cleanup and Repair	270.14(b)(7); 264.573(m)(1)(iii)	Establish a schedule for accomplishing the repairs.	NA	
G-4m(3)	Notification	270.14(b)(7); 264.573(m)(1)(iv)	Within 24 hours after discovery of the condition, notify the Regional Administrator or state director. Within 10 working days, provide written notice and a description of the repairs to be made to the drip pad.	NA	
G-4m(4)	Certification	270.14(b)(7); 264.573(m)(3)	Upon completing all repairs and clean up, provide certification signed by an independent, qualified registered PE.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION G. CONTINGENCY PLAN

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
G-5	Emergency Equipment	270.14(b)(7); 264.52(e)		Attch 10	
G-6	Arrangements with Local Authorities	270.14(b)(7); 264.37; 264.52(c)	Police and fire departments, hospitals, and emergency response teams must be notified by owner/operator. Document refusal to enter into a coordination agreement.	Attch 10	
G-7	Evacuation Plan for Facility Personnel	270.14(b)(7); 264.52(f)	Evacuation plans must include evacuation signals and primary and alternate evacuation routes.	Attch 10	
G-8	Required Report Procedures for Recordkeeping and Reporting to Federal Authority	270.14(b)(7); 264.56(j)	Owner/operator must note on operation record the time, date and details of incidents which require implementation of contingency plan.	Attch 10 and 15	
G-9	Location and Distribution of Contingency Plan	270.14(b)(7); 264.53	Copy of contingency plan must be maintained at facility and submitted to local authorities.	Attch 10	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.
[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.
[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION H. PERSONNEL TRAINING

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
H-1	Outline of Introductory and Continuing Training Programs	270.14(b)(12); 264.16(a)(1)	Facility personnel must successfully complete classroom or on-the-job training which will allow them to responsibly perform in their positions.	Attch 12	
H-1a	Job Title/Job Description	270.14(b)(12); 264.16(d)1), (d)(2)	Owner or operator must maintain records of job titles, names of employees, job descriptions, and types and amounts of training given to employees.	Attch 12	
H-1b	Description of How Training will be Designed to Meet Actual Job Tasks	270.14(b)(12); 264.16(c),(d)(3)	Training must be conducted by a qualified person; there must also be an annual review of the training.	Attch 12	
H-1c	Training Director	270.14(b)(12); 264.16(a)(2)	Program must be directed by person trained in hazardous waste procedures.	Attch 12	
H-1d	Relevance of Training to Job Position	270.14(b)(12); 264.16(a)(2)	Training must include instruction on hazardous waste procedures relevant to each employee's position.	Attch 12	
H-1e	Training for Emergency Response	270.14(b)(12); 264.16(a)(3)	Personnel must minimally be familiar with emergency procedures, emergency equipment, and emergency systems.	Attch 10 and 12	
H-2	Maintenance of Training Records/Copy of Personnel Training Documents	270.14(b)(12); 264.16(b),(d)(4),(e)	Training records on current personnel must be kept until closure of facility. Training must be completed within 6 months after date of employment.	Attch 12 and 15	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION I. CLOSURE POST-CLOSURE PLANS AND FINANCIAL REQUIREMENTS

Section and	Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-1	Closure Plans	270.14(b)(13)		Attch 14	
I-1a	Closure Performance Standard	270.14(b)(13); 264.111	Describe how closure: minimizes the need for further maintenance; controls, minimizes, or eliminates the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere; and complies with the closure requirements of Subpart G and unit-specific closure requirements.	Attch 14	
I-1b	Time and Activities Required for Partial Closure and Final Closure Activities	270.14(b)(13); 264.112(b)(1) through 264.112(b)(7)	Describe the time and all activities required for: partial closure, if applicable; final closure; and maximum extent of operation that will be active during life of facility.	Attch 14	
I-1c	Maximum Waste Inventory	270.14(b)(13); 264.112(b)(3)		Attch 14	
I-1d	Schedule for Closure	270.14(b)(13); 264.112(b)(6)		Attch 14	
I-1(d)(1)	Time Allowed for Closure	270.14(b)(13); 264.112(b)(2); 264.113(a) and (b)		Attch 14	
I-1d(1)(a)	Extension for Closure Time	270.14(b)(13); 264.113(a) and (b)		Attch 14	
I-1e	Closure Procedures	270.14(b)(13); 264.112; 264.114		Attch 14	

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CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION I. CLOSURE POST-CLOSURE PLANS AND FINANCIAL REQUIREMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-1e(1)	Inventory Removal	270.14(b)(13); 264.112(b)(3)	Discuss methods for removing, transporting, treating, storing, or disposing of all hazardous wastes and identify the type(s) of off-site hazardous waste management units to be used.	Attch 14	
I-1e(2)	Disposal or Decontamination of Equipment, Structure, and Soils	270.14(b)(13); 264.112(b)(4); 264.114	Provide a detailed description of the steps needed to decontaminate or dispose of all facility equipment and structures. Demonstrate that any hazardous constituents (i.e., Appendix VII) left at the unit will not impact any environmental media in excess of Agency-established exposure levels and that direct contact will not pose a threat to human health and the environment.	Attch 14	
I-1e(3)	Closure of Disposal Units/Contingent Closures	270.14(b)(13)		Attch 14	
I-1e(3)(a)	Disposal Impoundments	270.14(b)(13); 264.228(a)(2)		NA	
I-1e(3)(a)(i)	Elimination of Liquids	270.14(b)(13)		NA	
I-1e(3)(a)(ii)	Waste Stabilization	270.14(b)(13); 264.228(a)(2)(ii)		NA	
I-1e(3)(b)	Cover Design	270.14(b)(13); 264.228(a)(2)(iii);264.310(a)		NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION I. CLOSURE POST-CLOSURE PLANS AND FINANCIAL REQUIREMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-1e(3)(c)	Minimization of Liquid Migration	270.14(b)(13); 264.228(a)(2)(iii)(A); 264.310(a)(1)	Draft RCRA Guidance Document entitled Landfill (Design--Liner Systems and Final Cover (1982), suggests the following design for landfill cover systems (from top to bottom): a vegetated top cover, with a minimum of 24 inches of topsoil; a middle drainage layer (at least one foot thick with a saturated conductivity of not less than 1 x 10^{-3} cm/sec) overlain by a geotextile filter fabric or graded granular filter; and a low permeability bottom layer consisting of two components: an upper component of at least a 20 mil synthetic membrane protected above and below by at least six inches of bedding material, a lower component of at least 24 inches of low permeability (maximum hydraulic conductivity of 1 x 10^{-7} cm/sec) soil emplaced in lifts not exceeding six inches. For cover designs different than EPA-recommended designs, provide engineering calculations showing the proposed cover will provide long-term minimization of liquid migration through the cover.	NA	
I-1e(3)(d)	Maintenance Needs	270.14(b)(13); 264.228(a)(2)(iii)(B); 264.310(a)(2)		NA	
I-1e(3)(e)	Drainage and Erosion	270.14(b)(13); 264.228(a)(2)(iii)(C); 264.310(a)(3)	The following information should be provided: data demonstrating that the proposed final slopes will not cause significant cover erosion; description of drainage materials and their permeabilities; engineering calculations demonstrating free drainage of precipitation off of and out of the cover; and estimation of the potential for drainage-layer clogging.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION I. CLOSURE POST-CLOSURE PLANS AND FINANCIAL REQUIREMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-1e(3)(f)	Settlement and Subsidence	270.14(b)(13); 264.228(a)(2)(iii)(D); 264.310(a)(4)	Include the following information: potential foundation compression; potential soil liner compression; and potential waste consolidation and compression resulting from waste dewatering, biological oxidation and chemical conversion of solids to liquids.	NA	
I-1e(3)(g)	Cover Permeability	270.14(b)(13); 264.228(a)(2)(iii)(E); 264.310(a)(5)		NA	
I-1e(3)(h)	Freeze/Thaw Effects	270.14(b)(13); 264.228(a)(2)(iii); 264.310(a)	Identity the average depth of frost penetration and describe the effects of freeze/thaw cycles on the cover.	NA	
I-1e(4)	Closure of Containers	270.14(b)(13); 264.178; 264.112(b)(3); 270.14(b)(13	Address the following: hazardous waste removal and disposal; container decontamination and disposal; site decontamination and disposal including linings, soil, and washes; maximum inventory.	NA	
I-1e(5)	Closure of Tanks	270.14(b)(13); 264.197; 264.112(b)(3)	The description should address the following: waste removal from tanks and equipment; decontamination of all components; verification of decontamination; disposal of wastes and residues; and maximum inventory.	NA	
I-1e(6)	Closure of Waste Piles	270.14(b)(13); 270.18(h); 264.258	The description must address the following: procedure and criteria for determining whether or not decontamination has been successful; and sampling and analytical techniques.	NA	

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SECTION I. CLOSURE POST-CLOSURE PLANS AND FINANCIAL REQUIREMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-1e(7)	Closure of Surface Impoundments	270.14(b)(13); 270.17(f); 264.228(a)(1), (2), and (b)	Surface impoundments without liners or with liners that do not meet the requirements must also provide contingent plans for closure in place and a contingent post-closure plan, except for impoundments requesting a liner exemption in accordance with D-4b.	NA	
I-1e(8)	Closure of Incinerators	270.14(b)(13); 264.351	Describe how, at closure, all hazardous waste and hazardous waste residues (including, but not limited to, ash, scrubber waters, and scrubber sludges) will be removed from the incinerator, associated ductwork, piping, air pollution control equipment, sumps, and any other structures or operating equipment such as pumps, valves, etc., that have come into contact with the hazardous waste. Alternatively, describe how the incinerator and associated units and equipment will be dismantled and disposed of as a hazardous waste.	NA	
I-1e(9)	Closure of Landfills	270.14(b)(13); 270.21(e); 264.310(a)	Provide detailed plans and engineering report that describes the final cover components in detail. Cover installation and construction quality assurance procedures should be thoroughly described.	NA	
I-1e(10)	Closure of Land Treatment Facilities	270.14(b)(13); 264.280(a); 270.20(f)		NA	
I-1e(10)(a)	Continuance of Treatment	270.14(b)(13); 264.280(a)(1) through (7)		NA	
I-1e(10)(b)	Vegetative Cover	270.14(b)(13); 270.20(f); 264.280(a)(8)		NA	

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SECTION I. CLOSURE POST-CLOSURE PLANS AND FINANCIAL REQUIREMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-1e(11)	Closure of Miscellaneous Units	270.14(b)(13); 270.23(a)(2)		Attch 10	
I-1e(12)	Closure of Boilers and Industrial Furnaces	270.14(b)(13); 266.102(a)(2)(vii)	Describe how, at closure, all hazardous waste and hazardous waste residues (including, but not limited to, ash, scrubber waters, and scrubber sludges) will be removed from the BIF unit, associated ductwork, piping, air pollution control equipment, sumps and any other structures or operating equipment such as pumps, valves, etc., that have come into contact with hazardous wastes. Alternatively, describe how the BIF and associated equipment will be dismantled and disposed of. If any wastes, waste residues, contaminated components, subsoils, structures or equipment remain after closure, provide plans for closing the BIF unit as a landfill and provide a post-closure care plan.	NA	
I-1e(13)	Closure of Containment Buildings	270.14(b)(13); 264.1102	Show that at closure all hazardous waste, hazardous waste residues, contaminated containment system, contaminated subsoils, and all structures and equipment contaminated with waste and leachate will be removed. If any wastes, waste residues, contaminated components, subsoils, structures or equipment remain after closure, provide plans for closing the containment building as a landfill and provide a post-closure care plan.	NA	
I-2	Post-Closure Plans	270.14(b)(13)		NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION I. CLOSURE POST-CLOSURE PLANS AND FINANCIAL REQUIREMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-2a	Inspection Plan	270.14(b)(13); 264.118(a); 264.197(b); 264.197(c)(2); 264.226(d)(2); 264.228(b); 264.228(c)(1)(ii); 264.258(b); 264.258(c)(1)(ii); 264.303(c); 264.310(b)	Rationale for determining the length of time between inspections should be provided.	NA	
I-2b	Monitoring Plan	270.14(b)(13); 264.118(b)(1); 264.197(b); 264.197(c)(2); 264.226(d)(2); 264.228(b); 264.228(c)(1)(ii); 264.258(b); 264.258(c)(1)(ii); 264.303(c); 264.310(b)		NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION I. CLOSURE POST-CLOSURE PLANS AND FINANCIAL REQUIREMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-2c	Maintenance Plan	270.14(b)(13); 264.118(b)(2); 264.197(b); 264.197(c)(2); 264.228(b); 264.228(c)(1)(ii); 264.258(b); 264.258(c)(1)(ii); 264.310(b)	Describe the preventative and corrective maintenance procedures, equipment procedures, equipment requirements and material needs.	NA	
I-2d	Land Treatment	270.14(b)(13); 264.280(c)	Describe the operation, inspection, and maintenance programs to be used at the closed facility.	NA	
I-2e	Post-Closure Care for Miscellaneous Units	270.14(b)(13); 270.23(a)(3); 264.603		NA	
1-2f	Post-Closure Security	270.14(b)(13); 264.117(b) and (c)	Demonstrate that for property where hazardous wastes remain after partial or final closure, post-closure use must never be allowed to disturb the integrity of the final cover, liner(s), or any other components of the containment system, or the function of the facility's monitoring system.	NA	
I-2g	Post-Closure Contact	270.14(b)(13); 264.118(b)(3)		NA	
I-3	Notices Required for Disposal Facilities	270.14(b)(13)		NA	

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SECTION I. CLOSURE POST-CLOSURE PLANS AND FINANCIAL REQUIREMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-3a	Certification of Closure	270.14(b)(13); 264.115; 264.280		Attch 14	
I-3b	Survey Plat	270.14(b)(13); 264.116		NA	
I-3c	Post-Closure Certification	270.14(b)(13); 264.120		NA	
I-3d	Post-Closure Notices	270.14(b)(13); 270.14(b)(14); 264.119		NA	
I-4	Closure Cost Estimate	270.14(b)(15); 264.142	Estimate must equal final cost estimate. Estimate must be based on third party closing facility and may use on-site disposal if capacity will exist over life of facility. Estimate must be adjusted for annual inflation as stated in 264.142(b). Estimates may not assume zero cost for hazardous waste handling, and may not incorporate salvage value, facility structures/equipment, land, or other facility assets as offsets.	NA	
I-5	Financial Assurance for Closure	270.14(b)(15); 264.143; 264.151		NA	
I-5a	Closure Trust Fund	270.14(b)(15); 264.143(a); 264.151(a)(1)	Provide copy of fund agreement.	NA	
I-5b	Surety Bond	270.14(b)(15); 264.143(b),(c); 264.151(b),(c)		NA	

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SECTION I. CLOSURE POST-CLOSURE PLANS AND FINANCIAL REQUIREMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-5b(1)	Surety Bond Guaranteeing Payment into a Closure Trust Fund	270.14(b)(15); 264.143(b); 264.151(b)	Must provide bond or standby trust agreement. Bond must guarantee owner/operator will fund standby trust fund or provide financial assurance equal to penal sum.	NA	
I-5b(2)	Surety Bond Guaranteeing Performance of Closure	270.14(b)(15); 264.143(c); 264.151(c)	Guarantee owner/operator will perform closure required as worded in 246.151(c) and Subpart G.	NA	
I-5(c)	Closure Letter of Credit	270.14(b)(15); 264.143(d); 264.151(d)	Requires letter of credit for 1 year equal to amount of closure.	NA	
I-5(d)	Closure Insurance	270.14(b)(15); 264.143(e); 264.151(e)	Provide copy of certificate of insurance, wording requirement found in 264.151(e).	NA	
I-5(e)	Financial Test and Corporate Guarantee for Closure	270.14(b)(15); 264.143(f); 264.151(f),(h)	Signed letter by owner/operator or chief financial officer as specified in 264.151(f),(h) of applicant financial statement. If a parent corporation is guaranteeing closure care, corporate guarantee must accompany.	NA	
I-5(f)	Use of Multiple Financial Mechanism	270.14(b)(15); 264.143(g)	Financial assurance instruments must meet requirements stated in 264.143 (a),(b),(c),(d) or (e) that include trust funds, surety bonds, letter of credit, and insurance, respectively.	NA	
I-5(g)	Use of Multiple Financial Mechanism for Multiple Facilities	270.14(b)(15); 264.143(h)	Provide financial assurance mechanism showing amount of funds assured.	NA	
I-6	Post-Closure Cost Estimate	270.14(b)(16); 264.144	Estimate must be based on third party closing facility and may use on-site disposal if capacity will exist over life of facility. Estimate must be adjusted for annual inflation as stated in 264.142(b).	NA	

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SECTION I. CLOSURE POST-CLOSURE PLANS AND FINANCIAL REQUIREMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-7	Financial Assurance Mechanism for Post Closure Care	270.14(b)(16); 264.145; 264.151		NA	
I-7a	Post-Closure Trust Fund	270.14(b)(16); 264.145(a); 264.151(a)(1)	Provide copy of post-closure fund agreement. Wording requirements outlined in 264.151(a)(1).	NA	
I-7b	Surety Bond	270.14(b)(16); 264.145(b),(c); 264.151(b),(c)	264.145(b),(c) spells out requests for owner/operator for adjusting estimates, inflation, and reporting to regional administrator. 264.151(b),(c) outlines wording for bond agreement.	NA	
I-7b(1)	Surety Bond Guaranteeing Payment into a Post-Closure Trust Fund	270.14(b)(16); 264.145(b); 264.151(b)	Must provide bond or standby trust agreement before beginning final closure of the facility. Bond must guarantee owner/operator will fund a standby trust fund or provide financial assurance equal to penal sum.	NA	
I-7b(2)	Surety Bond Guaranteeing Performance of Closure	270.14(b)(16); 264.145(c); 264.151(c)	Guarantee owner/operator will perform closure required as stated in 246.151(c) and Subpart H.	NA	
I-7(c)	Post-Closure Letter of Credit	270.14(b)(16); 264.145(d); 264.151(d)	Requires letter of credit for 1 year equal to amount of post-closure cost.	NA	
I-7(d)	Post-Closure Insurance	270.14(b)(16); 264.145(e); 264.151(e)	Provide copy of certificate of insurance, wording requirement found in 264.151(e).	NA	
I-7(e)	Financial Test and Corporate Guarantee for Post-Closure Care	270.14(b)(16); 264.145(f); 264.151(f),(h)	Signed letter by owner/operator or chief financial officer as specified in 264.151(f),(h) of applicant financial statement. If parent corporation is guaranteeing post-closure care, corporate guarantee must accompany.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION I. CLOSURE POST-CLOSURE PLANS AND FINANCIAL REQUIREMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-7(f)	Use of Multiple Financial Mechanism	270.14(b)(16); 264.145(g)	Provide copy of financial assurance mechanisms. Combined financial assurance must be at least equal to post-closure cost estimate.	NA	
I-7(g)	Use of Multiple Financial Mechanism for Multiple Facilities	270.14(b)(16); 264.145(h)	Provide copy of financial assurance mechanisms for more than one facility. Amount must be no less than sum of funds that would be available if separate mechanism had been established and maintained for each facility.	NA	
I-8	Liability Requirements	270.14(b)(17); 264.147		NA	
I-8a	Coverage for Sudden Accidental Occurrences	270.14(b)(17); 264.147(a)	Coverage must be maintained for sudden accidental occurrences in the amount of $1 million per occurrence with an annual agreement of at least $2 million.	NA	
I-8a(1)	Endorsement of Certification	270.14(b)(17); 264.147(a)(1)	Submit original Hazardous Waste Facility Liability Endorsement wording pursuant to 264.151(i), or Certificate of Liability wording pursuant to 264.151(j).	NA	
I-8a(2)	Financial Test and Corporate Guarantee for Liability Coverage	270.14(b)(17); 264.147(a)(2), (f),(g); 264.151(f),(g)	Requires signed letter by owner or chief financial officer worded as outlined in 264.151(g) outlining applicant financial statement. 264.151(g) used if applicant is using financial test to cover cost for closure or post closure. Alternatively, owner/operator may submit corporate guarantee specified in 264.151(h)(2).	NA	
I-8a(3)	Use of Multiple Financial Mechanism	270.14(b)(17); 264.147(a)(3)	Submit items demonstrating liability coverage specified in I-8a(1) and I-8a(2). Amount of coverage must total at least minimum amount required by 264.147(a).	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION I. CLOSURE POST-CLOSURE PLANS AND FINANCIAL REQUIREMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-8b	Coverage for Nonsudden Accidental Occurrences	270.14(b)(17); 264.147(b)	For high risk storage facilities, surface impoundments, land disposal, land treatment facilities, liability coverage must be maintained in the amount of at least $3 million per occurrence. Annual aggregate at least $6 million.	NA	
I-8b(1)	Endorsement or Certification	270.14(b)(17); 264.147(b)(1)	Submit signed duplicate original of Hazardous Waste Facility Liability Endorsement.	NA	
I-8b(2)	Financial Test or Corporate Guarantee for Liability Coverage	270.14(b)(17); 264.147(b)(2); 264.151(f),(g)	Requires signed letter by owner or chief financial officer worded as outlined in 264.151(g) outlining applicant financial statement. 264.151(g) used if applicant is using financial test to cover cost for closure or post closure. Alternatively, owner/operator may submit corporate guarantee specified in 264.151(h)(2).	NA	
I-8b(3)	Use of Multiple Insurance Mechanism	270.14(b)(17); 264.147(b)(3)	Submit items demonstrating liability coverage specified in I-8a(1) and I-8a(2). Amount of coverage must total at least minimum amount required by 264.147(b).	NA	
I-8c	Requests for Variance	270.14(b)(17); 264.147(c)	Request for adjusted level of required liability must be supported by information which demonstrates 264.147(a) or (b) are not consistent with degree and duration of risk associated with treatment, storage, or disposal at facility or group of facilities.	NA	
I-9	Use of State Required Mechanisms	270.14(b)(18)		NA	
I-9a	Use of State Required Mechanisms	270.14(b)(18); 264.149	When state has regulations equivalent or greater liability requirements for financial assurance for closure post-closure submit copy of state-required financial mechanism.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS SECTION I. CLOSURE POST-CLOSURE PLANS AND FINANCIAL REQUIREMENTS					
Section and Requirement		**Federal Regulation**	**Review Consideration[a]**	**Location in Application[b]**	**See Attached Comment Number[c]**
I-9b	State Assumption of Responsibility	270.14(b)(18) : 264.150	If state assumes legal responsibility for compliance with closure, post-closure, or liability requirements there must be a letter submitted from state specifying assumption of responsibilities and amounts of liability.	NA	

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CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION J. SOLID WASTE MANAGEMENT UNITS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
J-1	Characterize the Solid Waste Management Unit (SWMU)	270.14(d)(1)	Describe methodology used to determine that no existing or former SWMUs exist at facility if applicable.	Draft Permit	
J-2	Releases	270.14(d)(2)	Provide following information concerning releases: date of release; type, quantity, and nature of release; groundwater monitoring and other analytical data; physical evidence of stressed vegetation; historical evidence of releases; any state, local, or federal enforcement action that may address releases; any public citizen complaints that indicate a release; and any other information showing the migration of the release. Describe methodology used to determine that releases from SWMUs are not present.	Draft Permit	

Notes:

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Reviewer: ____________________

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION K. OTHER FEDERAL LAWS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See attached Comment Number[c]
K-1	Other Federal Laws	270.14(b)(20), 270.3	Demonstrate compliance with requirements of applicable Federal laws such as the Wild and Scenic Rivers Act, National Historic Preservation Act of 1966, Endangered Species Act, Coastal Zone Management Act, and Fish and Wildlife Coordination Act.	Part A	

Notes:

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CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION L. PART B CERTIFICATION

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
L-1	Part B Certification	270.11		Page 1	

Notes:

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CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION M. SUBPART AA PROCESS VENTS

	Section and Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
M-1	Definition of Process Vent	270.14(a); 264.1030; 264.1031	A process vent is any open-ended pipe or stack that is vented to atmosphere either directly, through a vacuum-producing system, or through a tank.	NA	
M-2	Applicability—Process Vents Associated with the Following Six Operations that Manage Hazardous Waste with Organic Concentrations of at Least 10 Parts per Million by Weight if these Operations are Conducted in; a Unit Subject to the Permitting Requirements of 270; a Unit (including a Hazardous Waste Recycling Unit) that is Not Exempt from Permitting Under 262.34(a) and is Located at a Hazardous Waste Management Facility Otherwise Subject to Permitting Requirements; and a Unit that is Exempt from Permitting Under 262.34(a)	270.14(a); 264.1030(b); 264.1031	Concentrations should be determined by a time-weighted average annually or when waste or process changes.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION M. SUBPART AA PROCESS VENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
M-2a	Distillation—a Batch or Continuous Operation Which Separates One or More Feed Stream(s) into Two or More Exit Streams, Each Exit Stream Having Component Concentrations Different from Those in the Feed Stream(s)	270.24(b)(3); 264.1030(b); 264.1031	Include process description.	NA	
M-2b	Fractionation—a Distillation Operation or Method Used to Separate a Mixture of Several Volatile Components of Different Boiling Points in Successive Stages	270.24(b)(3); 264.1030(b); 264.1031	Include process description.	NA	
M-2c	Thin-Film Evaporation—a Distillation Operation that Employs a Heating Surface Consisting of a Large Diameter Tube that May be Either Straight or Tapered, Horizontal or Vertical	270.24(b)(3); 264.1030(b); 264.1031	Include process description.	NA	
M-2d	Solvent Extraction—an Operation or Method of Separation in Which a Solid or Solution Contacts a Liquid Solvent (The Two Being Mutually Insoluble) to Preferentially Dissolve and Transfer One or More Components into the Solvent	270.24(b)(3); 264.1030(b); 264.1031	Include process description.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION M. SUBPART AA PROCESS VENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
M-2e	Air Stripping—a Desorption Operation Employed to Transfer One or More Volatile Components from a Liquid Mixture into a Gas (Air) Either with or Without the Application of Heat to the Liquid	270.24(b)(3); 264.1030(b); 264.1031	Include process description.	NA	
M-2f	Stream Stripping—a Distillation Operation in Which Vaporization of the Volatile Constituents of a Liquid Mixture Takes Place by the Introduction of Steam Directly into the Charge.	270.24(b)(3); 264.1030(b); 264.1031	Include process description.	NA	
M-3a	Reduce Total Organic Emission below 1.4 Kilogram per Hour (3 Pounds per Hour) and 2.8 Million Grams per Year (3.1 Tons per Year), <u>or</u>	270.24(b); 264.1032(a)(1),(c)	Engineering calculations or performance tests may be used to determine vent emissions and emissions reductions or total organic compound concentrations achieved by add-on control devices.	NA	
M-3b	Reduce Total Organic Emissions of 95 Percent by Weight with the Use of a Control Device	270.24(b); 264.1032(a)(2),(b)	Engineering calculations or performance tests may be used to determine vent emissions and emissions reductions or total organic compound concentrations achieved by add-on control devices.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION M. SUBPART AA PROCESS VENTS

Section and	Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
M-3c	Reduce Emissions for Various Control Devices with Closed-vent Systems under the Following Operational Conditions:	270.24(b); 264.1032(a - b); 264.1033 (b - j)	Closed-vent systems are optional devices, but shall comply with regulations if they are used.	NA	
M-3c(1)	Control Device Involving Vapor Recovery (Condenser or Adsorber) Shall Recover at Least 95 Percent by Weight of the Organic Vapors	270.24(b); 264.1032(a) (1),(b)	A less than 95 percent recovery is permissible if control devices meet emission limits set in 264.1032(a)(1).	NA	
M-3c(2)	Enclosed Combustion Device (A Vapor Incinerator, Boiler, or Process Heater) Shall Recover at Least 95 Percent by Weight of Organic Emissions	270.24(d); 264.1033(c)	The device shall achieve 20 parts per million by weight or 1/2 second residence time at 760 °C.	NA	
M-3c(3)	A Flare Shall Operate under the Following Four Conditions: (1) No Visible Emissions, (2) a Flame Present at all Times, (3) an Acceptable Net Heating Value, and (4) Appropriate Exit Velocity	270.24(d); 264.1033(d)		NA	
M-4	Inspection Readings Shall Be Conducted at Least Daily. Vent Stream Flow Information Shall be Provided at Least Hourly.	270.24(d); 264.1033(f) (1),(3)		NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION M. SUBPART AA PROCESS VENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
M-4a	Continuous Monitoring for the Following Control Devices:	270.24(d); 264.1033(f)(2)		NA	
M-4a(1)	Thermal Vapor Incinerator (One Temperature Sensor).	270.24(d); 264.1033(f)(2)(i)	Sensor shall have accuracy of ± 1 percent °C or ± 0.5 °C, whichever is greater.	NA	
M-4a(2)	Catalytic Vapor Incinerator (Two Temperature Sensor)	270.24(d); 264.1033(f)(2)(i)	Sensor shall have accuracy of ± 1 percent °C or ± 0.5 °C, whichever is greater.	NA	
M-4a(3)	Flare (Heat Sensing Device)	264.1033(f)(2)(iii)		NA	
M-4a(4)	Boiler or Process Heater with Heater Input Capacity Equal or Greater than 44 Megawatts (Recorder Which Indicates Good Combustion Practices)	270.24(d); 264.1033(f)(2)(v)		NA	
M-4a(5)	Condenser (Device with Recorder to Measure the Concentration of Organic Compounds in the Condenser Exhaust Vent Stream or Temperature Monitoring Device Equipped with Recorder to Measure Temperature in the Condenser Exhaust Vent Stream)	270.24(d); 264.1033(f)(2)(vi)	Sensor shall have accuracy of ± 1 percent °C or ± 0.5 °C, whichever is greater.	NA	
M-4a(6)	Carbon Adsoprtion System (Device to Measure Organic Vapors or a Recorder that Verifies Predetermined Regeneration Cycle)	270.24(d); 264.1033(f)(2)(vii)		NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION M. SUBPART AA PROCESS VENTS

Section and	Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
M-4b	Alternate Monitoring of Control Device	270.24(c); 264.1033(i)	Describe measurement of applicable monitoring parameters.	NA	
M-4c	Inspection of the Following Control Devices:	270.24(d); 264.1033(g - h)		NA	
M-4c(1)	Regenerable Carbon Adsorption System	270.24(d); 264.1033(g)	Carbon replacement schedule must be acceptable.	NA	
M-4c(2)	Nonregenerable Carbon Adsoprtion System	270.24(d); 264.1033(h)	Carbon shall be replaced when breakthrough is observed or on an acceptable schedule.	NA	
M-5	Basic Design and Operation			NA	
M-5a	The Closed-Vent System Shall be Designed to Operate According to Either of the Following:	270.24(d); 264.1033(k)		NA	
M-5a(1)	With No Detectable Emissions	270.24(d); 264.1033(k)(1)	Emissions shall be less than 500 parts per million above background.	NA	
M-5a(2)	At a Pressure below Atmospheric Pressure	270.24(d); 264.1033(k)(2)	System shall be equipped with at least one pressure gauge or other measurement device that can be read from a readily accessible location to verify negative pressure is being maintained in system during operation.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION M. SUBPART AA PROCESS VENTS

Section and	Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
M-5b	Owner/operator Shall Monitor and Inspect Each System	270.24(d); 264.1033(1)	The monitoring and inspection shall be done: (1) by date the system is subject to regulation, (2) annually, and (3) other times requested by the U.S. Environmental Protection Agency regional administrator. Various inspection and monitoring requirements apply depending upon the type of closed-vent system employed. All detected defects shall be repaired according to the schedule prescribed in 264.1033(l)(3).	NA	
M-5c	Closed-Vent System Shall be Operated at all Times When Emissions May be Vented to Them.	270.24(d); 264.1033(m)		NA	
M-5d	Carbon Adsorption System Used to Control Air Pollutant Emissions	270.24(d); 264.1033(n)	Owner/operator must document that all carbon that is a hazardous waste and removed from the control device is managed in one of these approved manners: 264.1033(n)(1), (2), or (3).	NA	
M-6	Any Components of a Closed-Vent System that are Designated as Unsafe to Monitor are Exempt from the Monitoring Requirements of 1033(l)(1)(i)(B) if Certain Conditions are Met.	270.24(d); 264.1033(o)	Applies to system if its components are unsafe to monitor and it adheres to written plan that requires monitoring using the procedures in 264.1033(l)(1)(ii)(B) as frequently as practicable during safe-to-monitor times.	NA	

Reviewer: ______________________

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION M. SUBPART AA PROCESS VENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
M-7a	Owner/operator Complies with Record Keeping Requirements	270.24(d); 264.1033; 264.1035	Depending on the type of control devices and closed vent systems used, various records must be maintained in the facility operating record.	NA	
M-7b	Semiannual Report is Submitted According to Subpart AA Requirements	270.14(a); 264.1036	A semiannual report is only required if a control device operates outside the design specifications.	NA	
M-7c	Implementation Schedule is Provided	270.24(a); 264.1033(a)(2)	A schedule shall be provided when facilities cannot install a closed-vent system and control device to comply with Part 264 on date facility is subject to requirements.	NA	
M-7d	Performance Test Plan is Provided	270.24(c); 264.1035(b)(3)	A performance test plan shall be provided where owner/operator applies for permission to use control device other than thermal vapor incinerator, catalytic vapor incinerator, flare, boiler, process heater, condenser, or carbon adsorption system, and chooses to use test data to determine organic removal efficiency achieved by control device.	NA	

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CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION N. SUBPART BB EQUIPMENT LEAKS

	Section and Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
N-1a	Applicability	270.14(a); 270.25; 264.1050(b),(d)	Except as otherwise specified, this subpart applies to equipment that contains or contacts hazardous waste with organic concentrations of at least 10 percent by weight that are managed in one of the following: if these operations are conducted in; a unit subject to the permitting requirements of 270; a unit (including a hazardous waste recycling unit) that is not exempt from permitting under 262.34(a) and is located at a hazardous waste management facility otherwise subject to permitting requirements; and a unit that is exempt from permitting under 262.34(a) such as a 90-day tank or container.	NA	
N-1b	Definition of Equipment	270.14(a); 270.25; 264.1031; 264.1051	Examples include: valve, pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, or flange.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION N. SUBPART BB EQUIPMENT LEAKS

Section and	Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
N-1c	Equipment in a Vacuum or Equipment that Contains or Contacts Hazardous Waste with an Organic Concentration of at Least 10 Percent by Weight for a Period of Less than 300 Hours per Calendar Year is Excluded from Requirements at 264.1052 to 264.1060.	270.14(a); 270.25; 264.1050(f)	Equipment shall be identified in a log in facility's operating record as required by 264.1064(g) in order to qualify for exclusion.	NA	
N-2a	Monthly Monitoring for Leaks	270.25(d); 264.1052(a)(1)		NA	
N-2b	Visual Inspection for Pump Seal Leakage on a Weekly Basis	270.25(d); 264.1052(a)(2)		NA	
N-2c	Leak Detection	270.25(d); 264.1052(b); 264.1063	Leak detected if: (1) leak detection instrument reads 10,000 parts per million (ppm) or greater, or (2) there are indications of liquid dripping from the pump seal.	NA	
N-2d	Leak Repair as Soon as Practicable	270.25(d); 264.1052(c); 264.1059	Repairs are to be made within 15 calendar days after detection. Repair extensions are allowed under conditions specified in 264.1059.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION N. SUBPART BB EQUIPMENT LEAKS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
N-2e	Specific Exceptions to these Standards	270.25(d); 264.1052(d - f)	Exceptions to these standards are dual mechanical seal systems or no detectable emissions.	NA	
N-3a	Barrier Fluid Pressure Greater than the Compressor Stuffing Box Pressure	270.25(d); 264.1053(b)(1)		NA	
N-3b	Barrier Fluid System Connected by a Closed-Vent System to a Control Device as Described in Subpart AA	270.25(d); 264.1053(b)(2)		NA	
N-3c	No Detectable Atmospheric Emissions of Hazardous Contaminants from the Barrier System	270.25(d); 264.1053(b)(3)		NA	
N-3d	Sensors Checked Daily or an Audible Alarm Checked Monthly	270.25(d); 264.1053(d - c)		NA	
N-3e	Leak Detection	270.25(d); 264.1053(f)	A leak is detected if sensor indicates failure of: (1) seal system, or (2) barrier fluid system.	NA	
N-3f	Leak Repair as Soon as Practicable	270.25(d); 264.1053(g)(1); 264.1059	Repairs are to be made within 15 calendar days after detection. Repair extensions are allowed under conditions specified in 264.1059.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION N. SUBPART BB EQUIPMENT LEAKS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
N-3g	Specific Exceptions to these Standards	270.25(d); 264.1053(h - i)	Exceptions to these standards are certain closed vent systems or no detectable emissions.	NA	
N-4a	Except During Pressure Releases, No Pressure Relief Device Shall Release Detectable Emissions	270.25(d); 264.1054(a)	Emissions shall be less than 500 ppm above background levels.	NA	
N-4b	Within 5 Calendar Days after a Pressure Release, No Detectable Emissions Shall Emanate from Pressure Released Device	270.25(d); 264.1054(b)	Emissions shall be less than 500 ppm above background levels.	NA	
N-4c	Specific Exceptions to These Standards	270.25(d); 264.1054(c)	Exceptions to these standards are certain closed vent systems.	NA	
N-5a	Each Sampling Connecting System Shall Be Equipped with a Closed-Purge, Closed Loop, or Closed-Vent System. Closed-Vent Systems and Control Devices are also Subject to 264.1033	270.25(d); 264.1055(a - b); 264.1060	Each closed-purge, closed-loop, or closed-vent system shall either: (1) return purged process fluid directly to process line, (2) collect and recycle purged process liquid, or (3) be designed and operated to capture and transport all purged process fluid to a waste management unit or control device that satisfies applicable requirements.	NA	
N-5b	Exemption for Qualified Sampling Systems	270.25(d); 264.1055(c)	In situ sampling systems and sampling systems without purges are exempt from requirements of 264.1055(a),(b).	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION N. SUBPART BB EQUIPMENT LEAKS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
N-6a	Open-Ended Valve or Line	270.25(d); 264.1056(a), (c)	A double block or bleed system must comply with the open-ended valve or line requirements.	NA	
N-6b	Second Valve	270.25(d); 264.1056(b)	A second valve shall be operated such that primary valve shall be closed before second valve is opened.	NA	
N-7	Monitoring Schedule Based on Detection of Leaks and Predetermined Schedule	270.25(d); 264.1057(a - e)	A reading of 10,000 ppm denotes a detected leak.	NA	
N-7d	Specific Exceptions to the Monitoring Schedule	270.25(d); 264.0157(f - h); 264.1061; 264.1062	Exceptions to schedule include unsafe-to-monitor valves, no detectable emissions, and difficult-to-monitor valves.	NA	
N-8a	Monitoring	270.25(d); 264.1058(a); 264.1063(b)	Monitoring is required within 5 days after leak is found by sight, sound, smell, or other detection method.	NA	
N-8b	Leak Detection	270.25(d); 264.1058(b)	A leak is detected if a leak detection instrument reads 10,000 ppm or greater.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION N. SUBPART BB EQUIPMENT LEAKS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
N-8c	Leak Repair as Soon as Practicable	270.25(d); 264.1058(c); 264.1059	Repairs are to be made within 15 calendar days after detection. The first attempt at repair shall be made no later than 5 calendar days after each leak is detected. Repair extensions are allowed under conditions specified in 264.1059.	NA	
N-8d	Any Connector that is Inaccessible or is Ceramic or Ceramic-Lined is Exempt from the Monitoring Requirements of 264.1058(a) and 264.1064	270.25(d); 264.1058(e)	Examples of ceramic-lined connectors include porcelain, glass, or glass-lined connectors.	NA	
N-9	Specific Allowances for Delay of Repair for Various Types of Equipment	270.25(d); 264.1059		NA	
N-10	When Closed-Vent Systems and Control Devices are Used, they Must Comply with the Requirements in Subpart AA	270.25(e); 264.1033; 264.1060		NA	
N-11	An Owner/Operator may Elect to Comply with this Alternative Monitoring Program	270.25(e); 264.1061	No greater than 2 percent of the valves are allowed to leak per monitoring period.	NA	
N-12	An Owner/Operator may Elect to Comply with this Alternative Work Practice	270.25(e); 264.1062	Relief of monitoring frequency is allowed if less than 2 percent of the valves are leaking.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION N. SUBPART BB EQUIPMENT LEAKS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
N-13	Owner Complies with Recordkeeping Requirements	270.25(a); 264.1064	Depending on the type of requirement, various records must be maintained in the facility operating record.	NA	
N-13a	Semiannual Report	270.25(a); 264.1065	A semiannual report is only required if leaks from equipment have gone unrepaired or a control device operates outside the design specifications.	NA	
N-13b	Implementation Schedule	270.25(b)	An implementation schedule shall be provided if facility cannot install closed-vent system and control device to comply with provisions of Part 264, Subpart BB on the effective date that facility becomes subject to provisions of Parts 264 and 265.	NA	
N-13c	Performance Test Plan	270.25(c)	A performance test plan shall be provided if the owner/operator applies for permission to use a control device for other than a thermal vapor incinerator, flare, boiler, process heater, condenser, or carbon adsorption system and chooses to use test data to determine the organic removal efficiency achieved by the control device.	NA	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION O. SUBPART CC AIR EMISSION STANDARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-1	Standards Apply to All Facilities That Treat, Store, or Dispose of Hazardous Waste in Tanks, Surface Impoundments, or Containers Subject to 264, Subparts I, J, or K, Except as Provided Otherwise	270.14(a); 270.27; 264.1080 (a) - (d)	Exclusions from 264.1080(a) are listed at 264.1080(b) (e.g., a container that has a design capacity less than or equal to 0.1 cubic meters [m^3]).	NA	
O-2	Following is a List of Units that are Exempt from the 264.1084-264.1087 Standards:	270.14(a); 270.27; 264.1082(c)		NA	
O-2a	A Tank, Surface Impoundment, or Container for Which All Hazardous Waste Entering the Unit Has an Average Volatile Organic Concentration at the Point of Waste Origination of less than 500 Parts per Million by Weight (ppmw)	270.14(a); 270.27; 264.1082(c)(1)	Waste determination procedures are specified at 264.1083.	NA	
O-2b	A Tank, Surface Impoundment, or Container for Which the Organic Content of all the Hazardous Waste Entering the Waste Management Unit has been Reduced by an Organic Destruction or Removal Process that Achieves Specified Criteria	270.14(a); 270.27; 264.1082(c)(2)	Waste determination procedures are specified at 265.1084(b)(2)-(b)(9).	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION O. SUBPART CC AIR EMISSION STANDARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-2c	A Tank Used for Biological Treatment of Hazardous Waste that Destroys or Degrades the Organics Contained in the Hazardous Waste such that the Requirements of 264.1082(c)(2)(iv) are Met	270.14(a); 270.27; 264.1082(c)(3)	Waste determination procedures are specified at 264.1083(b) and 264.1083(a).	NA	
O-2d	A Tank, Surface Impoundment or Container for Which all Hazardous Waste Placed in the Unit Meets Applicable Organic Concentration Limits or has been Treated by Appropriate Treatment Technology	270.14(a); 270.27; 264.1082(c)(4)	Waste determination procedures are specified at Part 268.	NA	
O-2e	A Tank Located Inside an Enclosure Vented to a Control Device that is Used for Bulk Feed of Hazardous Waste to a Waste Incinerator that Meets Specified Criteria	270.14(a); 270.27; 264.1082(c)(5)	Design and operation of the control device and enclosure shall satisfy Part 61, Subpart FF; 52.741, Appendix B; and other conditions as specified.	NA	
O-3	Several Waste Determination Procedures are Explained in Detail and Must be Followed in Order to Demonstrate the Various Subpart CC Exemptions and/or Control Requirements	270.14(a); 270.27; 264.1083; 265.1084	In general, an owner or operator need not undergo waste determination procedures unless they are pursuing an exemption from the Subpart CC regulations.	NA	

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SECTION O. SUBPART CC AIR EMISSION STANDARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-4	Tanks that Satisfy the Conditions at 264.1084(b)(1)(i-iii) Can Use Tank Level 1 or Tank Level 2 Controls. Tanks that do not Satisfy Conditions Shall Use Tank Level 2 Controls	270.14(a); 270.27; 264.1084(b)(1), (2)		NA	
O-5a	The Conditions at 264.108(b)(1)(i-iii) Provide that Hazardous Waste in the Tank Shall:	270.14(a); 270.27; 264.1084(b)(1)		NA	
O-5a(1)	Have Maximum Organic Vapor Pressure Which is less than Maximum Organic Vapor Pressure Limit for Tank's Design Capacity Category	270.14(a); 270.27; 264.1084(b)(1)(i)		NA	
O-5a(2)	Not be Heated to Temperature Greater than Temperature at Which Maximum Organic Vapor Pressure of Waste is Determined for Purposes of Compliance	270.14(a); 270.27; 264.1084(b)(1)(ii)		NA	
O-5a(3)	Not be Treated Using a Waste Stabilization Process, as Defined in 265.1081	270.14(a); 270.27; 264.1084(b)(1)(iii)	A waste stabilization process includes mixing hazardous waste with binders or other materials, and curing resulting hazardous waste and binder mixture.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION O. SUBPART CC AIR EMISSION STANDARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-5b	Maximum Organic Vapor Pressure Determination	270.14(a); 270.27; 264.1084(c) (1)	Must be determined before first time waste placed in tank, and retested whenever changes could cause it to increase above the maximum vapor pressure limit [264.1084(b)(1)(i)].	NA	
O-5b(1)	Tank Level 1. Owner/Operator Shall Equip Tanks with Fixed Roof and Closure Devices as Needed	270.14(a); 270.27; 264.1084(c) (2), (3)	Fixed roof/closure devices shall form continuous barrier over entire waste in tank; contain no visible open spaces between roof section joints or between interface of roof edge and tank wall; contain openings with closure devices or closed-vent system; and be made of suitable materials.	NA	
O-5b(2)	Tank Level 2. Owner/Operator Shall Use One of the Following Tanks:	270.14(a); 270.27; 264.1084(d)		NA	
O-5b(2)(i)	Fixed Roof Tank Equipped with Internal Floating Roof	270.27(a)(1); 264.1084(d)(1) (e)	Internal floating roof shall be designed to float on liquid surface, except when supported by leg supports; be equipped with continuous seal between tank wall and floating roof edge; and meet other design specifications.	NA	
O-5b(2)(ii)	Tank Equipped with an External Floating Roof	270.27(a)(1); 264.1084(d)(2), (f)	External floating roof shall be designed to float on all liquid surface, except when supported by leg supports; be equipped with two continuous seals; and meet other design specifications.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION O. SUBPART CC AIR EMISSION STANDARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-5b(3)	Tank Vented Through Closed-Vent System to a Control Device	270.14(a); 270.27; 264.1084(d)(3), (g)	Fixed roof/closure devices shall form continuous barrier over entire liquid surface; be made of suitable materials; and satisfy 264.1087 standards.	NA	
O-5c	Pressure Tank	270.14(a); 270.27; 264.1084(d)(4), (h)	Tank shall be designed not to bend to atmosphere as result of compression of vapor headspace in tank, and be equipped with closure devices as needed.	NA	
O-5d	Tank Located Inside an Enclosure that is Vented Through a Closed-Vent System to an Enclosed Combustion Control Device	270.14(a); 270.27; 264.1084(d)(5), (1)	Tank shall be located in enclosure that is vented through closed vent system to enclosed combustion device, and enclosure shall be equipped with safety devices as needed.	NA	
O-5e	Tank Level 1. Owner/Operator Shall:	270.14(a); 270.27; 264.1084(c) (1),(3)		NA	
O-5e(1)	Determine Maximum Organic Vapor Pressure for Hazardous Waste Initially and Whenever Changes could Cause the Vapor Pressure to Increase Above the Maximum Organic Vapor Pressure Limit	270.14(a); 270.27; 264.1084(c)(1)	Maximum organic vapor pressure shall be determined using 264.1083(c) procedures.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION O. SUBPART CC AIR EMISSION STANDARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-5e(2)	Ensure that, Whenever Hazardous Waste is in Tank, the Fixed Roof is Installed with Each Closure Device Secured in Closed Position		Exceptions are listed at 264.1084(c)(3)(i-iii).	NA	
O-5e(3)	Inspect the Air Emission Control Equipment	270.14(a); 270.27; 264.1084(c)(4)		NA	
O-5f	Tank Level 2. Owner/Operators Shall Adhere to the Following Operating Procedures for Each Unit Type:	270.14(a); 270.27; 264.1084(e)(i)		NA	
O-5f(1)	Fixed Roof Tank Equipped with Internal Floating Roof	270.14(a); 270.27; 264.1084(e) (2),(3)	When floating roof is resting on leg supports, filling, emptying, or refilling shall be continuous and completed as soon as practical; when roof is floating, automatic bleeder vents shall be set closed; and prior to filling, openings in roof shall be secured. Inspect the floating roof.	NA	
O-5f(2)	Tank Equipped with an External Floating Roof	270.14(a); 270.27; 264.1084(f) (2),(3)	When floating roof is resting on leg supports, filling, emptying, or refilling shall be continuous and completed as soon as practical; when closure device is open for access, equipment and devices shall be closed and secured as specified; and seals shall provide a continuous and complete cover as specified. Inspect the floating roof.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION O. SUBPART CC AIR EMISSION STANDARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-5f(3)	Tank Vented Through Closed-Vent System to a Control Device	270.14(a); 270.27; 264.1084(g)(2), (3)	When hazardous waste is in tank, fixed roof shall be installed with closure devices secured in closed position and vapor headspace underneath fixed roof vented to control device, except as specified. Inspect and monitor the air emission control equipment.	NA	
O-5f(4)	Pressure Tank	270.14(a); 270.27; 264.1084(h)(2), (3)	When hazardous waste is in tank, it shall be operated as closed system that does not vent to atmosphere, except to avoid an unsafe condition.	NA	
O-5f(5)	Tank Located Inside an Enclosure that is Vented Through a Closed-Vent System to an Enclosed Combustion Control Device	270.27(a)(3), 264.1084(i)	Enclosure shall be operated in accordance with 52.741, Appendix B, and comply with applicable closed-vent requirements. Safety devices may be operated as needed. Inspect and monitor the system and control device.	NA	
O-5f(6)	Shall be Conducted Using Continuous Hard-Piping or Another Closed System that Does Not Allow Exposure of Hazardous Waste to Environment	270.14(a); 270.27; 264.1084(j)(1)	Requirements do not apply under the conditions specified at 264.1084(j)(2).	NA	
O-6a	Owner/Operators Shall Install Either of the Following Controls:	270.14(a); 270.27; 264.1085(b)(d)		NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION O. SUBPART CC AIR EMISSION STANDARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-6a(1)	Floating Membrane Cover	270.27(a)(4); 264.1085 (b)(1), (c)(1)	Floating membrane cover shall float on liquid surface and form continuous barrier over entire liquid; be made of synthetic membrane material; contain no visible open spaces; and be equipped with closure devices and cover drains as needed.	NA	
O-6a(2)	Cover That Is Vented Through a Closed-Vent System to a Control Device	270.14(a); 270.27; 264.1085 (b)(2) and (d)(2)	Cover/closure devices shall form continuous barrier over entire liquid surface; be equipped with closure device; be made of suitable material; and be designed in compliance with 264.1087.	NA	
O-6b	Owner/Operators Shall Adhere to the Following Operating Procedures for Each Control Type:	270.14(a); 270.27; 264.1085 (c), (d)		NA	
O-6b(1)	Floating Membrane Cover	270.14(a); 270.27; 264.1085(c) (2), (3)	When hazardous waste is in surface impoundment, floating membrane cover shall float on liquid, and each closure device shall be secured in closed position, except as specified. Inspect the cover.	NA	

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SECTION O. SUBPART CC AIR EMISSION STANDARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-6b(2)	Cover that is Vented Through a Closed-Vent System to a Control Device	270.14(a); 270.27; 264.1085(d)(2), (3)	When hazardous waste is in surface impoundment, cover shall be installed with each closure device secured in closed position and vapor headspace underneath the cover vented to control device, except as specified. Closed-vent system and control device shall be operated in accordance with 264.1087. Inspect and monitor the control device.	NA	
O-7	Shall be Conducted Using Continuous Hard-Piping or Another Closed System	270.14(a); 270.27; 264.1085(c)(1)	Requirements do not apply under conditions specified at 264.1085(e)(2).	NA	
O-8a	Container Level 1 Standards Apply to:	270.14(a); 270.27; 264.1086(b)(1)		NA	
O-8a(1)	Container with Design Capacity Greater than 0.1 m^3 and less than or Equal to 0.46 m^3	270.14(a); 270.27; 264.1086(b)(1)(i)		NA	
O-8a(2)	Container with Design Capacity Greater than 0.46 m^3 that is not in Light Material Service	270.14(a); 270.27; 264.1086(b)(1)(ii)		NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION O. SUBPART CC AIR EMISSION STANDARDS

Section and	Requirement	Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-8ab	Container Level 2 Standards Apply to Container with a Design Capacity Greater than 0.46 m^3 that is in Light Material Service	270.14(a); 270.27; 264.1086(b)(1)(iii)		NA	
O-8c	Container Level 3 Standards Apply to Container with Design Capacity Greater than 0.1 m^3 that is Used for Stabilization	270.14(a); 270.27; 264.1086(b)(2)	Level 3 standards apply at those times during waste stabilization process when hazardous waste in container is exposed to atmosphere.	NA	
O-9	Identify Each Container Area Subject to Subpart CC	270.27(a)(2)		NA	
O-9a	Container Level 1. A Container Using Level 1 Controls is Defined as One of the Following:	270.27(a)(2); 264.1086(c)(1)		NA	
O-9a(1)	Container that Meets Department of Transportation Regulations on Packaging	270.27(a)(2); 264.1086(c)(1)(i),(f)	Container shall meet Part 178 or Part 179 and be managed in accordance with Parts 107, 172, 173, and 180.	NA	
O-9a(2)	Container Equipped with Cover and Closure Devices	270.27(a)(2); 264.1086(c)(1)(ii),(2)	Container shall be equipped with covers and closure devices, as needed.	NA	
O-9a(3)	Open-Top Container Equipped with Organic-Vapor Suppressing Barrier	270.27(a)(2); 264.1086(c)(1)(iii),(2)	Container shall be equipped with covers and closure devices, as needed.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION O. SUBPART CC AIR EMISSION STANDARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-9b	Container Level 2. A Container Using Level 2 Controls is Defined as One of the Following:	270.27(a)(2); 264.1086 (d)(1)(f),(g)		NA	
O-9b(1)	Container that Needs Department of Transportation (DOT) Regulations on Packaging	270.27(a)(2); 264.1086(d)(1)(i),(f)	Containers shall meet Part 178 or Part 179, and be managed in accordance with Parts 107, 172, 173, and 180.	NA	
O-9b(2)	Container that Operates with No Detectable Organic Emissions	270.27(a)(2); 264.1086(d)(1)(ii),(g)	Owner/operator shall follow the procedures at 264.1086(g) and 265.1084(d) to determine no detectable organic emissions.	NA	
O-9b(3)	Container that has been Demonstrated Within the Preceding 12 Months to be Vapor-Tight	270.27(a)(2); 264.1086(d)(1)(iii) and (h)	Owner/operator shall follow procedures at 264.1086(h) and Part 60, Appendix A, Method 27 to demonstrate container is vapor-tight.	NA	
O-9c	Container Level 3. A Container Using Level 3 Controls is Defined as One of the Following:	270.27(a)(2); 264.1086(e)(1), (2)		NA	
O-9c(1)	Container that is Vented Directly Through a Closed-Vent System to a Control Device	270.27(a)(2); 264.1086(e)(1)(i)	The closed-vent system and control device shall be designed in accordance with 264.1087. Safety devices may be installed as needed.	NA	
O-9c(2)	Container that is Vented Inside an Enclosure Which is Exhausted Through a Closed-Vent System to a Control Device	270.27(a)(2); 270.27(a)(3); 264.1086(e)(1)(ii)	The container/enclosure must be designed in accordance with 52.741, Appendix B and 264.1087. Safety devices may be installed as needed.	NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION O. SUBPART CC AIR EMISSION STANDARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-10a	Container Level 1. Owner/Operators Shall Install Covers and Closure Devices for the Container and Secure and Maintain Each Closure Device in Closed Position, Except as Specified	270.14(a); 270.27; 264.1086(c) (3), (4)	The closure device or cover may be opened for the purpose of adding or removing hazardous waste or for maintenance or to avoid unsafe conditions.	NA	
O-10b	Container Level 2. Owner/Operator Shall Install All Covers and Closure Devices for the Container and Maintain and Secure Each Closure Device in Closed Position, Except as Specified	270.14(a); 270.27; 264.1086(d)(2), (3)	Transfer of hazardous waste in or out of container shall be conducted in such a manner as to minimize exposure to atmosphere, as practical. The closure device or cover may be opened for the purpose of adding or removing hazardous waste or for maintenance or to avoid unsafe conditions.	NA	
O-10c	Container Level 3. Owner/Operators Shall Operate the System in Accordance with 52.741, Appendix B; 264.1087; and 265.1081, as Needed	270.14(a); 270.27; 264.1086(e) (3),(4), (5)		NA	
O-11a	Standards Apply to Each Closed-Vent System and Control Device Used to Control Air Emissions under Part 264; Subpart CC	270.14(a); 270.27; 264.1087(a)		NA	
O-11(b)	Closed-Vent Systems Shall:	270.27(a)(5); 264.1087(b)		NA	
O-11b(1)	Route Gases, Vapors, and Fumes to Control Device	270.27(a); 264.1087(b)(1)		NA	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION O. SUBPART CC AIR EMISSION STANDARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-11b(2)	Be Designed and Operated in Accordance with 264.1033(k)	270.27(a); 264.1087(b)(2)	The Subpart AA standards for closed-vent systems must be satisfied.	NA	
O-11b(3)	Meet the Requirements for Bypass Devices, if Applicable	270.27(a); 264.1087(b)(3)	Each bypass device shall be equipped with either a flow indicator or a seal or locking device.	NA	
O-12a	The Control Device Shall be One of the Following:	270.27(a)(5); 264.1087(c)(1)		NA	
O-12a(1)	A Control Device Designed and Operated to Reduce Total Organic Content on Inlet Vapor Stream Vented to the Control Device by at Least 95 Percent by Weight	270.27(a)(5); 264.1087(c)(1)(i)	Owner/operator shall demonstrate compliance using either performance test or design analysis, except as specified.	NA	
O-12a(2)	An Enclosed Combustion Device	270.27(a)(5); 264.1087(c)(1)(ii)	Owner/operator shall demonstrate compliance using either performance test or design analysis, except as specified. Control device shall be designed and operated in accordance with 264.1033(c).	NA	
O-12a(3)	A Flare	270.27(a)(5); 264.1087(c)(1)(iii)	Owner/operator shall demonstrate compliance using either performance test or design analysis, except as specified.	NA	

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SECTION O. SUBPART CC AIR EMISSION STANDARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-12b	Each Closed-Vent System and Control Device Shall Comply with the Operating Requirements of 264.1087(c)(2)	270.27(a)(5); 264.1087(c)(2)	Planned routine maintenance of control device shall not exceed 240 hours per year; system malfunctions shall be corrected as soon as practicable; and system shall be operated such that gases, vapors, or fumes are not actively vented to control device during planned maintenance or system malfunction, except as specified.	NA	
O-12c	A Carbon Adsorption System	270.27(a)(5); 264.1087(c)(3)	Carbon replacement and removal shall follow prescribed requirements in 264.1033(g), (h), and (n).	NA	
O-12d	Each Control Device Shall be Operated and Maintained in Accordance with 264.1033(j), Except for Certain Devices Identified (e.g., Flare)	270.27(a)(5); 264.1087(c)(4)	264.1033(j) requires the owner/operator to prepare documentation describing the control device's operation and to identify the process parameter(s) that indicate its proper operation and maintenance.	NA	
O-12e	The Owner/Operator Shall Demonstrate that a Control Device Achieves the Performance Requirements Using a Performance Test or Design Analysis, Except for Specific Devices Identified (e.g., flare)	270.27(a)(5); 264.1087(c)(5)	For performance test, owner/operator shall use the test specified at 264.103(c). For design analysis, owner/operator shall use an analysis that meets requirements specified at 264.1035(b)(4)(iii). In addition, the U.S. Environmental Protection Agency (EPA) prescribes unit-specific performance demonstration requirements for certain unit types at 264.1087(c)(5).	NA	

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SECTION O. SUBPART CC AIR EMISSION STANDARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-12f	If Design Analysis is Not Sufficient, then a Performance Test is Required	270.27(a)(5); 264.1087(c) (6)	The EPA regional administrator shall determine if a performance test is required to demonstrate control device's performance.	NA	
O-12h	Inspect and Monitor the Control Device	270.27(a)(5); 264.1087(c) (7)	Control devices shall be inspected and monitored at least once a day.	NA	
O-13	Each Tank, Surface Impoundment and Container Shall be Inspected, Monitored, and Repaired in Accordance with the 264 Subpart CC Requirements	270.27; 264.1088	Inspection, monitoring and repair requirements specific to each unit are located in the standards sections of the regulation 264.1084 through 264.1087. Owner/operator shall develop and implement written plan and schedule to perform inspections and monitoring required. The plan and schedule shall be incorporated into facility's inspection plan.	NA	
O-14	Each Owner/Operator Shall Comply with the Recordkeeping Requirements Specified at 264.1089	270.27; 264.1089	Except as specified, records shall be maintained in facility's operating record for a minimum of 3 years. Various records are required depending on the type of unit and control device.	NA	
O-14a	Each of the Following Owner/Operators Shall Comply with the Reporting Requirements at 264.1090:	270.27; 264.1090		NA	

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SECTION O. SUBPART CC AIR EMISSION STANDARDS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-14a(1)	Each Owner/Operator Managing Hazardous Waste in a Tank, Surface Impoundment, or Container Exempted from Using Air Emission Controls under 264.1082(c)	270.27; 264.1090(a)	Owner/operator shall report to EPA each noncompliance identified under 264.1082(c).	NA	
O-14a(2)	Each Owner/operator Using Air Emission Controls on a Tank in Accordance with 264.1084(c)	270.27; 264.1090(b)	Owner/operator shall report to EPA each noncompliance identified under 264.1084(B).	NA	
O-14a(3)	Each Owner/operator Using a Control Device in Accordance with 264.1087	270.27; 264.1090 (c),(d)	Owner/operator shall submit semiannual written report to EPA, except as specified.	NA	
O-14b	Each Owner/Operator shall Provide an Emission Monitoring Plan	270.27(a)(6)	Applies to Method 21 and control device monitoring methods.	NA	
O-14c	Subpart CC Implementation Plan	270.27(a)(7)	Required when facility cannot comply with Subpart CC by date of permit issuance.	NA	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

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SECTION P. EXPOSURE INFORMATION

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
P	Information on the Potential for the Public to be Exposed to Releases. At a Minimum, this must include: C reasonably foreseeable potential releases C potential pathways of human exposure C potential magnitude and nature of exposure	270.10(j)	The federal requirement is for surface impoundments and land disposal units.	NA	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.
[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.
[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

RCRA Hazardous Waste
Part B Permit Application

ARIZONA HAZARDOUS WASTE MANAGEMENT PERMIT

EPA I.D. NO. AZ5213820991

U.S. ARMY GARRISON YUMA PROVING GROUND

PERMIT ATTACHMENT 1

FACILITY DESCRIPTION

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ATTACHMENTS

FACILITY DESCRIPTION

1.1 GENERAL DESCRIPTION

1.1.1 Introduction

This Resource Conservation and Recovery Act (RCRA) Permit has been prepared for the Open Burning / Open Detonation (OB/OD) Munitions Treatment Facility (MTF) operated at the U.S. Army Garrison Yuma Proving Ground (USAGYPG). It is based on the 2003 RCRA Part B Permit Application submitted by USAGYPG in 2003, and the revised RCRA Part A and B Permit Application submitted in 2004 (YPG, 2004c).

This permit is for a continued operation of the OB/OD MTF.

1.1.2 Base and Facility Location

The USAGYPG base installation is approximately 40 km (25 miles) from the downtown area of Yuma. Bordered on the west by California, the installation is approximately 288 km (180 miles) from San Diego, California, and approximately 200 km (125 miles) from Phoenix, Arizona (See Permit Attachment 1A, Figure 1A-1).

The OB and OD units are located within a fenced, secured and remote area on the active Kofa firing range, which is on the USAGYPG property. The location of the OB/OD MTF area, based on the Public Land Survey System (PLSS), is Sections 30 and 31 of Township 5 South, Range 19 West, Gila and Salt River Base and Meridian.

The latitude/longitude coordinates in NAD-27 CONUS are (ADEQ 2003a; and ADEQ 2004a):

	Degrees	Minutes	Seconds	Direction
Latitude	32	57	12 to 22	North
Longitude	114	15	40 to 51	West

Any reference to 40 CFR 260 et seq. in this permit also implies reference to the adopting A.A.C. R18-8-260 et seq. citation. For example, 40 CFR 264 refers to A.A.C. R18-8-264.A (40 CFR 264). In general, the A.A.C. citation will not be referenced in this permit unless it amends or modifies some part of the 40 CFR citations.

1.1.3 Owner and Operator

The following identifies the OB/OD MTF HW treatment facility and provides information on the owner and operator:

Identification of the Facility

Name:	U.S. Army Garrison Yuma Proving Ground Kofa HW OB/OD Facility
EPA I.D. No.:	AZ5213820991
Address:	U.S. Army Garrison Yuma Proving Ground 301 C. Street Yuma, Arizona 85365-9498 Chief, Environmental Sciences Division
Telephone:	Chief, Environmental Sciences Division (928) 328-2024

Name and Address of Installation

Name:	U.S. Army Garrison Yuma Proving Ground
Address:	U.S. Army Garrison Yuma Proving Ground 301 C. Street Yuma, Arizona 85365-9498 Chief, Environmental Sciences Division
Telephone:	Chief, Environmental Sciences Division (928) 328-2024

Identification of Owner and Operator of Installation

Name:	U.S. Army
Address:	U.S. Army Garrison Yuma Proving Ground 301 C. Street Yuma, Arizona 85365-9498 Garrison Manager
Telephone:	Garrison Manager (928) 328-3468

Previous ownership of the land was the public, administered by the U.S. Dept. of the Interior. The land was withdrawn from the public domain and the installation created on May 26, 1952. Operations at the MTF commenced on or about the 1971-1974 time frame. (YPG 2004c, Appendix C).

1.1.4 Objective and Scope

The objective of this permit is to present all pertinent information required by Arizona Administrative Code (A.A.C.) Title 18, Chapter 8, Article 2 (which adopts and modifies 40 CFR 270) for an operating permit under the Arizona Hazardous Waste Management Act (AHWMA). The standards associated with the Permit contained in 40 CFR Part 264 have been considered and addressed, as appropriate.

This permit has been prepared in accordance with the United States Environmental Protection Agency (EPA) and the United States Army Environmental Hygiene Agency (AEHA) permit writer's guidance (EPA 1983 and AEHA 1987).

The USAGYPG voluntarily conducted a public meeting in 2004 in regard to operating an OB/OD MTF at the USAGYPG (YPG 2004c, Submittal 1). All comments received at this public meeting were considered and appropriately addressed in the original permit application.

The OB/OD MTF Final Closure Plan (Permit Attachment 14) is part of this permit. The closure plan explains in detail the proposed sampling and analysis procedures and sets guidelines for remediation and closure. There are no plans to close the site in the near future. Partial closure activities, if implemented, will occur in strict compliance with the requirements of 40 CFR 264 Subpart G (including 40 CFR 264.112(b) and 40 CFR 264.111), and applicable guidance documents available through the EPA and the ADEQ. The guidance documents that will be used include the RCRA Guidance Manual for Subpart G Closure and Post Closure Care Standards (EPA 1987). Final closure activities, when implemented, will include equipment decontamination, decommissioning and disposal, site characterization, remediation and restoration. Impacts are anticipated to be limited to the near-surface soil environment. Post-closure activities, including monitoring and maintenance, are not anticipated.

The following subsections provide a general description of the USAGYPG OB/OD MTF. The following description is intended to acquaint the permit reviewer with an overview of the facility.

1.2 APPLICABILITY

The USAGYPG is a 21st-century research and development facility focused on testing military equipment and weapons systems. While conducting test programs, the USAGYPG stores and uses significant quantities of munitions and explosives. Each year, quantities of these materials must be treated as wastes. These wastes include out-of-date munitions, explosive and propellants items; and items in storage that have failed quality assurance (QA) tests and now unsafe for use.

OB/OD is a means to demilitarizing many munition items, decontaminating propellants, explosives, and pyrotechnic (PEP) material from large metal objects, and reduces most combustibles to a smaller volume. OB/OD is the safest method currently available for the effective destruction, decontamination, and treatment of waste PEP conducted at the OB/OD MTF.

The OB/OD MTF has been in operation since approximately 1971. The OB/OD MTF consists of open burning and open detonation areas for disposal of waste PEP. This is an open-air facility.

The OB area consists of two concrete burn pads, each with three burn pans. Prior to May 2014, there was only one OB area burn pad south of the current pads. This site is now inactive and is undergoing closure. The OD area consists of three locations; two of the locations containing two adjacent trenches each for open detonation of waste ordnance and the third location existing as an open flat area.

A flood protection berm was constructed around the OBOD site preventing offsite storm water runoff from entering the site. The berm has an 8-foot top width, 3:1 side slopes and is approximately 2.66 feet above existing grade. The area also includes two retention basins downstream of the elevated open burn concrete pads.

Post-treatment wastes and other process wastes will be temporarily accumulated in a satellite accumulation area (SAA) at the OB/OD MTF adjacent to the safety bunker. Upon sufficient accumulation, the waste will be transferred off the OB/OD MTF to a 90-day waste accumulation area (HAZMART facility located on the USAGYPG) pending characterization for shipment offsite to a permitted Treatment Storage and Disposal Facility (TDSF) for further treatment and/or ultimate disposal. The USAGYPG generates a number of waste streams from the core operations of the installation, which are all managed under the Large Quantity Generator requirements. Satellite and 90-day accumulation areas do not require a RCRA permit and will be managed according to generator requirements of A.A.C. R18-8-262.G and 40 CFR 262.34. Therefore, this permit does not discuss these areas in detail, and includes this information in a general way for clarification of material process and handling.

1.3 TOPOGRAPHY AND PHYSIOGRAPHY

1.3.1 Topography

As part of the vast Basin and Range Physiographic Province of North America, the installation's topography and elevation varies from approximately 153 feet (46 meters) to 2,800 feet (853 meters). The most obvious features at the USAGYPG are isolated fault-block mountain ranges rising abruptly from relatively flat debris-filled basins. Mountain ranges at the USAGYPG consist of several types of consolidated rock that varies from hard, dense crystalline rocks, such as gneiss, schist, and granite, to volcanic rocks such as flows, tuffs, basalt, and andesite. These ranges have slow infiltration rates with high runoff potential, the availability of precipitation being the determining factor. Composed of alluvium derived from the surrounding mountain ranges, broad flat basins or plains with dendritic drainage patterns interrupt the mountain ranges. Along the western edge of the USAGYPG is the Colorado River floodplain; the Middle Mountains Plain and Castle Dome Plain comprise the remaining level areas of the installation (see Permit Attachment 1A, Figure 1A-6).

The United States Geological Survey (USGS) Map of Reference for the OB/OD MTF is Middle Mountain South. The topography of the entire installation is depicted on the following USGS 7.5-Minute Quadrangle maps for the following areas:

Cementosa Wash	North Trigo Peaks
Cibola SE	Palomas Mountains NW
Cunningham Mountain	Palomas Mountains SW
Dome	Picacho
Dome Rock Mountains SW	Red Bluff Mountain East
Hidden Valley	Red Bluff Mountain NW
Imperial Reservoir	Red Bluff Mountain West
Kofa	Red Hill
Laguna Dam	Red Hill NE
Mesquite Jim Well	Red Hill SW
Middle Mountains North	Roll
Middle Mountains South	Salton Tanks
Mohave Peak	Trigo Pass
Mule Wash	Tweed Mine
North of Roll	

1.3.2 Surface Waters & 100-Year Flood Plain

No perennial lakes or streams occur within the USAGYPG. Any surface water exists only for brief periods during and after intense rainfall events that produce flash flooding and ponding in low areas.

The western border of USAGYPG runs south from Blythe, California approximately parallel with the Colorado River and California border, and at distances ranging from about 8 miles to less than 1 mile. The Imperial Dam and Reservoir on the Colorado River are located about two miles northwest of the USAGYPG gate at the Main Administrative Area. This reservoir supplies water for the Gila Gravity Main Canal and the All American Canal. The southern border of USAGYPG runs approximately parallel with the Gila River and at distances ranging from about 7.5 miles to less than 1 mile. ; it is dry except after intense rainfall. There are no other named surface waters that are in proximity to the borders of USAGYPG.

The Middle Mountain Plain drainage separates the McAllister and Indian Wash drainages from the Castle Dome Wash drainage. The McAllister and Indian Washes are the primary ephemeral stream channels that drain surface runoff to the Colorado River. These washes flow only during intense rainfall.

In the Kofa Firing Range (see Permit Attachment 1A, Figure 1A-7a), the primary ephemeral stream channel is Castle Dome Wash and its tributaries. Castle Dome Wash drains to the Gila

River, located to the south of the USAGYPG. One tributary, originating at Doc Carter Spring located about 12 miles northwest of the OB/OD MTF in the Castle Dome Mountains of the Kofa National Wildlife Refuge, serves as an ephemeral water source for a wash directly adjacent to the OB/OD MTF.

The OB/OD MTF is located in an alluvial fan within the Castle Dome Plains. The plains were formed as a result of deposition of sediments washed down from the Castle Dome Mountains to the northeast. This forms a wide, shallow, and braided drainage pattern. It is common in alluvial fans such as this for storm flows to concentrate in different washes from year to year due to the effects of sedimentation (YPG 2004c, Submittal 6-1).

Surface hydrology at the OB/OD MTF consists of desert washes, which conduct precipitation overflow through the area from localized rain flow events and those of the surrounding watershed. The OB/OD MTF is located within the Castle Dome Plain at about 780 feet above mean sea level (msl) (YPG 2004c, Submittal 6-1); the surrounding watershed influences surface hydrology drainage patterns. The drainage patterns on this portion of the plain are generally shallow and ill-defined because drainage must traverse hard desert pavement in this area.

The watershed upstream of the OB/OD MTF is approximately 44 square kilometers (17 square miles) (YPG 2004c, Submittal 6-1). Castle Dome wash has a maximum elevation of about 2400 feet at its head, a minimum elevation of 160 feet at its junction with the Gila River, and is about 29 miles long (YPG 2004c, Submittal 4). The flow is to the southwest towards the Gila River at an overall average ground slope of about 77 feet per mile. The watershed area above the OB/OD MTF (approximately 12 miles long) has slopes ranging from 39 to 284 feet per mile (YPG 2004c, Submittal 4), whereas below the OB/OD MTF (the longest flow path about 20 miles long), the average gradient is 30-40 feet per mile.

Detailed surface hydrology information for the facility is contained in geohydrologic study of the Yuma Proving Ground with Particular Reference to the OB/PD MTF, Yuma County, Arizona (YPG 2004c, Submittal 4). Based on a review of OB/OD MTF national Federal Insurance Rate Map (FIRM) data for panel 04027C1000E, effective 8/28/2008, the OB/OD MTF is located in Zone D outside of both the 100-year and 500-year flood areas (see Permit Attachment 1A, Figures 1A-8a and 1A-8b); however, a previous floodplain evaluation included in the Surface Water Hydrological Data Detailed Report (YPG 2004c, Submittal 6-2) had indicated that the area might be subject to the effects of 100-year flood.

Similar to other arid regions, the USAGYPG may be subject to flash flooding following heavy precipitation. Therefore, USAGYPG and ADEQ have agreed that USAGYPG will continue to maintain the current protection measures already in place (facility berm and OB Pad retention basins) to protect against run-on and run-off from any rain event.

1.3.3 Land Uses

Formal testing activities began at the U.S. Army Garrison Proving Ground in 1942. During World War II, General Patton used the U.S. Army Garrison Proving Ground installation for troop and weapons training and exercise maneuvers. In 1951, the area was established as the Yuma Test Station for research, development, testing, and evaluation of artillery, tank armaments, and munitions. In 1963, Yuma Test Station became Yuma Proving Ground. In October 2003, the facility was renamed the USAGYPG. Munitions testing has intensified during wartime, and continues at a reduced pace during peacetime (YPG 1992; and YPG 2001).

The USAGYPG is a multipurpose complex that plans, conducts, evaluates, and reports the results of developmental and operational tests for major materiel categories. The primary mission at the USAGYPG is testing and evaluation as directed by the Army Test and Evaluation Command (ATEC) and Developmental Test Command (DTC). In addition, activities at the installation include reviewing plans; monitoring developmental testing conducted by developers, producers, and contractors; as well as providing technical support, guidance, and services to Federal agencies and other branches for the military. Typical projects conducted at the USAGYPG include but are not limited to munitions and weapons testing, automotive and combat systems testing, natural environment testing, aviation systems testing, and military personnel training operations (YPG 2001).

Permit Attachment 1A, Figure 1A-2 shows land use surrounding the USAGYPG. The base is dedicated to military testing. Consequently, most land is reserved for firing ranges, impact areas, mobility test courses, and drop zones. These types of activities require large open areas with associated safety and buffer zones.

The USAGYPG is subdivided into three areas: the Cibola, Laguna, and Kofa Regions.

The Cibola Region is in the northwest portion of the USAGYPG and covers approximately 1,775 square kilometers (438,195 acres). This sparsely populated region is primarily utilized for aviation test activities.

The Laguna Region in the southwest portion covers approximately 280 square kilometers (68,720 acres). Most of the administrative areas and the vehicle mobility courses are in this region. The four cantonment areas in the Laguna Region are Main Administrative Area, Yuma Test Center, Laguna Army Airfield, and Kofa Firing Range.

East of the Laguna Region is the Kofa Region, which encompasses approximately 1,340 square kilometers (331,259 acres) of the southern and eastern portions of the USAGYPG. The Kofa OB/OD MTF is located in this region. The majority of firing missions also occur here (YPG 2001).

Other structures close to the OB/OD MTF include the Castle Dome Heliport, approximately 2.5 kilometers (1.5 miles) northeast, the Main Administrative Area (MAA) of the Laguna Region 19 kilometers (12 miles) southwest, and the Kofa Firing Range (KFR) complex 16 kilometers (10 miles) to the south. With few exceptions, real estate under the control of the USAGYPG has the potential for military use.

Hunting is permitted within designated areas. The USAGYPG installation is officially closed to any other civilian use of the range. Hunters may enter and camp on the base during designated hunting seasons if they possess valid Arizona Game and Fish Department (AGFD) and a USAGYPG issued hunting access card. There are no formal recreation areas in proximity to the facility.

Most of the land immediately surrounding the installation is sparsely populated and publicly owned, and the majority is managed by other Federal agencies. To the west, the Cibola and Imperial National Wildlife Refuges protect wetland and waterfowl habitat along the Colorado River. The Martinez Lake Recreation Area, Imperial Reservoir Recreation Area, and Mittry State Wildlife Area stretch from north to south between the western arm of the installation and the Colorado River. Kofa National Wildlife Refuge (KNWR), which protects the desert bighorn sheep habitat of the Castle Dome Mountains, occupies the area between the arms of the installation's U-shape. The Kofa Region is bordered to the west by the Laguna Region and to the north by the KNWR. The eastern and southern boundaries of this USAGYPG region border Bureau of Land Management (BLM), State, and some privately owned lands primarily used for agriculture (YPG 2001). Some privately owned land south of the installation in the Gila River Valley is used primarily for irrigated agriculture (YPG 2001).

Permit Attachment 1A, Figure 1A-3a shows the active area of the OB/OD MTF and the immediate surrounding areas out to approximately 1-mile around the facility.

The Kofa and Castle Dome mountains to the northeast of the OB/OD MTF, and Muggins Mountains to the south of the OB/OD area, offer opportunities for camping, hiking, and small game hunting. Nearby BLM and wilderness areas and neighboring wildlife refuges in the Cibola, Kofa, and Imperial areas provide numerous places for picnicking, camping, and hiking.

1.3.4 Meteorological Information

The USAGYPG is located in the Sonoran Desert, a low-elevation hot arid desert. Clear skies, low relative humidity, light winds, slight rainfall, and wide daily temperature variations characterize the installations typical climate.

According to meteorological records, average daily temperatures range from 27°C (80°F) to more than 38°C (100°F) during summer months , and from 4.3°C (40°F) to 19°C (65°F) during winter months. The all-time record high temperature is 51°C (124°F), which occurred on July 28, 1995. The all-time record low temperature is -8.4°C (23°F), which occurred January 8, 1971.

Clear skies, low relative humidity, low precipitation rates [1.6 to 9.4 centimeters (0.64 to 3.7 inches) annually], and a wide range of daily temperatures characterize the installation's climatic conditions. Based on data from 1948 to 1990, the average annual precipitation is about 3.51 inches. The maximum annual precipitation recorded from 1954 to 1992 was 7.55 inches in 1958. The heaviest 1-day rainfall of record was 3.02 inches in October 1972. Additional information concerning expected 2-year and 100-year 24-hour precipitation events can be found in the Final Drainage Report, YPG OB/OD MTF (YPG 2004c, Submittal 6-1).

Humidity varies greatly throughout the year. Low-humidity conditions are expected during early summer when extreme values are below 10 percent. High-humidity conditions with sustained readings of 90 percent or greater can occur any time of year, typically during winter and early spring.

Based on data from 1935 to 1980, the pan evaporation rate averages 107 in. per year. This results in a net loss of 103.5 in. per year when compared with annual precipitation.

Surface wind speeds are generally light throughout the year; however, there is a diurnal cycle to the installation's wind speed. From sunset to sunrise, a nocturnal inversion develops and the winds are generally light, averaging 1 to 2 knots (equal to 1.15-to-2.30 miles per hour (mph), or 1.85-to-3.70 kilometers per hour (km/hr)), often coming from a northeasterly direction in the early morning hours. After sunrise wind, speeds gradually increase until the inversion breaks. By the time of inversion breakup, these winds have reached the speed that will be maintained throughout the day.

During September through February, surface wind speeds average approximately 3.2 knots (6 km/hr or 3.7 mph). From March through August, average wind speed is approximately 3.8 to 4.9 knots (7-to-9 km/hr or 4.4-to-5.6 mph). The windiest time of the year is generally in the spring and summer. From March through September, there are normally more than 10 days each month with wind gusts over 20 knots (37 km/hr or 23 mph). The two highest wind gusts recorded at the USAGYPG were 62 knots (114 km/hr or 71 mph) in March 1970 (Cochran, 1991), and 60 knots (111 km/hr or 69 mph) in August 1990 (YPG 2004c, Submittal 3). This does not include a probable microburst wind speed of 63 knots (117 km/hr or 73 mph) recorded on September 1991.

From late autumn to early spring (November through February), prevailing surface winds are from the north to northwest. As temperatures warm, winds shift and are from the west southwest or from the south; during the summer moisture influx associated with the southwestern monsoon, winds shift back toward the southeast.

A 5-year wind rose for 2011 through 2015, based on wind data collected at a USAGYPG meteorological site in proximity to the OB/OD MTF, is provided in Permit Attachment 1A, Figures 1A-3a and 1A-3b.

Historical climatic conditions at the USAGYPG is included in Yuma Proving Ground: A Climatology 1954-1992 (YPG 2004c, Submittal 3), and other supporting documents (YPG 2004c, Submittal 4, Submittal 6-2 and Submittal 6-3).

1.3.5 Geologic Characterization

The descriptions of local geology are taken from Remedial Investigation Report for Selected Sites at Yuma Proving Ground, Arizona (Davies 2004).

Wide, gently sloping plains formed by late Tertiary and Quaternary age basin-fill deposits characterize the geology of the USAGYPG. Sharply rising mountains break the continuity of these deposits. The mountain ranges consist mainly of Cretaceous-Quaternary age intrusive and volcanic rocks. Sedimentary deposits of Triassic-Jurassic age make up a portion of the mountains in the western and central portions of the USAGYPG. The sedimentary rocks are locally metamorphosed to schists and gneiss. Together these formations form the lateral and underlying boundaries of the alluvial basins. The basin-fill deposits are generally sandy, with variable fine-grained (silts and clays) to coarse-grained (gravel and cobbles) lenses. These deposits can exceed a thickness of 1,300 ft.

The basins at the USAGYPG were formed during the middle to late Miocene epoch basin-and-range structural disturbance. Movement along high-angle normal faults down-dropped relative to the mountains, producing a series of generally north-northwest trending basins. These basins subsequently subsided. This subsidence was a gradual process accompanied by deposition of locally derived sediment in internally drained basins. The closed drainage system produced a gradual change from coarse-grained sediment near the mountains to fine-grained near the basin centers. The basins within the areas of interest at the USAGYPG are currently not enclosed and drain to the Colorado and Gila Rivers.

1.3.6 Soil Description

Nine different soil descriptions are associated with the USAGYPG: (1) Riverbend family-Carrizo family complex; (2) Cristobal family- Gunsight family complex; (3) Chuckawalla family-Gunsight family complex; (4) Gunsight family-Chuckawalla family complex; (5) Superstition family-Rositas family complex; (6) Carsitas family-Chuckawalla family complex; (7) Tucson family-Tremant family-Antho family complex; (8) Gilman family-Harqua family-Glenbar family complex; and (9) Lithic and Typic Torriorthents soils (YPG 2004c, Submittal 6-3).

The following hypothermic arid general soil associations occur near the OB/OD MTF: Gilman-Vint-Brios; Harqua-Perryville-Gunsight; Coolidge-Wellton-Antho; and Lomitas-Rock Outcrop (YPG 2004c, Submittal 4: and YPG 2004c, Submittal 6-4).

Gilman-Vint-Brios soils are found along the southwestern and western portion of the USAGYPG and are mainly sandy loam and fine sand and are found only on the floodplains of the Colorado and Gila Rivers.

The Harqua-Perryville-Gunsight soils are the most prevalent of all the soil types at the USAGYPG and consist of deep (extends to more than 60 inches in depth), gravelly moderately fine- and medium-textured soils high in lime, and very gravelly calcareous soils on old alluvial fans. The soil is derived from volcanic, calcareous, granitic, and sedimentary sources. The ground surface in these plains commonly exhibit “desert pavement” thin layer of varnished gravel). The OB/OD MTF is located in a Harqua-Perryville-Gunsight soil area.

The Gunsight-Rillito soils are found only in the far northern portion of the USAGYPG.

Coolidge-Wellton-Antho soils, which are found in the southwestern corner of the USAGYPG, are medium- to coarse-textured soils formed from source rocks similar to those that are the sources of the Harqua-Perryville-Gunsight soils, but they have more sand than gravel.

The Lomitas-Rock outcrop is the source of soil found in the Harqua-Perryville-Gunsight areas and the Coolidge-Wellton-Antho areas. The watershed that contributes to washes adjacent to the OB/OD MTF contains this outcrop. The Lomitas rock is composed of volcanic rocks (such as andesite, rhyolite, and related tuffs) and some basalts.

Because of the type of surface soil at the USAGYPG (gravelly black “desert pavement” surfaces), the temperature of soil one-inch or less from the ground surface often exceeds 160 F during the summer months of July and August (YPG 2004c, Submittal 6-3).

1.3.7 Groundwater Hydrology

The Arizona Department of Water Resources specified regional groundwater basin and sub-basins, and generalized flow directions are provided in Permit Attachment 1A, Figure 1A-7b. The groundwater potentiometric map for the OB/OD MTF area is provided in Permit Attachment 1A, Figure 1A-7c.

Groundwater is present in two systems beneath the USAGYPG. The deep groundwater is found in consolidated volcanic rock (at depths typically greater than 500 feet) and in deep sediment. In the distant past, water entered the closed basins and formed salty lakes. With time, the lakes evaporated and developed layers of evaporates (salts). Infiltration of salty water produced highly mineralized water deep within the basin. This water has been primarily recharged by water from the Colorado and Gila Rivers. Infiltration of precipitation and ponded surface water adds very small amounts of additional recharge to this deep groundwater. Because this water is very deep and highly mineralized, it is not considered to be a primary drinking water source.

The shallow groundwater occurs within the alluvial and floodplain deposits at the USAGYPG. The groundwater exists as an unconfined aquifer and contains several production wells that are used for drinking water. A hydrogeologic study of USAGYPG was conducted in 1987 (YPG 2004c, Submittal 4). At that time, 13 production wells were located within the USAGYPG. The top of the groundwater aquifer ranged in elevation from approximately 200 feet above msl at the Castle Dome Heliport to 155 feet above msl in the southwestern portion of the USAGYPG. The depth to groundwater ranged from 30 feet below ground surface (bgs) to greater than 600 feet bgs.

Three parameters are frequently used to characterize a groundwater aquifer: transmissivity, hydraulic conductivity, and storativity.

Transmissivity is an indication of how well an aquifer can transmit water. It is the rate of flow through a vertical strip of the aquifer that has a width of 1 foot under a unit hydraulic gradient (one foot/foot). Transmissivity values derived from specific production well capacity data range from 19,000 to 83,300 gallons/day/foot (gpd/ft) for the alluvium, 9,600 gpd/ft for the consolidated rock, and an average of 130,800 gpd/ft for the floodplain deposits. A pump test on one alluvium well indicated a transmissivity 200 percent larger than its empirically derived value.

Saturated hydraulic conductivity is a function of the porous media and the fluid (in this case, groundwater) with units of distance/time. Horizontal hydraulic conductivity values ranged from 83 to 902 gpd/ft^2 (11.1 to 121 feet/day) for the alluvial wells, with an average value of about 500 gpd/ft^2 (67 feet/day). The horizontal saturated hydraulic conductivity was about 56 gpd/ft^2 (7.5 feet/day) for consolidated rock and about 1,245 gpd/ft^2 (166 feet/day) for the floodplain deposits.

The storage coefficient of the aquifer is an indication of the aquifer's ability to yield or store water. Reasonable values for the storage coefficient range from 10 to 15 percent for alluvium, 1 to 5 percent for consolidated rock with no fractures, and 20 to 30 percent for floodplain deposits.

The rate of groundwater movement can be determined by combining data on the hydraulic gradient in the aquifer with its hydraulic conductivity and effective porosity. For the alluvium, using the above horizontal hydraulic conductivity (69 feet/day), a maximum horizontal hydraulic gradient of 5 feet per mile, and a low average porosity of 12.5 percent, the average rate of groundwater movement is about 0.55 ft/day (200 ft/year). This is an average flow rate across the areas that have been investigated or are under investigation at the USAGYPG. Local heterogeneity within the surficial aquifer can result in a range of flow direction and velocity at specific locations.

Saturated vertical hydraulic conductivity tests were performed on samples collected from 0 to 35 feet below ground surface from soil borings drilled in the OD pits at the OB/OD MTF (YPG 2004c, Submittal 12). Saturated vertical hydraulic conductivity values were also obtained from infiltration tests in undisturbed soil in the same area (YPG 2004c, Submittal 12). Results showed:

	Field Infiltration Tests	Infiltration & Soil Sample Tests	Lab Soil Sample Tests
Minimum:	0.00356 feet/day	0.000214 feet/day	0.000214 feet/day
Average:	0.0953 feet/day (3.36E-05 cm/sec)	1.17 feet/day (4.12E-04 cm/sec)	2.46 feet/day (8.67E-04 cm/sec)
Maximum:	0.306 feet/day	12.1 feet/day	12.1 feet/day

The average value is what is expected from sandy soils with silt.

Porosity was also analyzed for during the above hydraulic conductivity tests (YPG 2004c, Submittal 12). Porosity in the samples ranges from 24 to 47 percent, within the expected range for silty-sand well-graded materials.

1.3.7.1 Estimate of Net Recharge Rate

The referenced geohydrologic report (Entech 1987) estimates aquifer characteristics based on historical pump test data from Castle Dome Heliport Well M, 1.5 miles hydraulically upgradient of the OB/OD MTF and screened in the deep groundwater, and Well H, about 5 miles downgradient of the OB/OD MTF screened in the shallow groundwater.

A pump test of Well M conducted in February 1970 indicated that Well M is capable of yielding more than 1.3 cubic meters (350 gallons) per minute. After pumping was stopped, the well recovered to its static water level in 10 to 12 minutes, indicating good recharge potential. This well is completed in volcanic flows and tuffs. The well yield from downgradient Well H was 1.9 cubic meters (500 gallons) per minute with 4.9 meters (16 feet) of drawdown in the alluvial deposits. Based on well log data from Well M, there does not appear to be any perched groundwater horizons in the vadose zone beneath the OB/OD MTF. The lithologic log also indicates fine-grained silts and clays in the alluvial deposits.

Water balance information was collected and determined for the USAGYPG (YPG 2004c, Submittal 4, Table 17). Precipitation and infiltration from surface water runoff are related to average pan evaporation and evapotranspiration. Results for each month of the year indicate a water deficiency ranging from 5.26 centimeters (2.07 inches) in January to a maximum of 26.4 centimeters (10.4 inches) in July.

1.3.7.2 Description Of Uppermost Aquifer

Based on well log data from Well M, located approximately 1.5 miles northwest of the OB/OD MTF site, there are no perched groundwater zones in the alluvial deposits beneath the site. Well M is 1,000 feet deep and penetrates the younger alluvium from 0 to 180 feet bgs, the older alluvium from 180 to 210 feet bgs, and the underlying consolidated volcanic rocks from 210 to 1000 feet bgs. (YPG 2004c, Submittal 4).

1.3.8 Seismicity

The seismic requirements of 40 CFR 270.14(b)(11)(i,ii) and 40 CFR 264.18(a) do not apply to existing facilities such as the OB/OD MTF. However, precautions are still necessary to ensure seismic events will not cause a release or otherwise cause some operation of the OB/OD MTF to threaten human health and the environment. Therefore, the following seismic data is provided to better describe the setting.

The geology of the USAGYPG is marked by a combination of steeply faulted margins, extensive intrarange faulting and jointing, and severe mechanical weathering (Entech 1987). Two principal fault zones occur close to the USAGYPG are: Sheep Mountain Fault Zone and Lost Trigo Fault Zone. Both are in the Sonoran Fault Zone. Sheep Mountain Fault Zone is in Yuma County southwest of the town of Welton, about 35 miles from the USAGYPG. This fault zone is about 5 miles long, with its longest segment about two miles long. The age of the fault is unknown but believed to be modern (late Pliocene [5 to 2 million years ago] to the present). Lost Trigo Fault Zone is of early Pleistocene age (2 million to 10,000 years ago), is located about four miles south of the town of Cibola, and is about 6 miles long. The other two nearest fault zones occur in the Salton Periphery Zone. Cargo Muchacho Fault Zone is about 6 miles northwest of Yuma, is about 1 mile long, and is of late Pleistocene age. Algodones Fault Zone is in the southwestern corner of Arizona, is about 7 miles long and is Pleistocene to present in age.

A study performed for the Arizona Department of Transportation in 1992 (ADOT, 1992) located the USAGYPG base in a nearly stable seismic block between more active regions to the northeast and southwest. This zone has very little seismic activity because the basin-and-range faulting has been inactive for several million years. Earthquakes in the area are infrequent and of relatively low magnitude. Although a few faults are located in the Sonoran Fault Zone, the San Andreas-San Jacinto Fault System of southern California and fault zones in Mexico contribute to the probability of an earthquake. Within the Sonoran Fault Zone, the average rate of repetition is one event in every 25,000 years. The estimated maximum credible earthquake for the zone is a magnitude 6.5 event. The return period for an earthquake of this magnitude is very long.

Permit Attachment 1A, Figure 1A-4 is the Arizona Geological Survey fault map for the area where the USAGYPG is located. While there are many fault structures in the area approximately 3-miles west of the OB/OD MTF, the nearest fault with known Holocene era movement is the Algodones Fault 36-miles southwest of the OB/OD MTF. Since there are no known or reported faults within the general area of the OB/OD MTF with Holocene era activity, seismic standards are not applicable.

1.4 OB/OD MTF RELATED STRUCTURES

Design of the OB/OD Units is discussed in Permit Attachment 2 (Miscellaneous Units). The following is a discussion of OB/OD related structures at the facility.

1.4.1 Safety Bunker (Operational Shield)

An Operational Shield (safety bunker) constructed of reinforced concrete (designated as the USAGYPG Building 778F) is the only building at the site, approximately 750 meters (2,460 feet) west-northwest of the OB/OD treatment units.

Ordnance Recovery Technician (ORT) personnel occupy this building during OB and OD treatment events. A small intermodal storage container holding supplies and equipment is near the bunker. There is also a work table and a grounding rod at this location.

No explosives are stored in this area. However, hazardous waste may be accumulated in this area in accordance with HW generator accumulation standards (40 CFR 262.34). In the unlikely case that untreated reactive or ignitable residue is present in the containerized waste and the area designation as a 90-day generator accumulation point, the area is greater than 50 feet from the OB/OD MTF fence line and would meet 40 CFR 262.34(a) and 40 CFR 265.176.

Based on maximum allowed weight of waste munitions burned (2,000 pounds per pan and 4,000 pounds per day) or detonated (1,000 pounds per day), the safety bunker has an adequate protective distance from the OB/OD units defined as 1,730 feet (40 CFR 265.382).

The bunker is on higher ground and would not be subject to washout resulting from a 100-year flood. Further, the area has positive drainage away from the bunker preventing standing water.

1.4.2 Flood Protection Berm

As described in Section 1.3.2 (Surface Water Hydrology & Potential Flooding), like other arid regions, the USAGYPG is subject to flash flooding following heavy precipitation. Details on the structures to prevent run-on to, and runoff from, the treatment units are included in Permit Attachment 2 (Miscellaneous Units). As shown in the attachment, this berm only encompasses the OB and OD units and on-site SWMU's, and does not encompass the safety bunker, fenceline or roads to the facility. The OB/OD MTF access road is routinely taken out by stormwater damage.

A minimum buffer distance between these units and the flood diversion berm is required because OB/OD activities typically eject residue and ash out from the units. Based on maximum allowed weight of munitions burned (2,000 pounds per pan and 4,000 pounds per day) or detonated (1,000 pounds per day), the protective distance to the property of others is 1,730 feet (40 CFR 265.382). However, the purpose of the berm is to contain most chemical residue and not for protection of other property from scrap metal, the design includes only a minimum of 80-feet between these units and the diversion berm.

Installation of the berm resulted in a small diversion (approximately 5 feet) of one channel of a braided ephemeral wash. Because the distance is minimal, the channel will naturally redirect itself around the berm. The U.S. Army Corps of Engineers determined that the diversion would be minor enough that a Clean Water Act section 404 permit was not necessary. Because only a few small trees (many of which were dead) were removed from an area where larger trees are present, wildlife habitat was not be affected.

1.4.3 Solid Waste Management Units

In 2004, USAGYPG prepared a document to meet the requirements for description of all SWMUs on the facility as required by 40 CFR 270.14(d). The document (YPG 2004c, Appendix K) included all SWMUs within the property of the hazardous waste management facility as defined in 40 CFR 270.2. This property is the entire installation.

The 2004 USAGYPG report used the results of several surveys to develop the required information on the SWMUs. Additionally, the USAGYPG had conducted a thorough review of all documentation and an analysis of ongoing activities and compiled a list of existing or potential releases of hazardous waste and/or hazardous constituents. Several of the SWMUs have been or are being remediated under the authority of the ADEQ. All actions were detailed on the descriptions for each individual unit.

In 2016, USAGYPG completed another review and update of SWMU status using the 2004 report as a baseline. This 2016 update is provided in Permit Attachment 1B.

1.4.4 Roads and Traffic Patterns

U.S. Highway 95 is the principal access route to the USAGYPG base (Permit Attachment 1A, Figure 1A-5). This north/south two-lane, paved road bisects the KNWR and the USAGYPG. Within the USAGYPG installation, vehicle access consists of 291 km (181 miles) of paved roads, 1,316 km (818 miles) of improved roads (gravel/graded), and numerous unimproved roads (dirt only). The majority of paved roads are in the Laguna Region (Main Administrative Area, Yuma Test Center (YTC), and Laguna Army Airfield). Roads in the Cibola Region and Kofa Firing Range (Kofa Region) are mostly gravel and unimproved. The main roadways and well-traveled secondary roads are maintained. This maintenance includes grading, watering, and repair of storm-damaged roads. Access roads to the site are graded.

The OB/OD MTF is off-limits to the public. The nearest “public” road is Castle Dome road into KNWR (slightly east of U.S. Highway 95). This presents the closest point of public access as approximately 2,380 meters (7,809 feet) from the facility’s active area. This road is regulated by the USAGYPG. Control of the on-base roads to the OB/OD MTF is described in Permit Attachment 8 (Security Provisions).

Speed limit signs are posted at the entrance to the OB/OD MTF. All vehicles entering the USAGYPG base are notified by sign that speed limits are 25 mph, unless otherwise posted. For the main road to the OB/OD MTF, there are no vehicle height clearance requirements as there are no overhead electric lines or bridge overpasses.

Waste PEP is transported directly from the point of origin [storage bunkers (igloos), ammunition loading plants, and gun positions] to the OB/OD MTF for treatment. Waste ash is collected in a 55-gallon drum and transported from the OB/OD MTF to a 90-day waste accumulation area on the USAGYPG when the drum is 75% full. The waste transport vehicle crosses Highway 95 on USAGYPG owned roads. The transport is on contiguous property (see definition of “Facility” in 40 CFR 260.10) and only one EPA I.D. number for the base is required. No other transfer or pickup stations are associated with the OB/OD MTF. Permit Attachment 1A, Figure 1A-5 provides a map showing road classifications and routes for transport of the waste materials.

On-site traffic patterns, including MHE overnight parking areas and load/unload areas, are shown in Permit Attachment 1A, Figure 1A-3a, A-3b and A-3c. Figure 1A-3b shows parking overnight areas for the forklift, large earthmover, and magnet trailer. Figure 1A-3c shows the roads traffic must follow within the OB/OD MTF. Details on the load/unload areas for the OB Pads and the OD Pits are provided in Permit Attachment 6 (OB/OD Operations).

No more than 20 to 25 vehicles per day travel the main military access road 1646 meters (5400 feet) west of the facility.

The USAGYPG has the following specifications for required road surface composition and load bearing capacity at the OB/OD MTF. The OB/OD MTF road is Class E and the road is described as primary gravel (G-4) with a street width of 20 feet. Further classification as Category III is based on observations that the traffic is 85 percent light pickups, 14 percent two-axle trucks, and 1 percent three- to five-axle trucks. The larger trucks would include a trailer transporting heavy equipment such as an excavator or a water truck. All vehicles requiring access to the site, including the USAGYPG fire fighting vehicles, are all-terrain. Vehicles with waste do not cross arroyos that contain flowing water. Muddy terrain is not a problem.

Vehicle waste weight can vary but does not exceed treatment limits established in Permit Attachment 2 (Miscellaneous Units) and Permit Attachment 6 (OB/OD Operations) – 4,000 pounds net explosive weight (NEW) of PEP per day for OB, and 1,000 pounds NEW of PEP per day for OD. Based on the road specifications above, the road to the OB/OD MTF can accommodate this load as well as the weight of the USAGYPG fire fighting vehicles. An average of fewer than three vehicles enters the facility per day.

Besides the above vehicle and pedestrian (load/unload) traffic patterns, there is also the Castle Dome Heliport nearby as well as training missions involving aircraft. Range control will ensure that air patterns in the proximity of the OB/OD MTF will not occur during OB/OD operations at the site.

1.4.5 Fences, Gates, and Warning Devices

A description of the security devices at the site is contained in Permit Attachment 8 (Security Provisions).

1.5 VEGETATION AND WILDLIFE

Refer to Section 7.7 of the permit “Biological and Cultural Resource Considerations” for information on vegetation and wildlife near and at the USAGYPG Kofa Firing Range (KFR) Hazardous Waste OB/OD MTF.

Section 6 of the Firing Range Report No. 39-EJ-5812-98 (Conceptual Site Model for the Environmental Risk Assessment at YPG) discusses sensitive floral and wildlife species in the area.

1.6 REFERENCES

The following documents from the 2007 RCRA Permit issued by ADEQ are incorporated by reference into this 2016 renewal permit:

ADEQ 2003a	ADEQ Memorandum from Michael Naber to U.S. Army YPG Hazardous Waste Permits Unit File, February 18-19, 2003 Site Visit and Public Meetings, dated February 29, 2003 [Ref: HWP-IN1012].
ADEQ 2004a	ADEQ Memorandum from Michael Naber to U.S. Army YPG Hazardous Waste Permits Unit File, Site Visits dated August 2004 of Soil Sampling and Infiltration Study Activities at the HW Munitions Open Detonation Units, dated August 16, 2004 [Ref: HWP-IN1048].
ADOT 1992	*Development of Seismic Acceleration Contour Maps for Arizona*. Kenneth M. Euge, Bruce A. Schell, and Ignatious Po Lam, Arizona Department of Transportation, September 1992.
AEHA 1987	U.S. Army Environmental Hygiene Agency (AEHA) Draft *RCRA Part B Permit Writers Guidance Manual for Open Burn/Open Detonation Facilities*, April 6, 1987.
Cochran 1991	Cochran, Chris, 1991, *Soil Survey of the U.S. Army Yuma Proving Ground, Arizona – Parts of LaPaz and Yuma Counties in 1991,* Soil Conservation Service, U.S. Army Yuma Proving Ground, Yuma, Arizona.
Davies 2004	Davies, B., Botdorf, C., Butler, J., Cantwell, B., Hlohowskyyj, I., Kimmell, T.A., et. al. 2004, *Remedial Investigation Report for Selected Site at Yuma Proving Ground, Arizona*, Argonne National Laboratory, Environmental Assessment Division, Argonne IL, prepared for U.S. Army Yuma Proving Ground.
Entech 1987	Entech Engineers, Inc. 1987, *Yuma Proving Ground Hydrologic and Pollution Investigation Study, Cibola and Kofa Ranges,* Santa Ana, California, prepared for Los Angeles: U.S. Army Corps of Engineers, Los Angeles District.
EPA 1983	U.S. Environmental Protection Agency (EPA) SW-968, *Permit Applicants' Guidance Manual for the General Facility Standards of 40 CFR 264*, 10/15/1983.

EPA 1987 — U.S. Environmental Protection Agency (EPA) EPA/530-SW-87-010, *RCRA Guidance Manual for Subpart G Closure and Post-Closure Care Standards and Subpart H Cost Estimating Requirements*. (NTIS PB87-158978), January 1987.

YPG 1992 — YPG (U.S. Army Yuma Proving Ground), 1992, *Master Plan Report Yuma Proving Ground,* U.S. Army Corps of Engineers, Sacramento, California.

YPG 2001 — YPG 2001, *Final Range-Wide Environmental Impact Statement*, Command Technology Directorate, CSTE-DTC-YP-CD-ES, Yuma, Arizona.

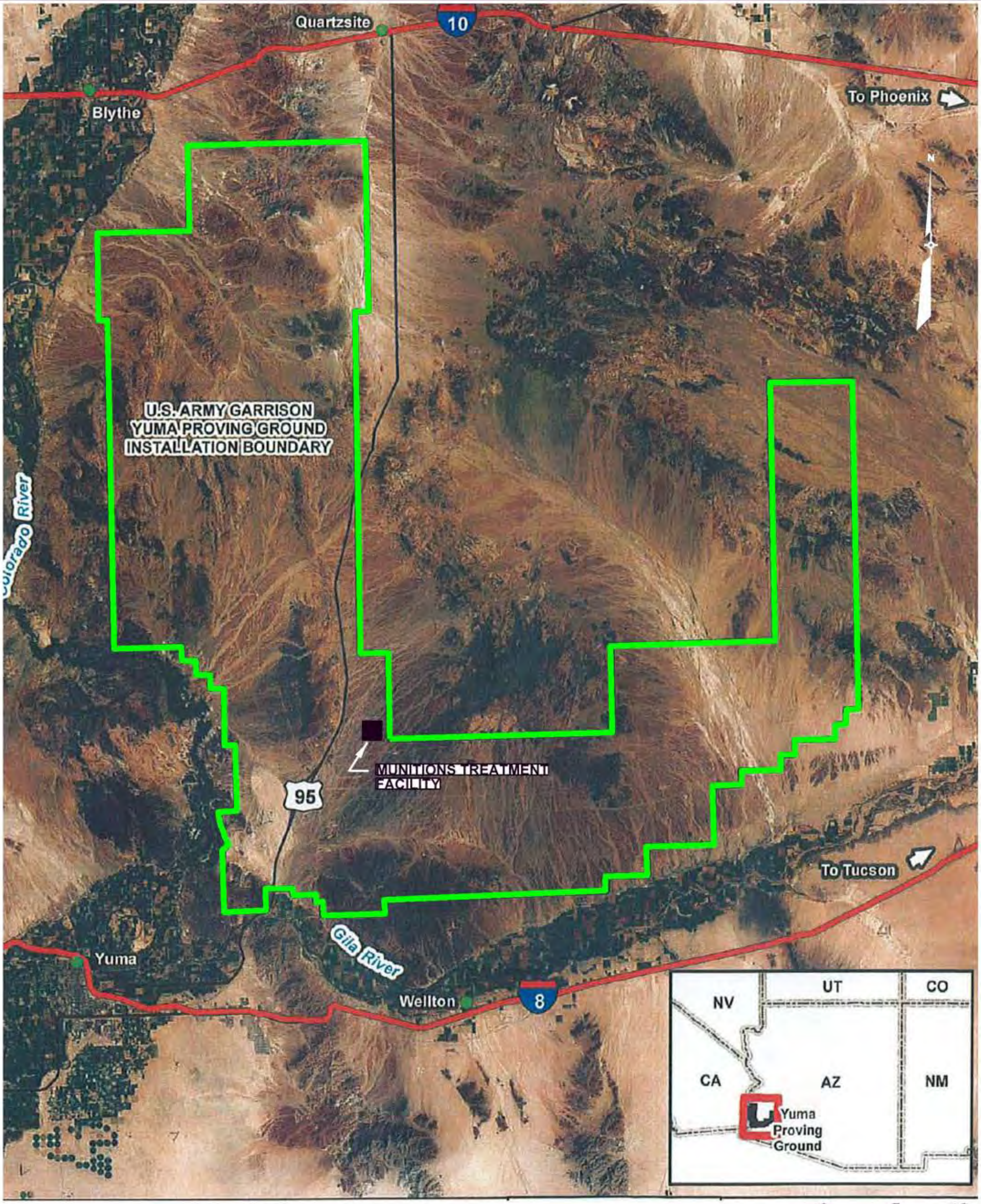
YPG 2004c — RCRA Operating Permit Application, Open Burn/Open Detonation Facility, U.S. Army Yuma Proving Grounds, prepared by Jason Associates Corporation, September 2004 Update.

- YPG 2004c, Appendix C: "*RCRA Part A Application*"
- YPG 2004c, Appendix K: "*Solid Waste Management Unit Descriptions*"
- YPG 2004c, Submittal 1: "*Pre-Application Public Meeting Summary*"
- YPG 2004c, Submittal 3: "*Yuma Proving Ground: A Climatology 1954-1992*", by Andrew Woodcock, Meteorologist, U.S. Army Test and Evaluation Command, Yuma Proving Ground, Arizona, dated July 1, 1992.
- YPG 2004c, Submittal 4: "*Geohydrologic Study of the Yuma Proving Ground with Particular Reference to the Open Burning/Open Detonation Facility at Yuma County, Arizona",* prepared by ENTECH Engineers, Inc, May 1988, accompanied by a "Memorandum to the Record" by Jason Associates Corp.
- YPG 2004c, Submittal 6-1: "*Final Drainage Report", by Premier Corporation.*
- *YPG 2004c, Submittal 6-2: "100-Year Flood Plain/Flood Protection Analysis, Open Burn/Open Detonation Site, Yuma Proving Grounds", prepared by James Davey and Associates, dated August 2004.*
- YPG 2004c, Submittal 6-3: "*Soil Survey of the U.S. Army Yuma Proving Ground, Arizona, parts of La Paz and Yuma Counties",* by Christopher C. Cochran, Soil Conservation Service, 1991.
- YPG 2004c, Submittal 6-4: "*Report and Interpretations for the General Soil Map of Yuma County, Arizona*", prepared by E.C. Chamberlin and M.L. Richardson, U.S. Dept of Agriculture Soil Conservation Service and Natural Resource Conservations Districts in Yuma County, July 1974.

- YPG 2004c, Submittal 12: Southwest Ground-Water Consultants, Inc., July 10, 2004, *QA Project Plan, Infiltration Study, OB/OD Treatment Facility, Kofa Firing Range*, U.S. Army Yuma Proving Ground, Yuma County, Arizona, EPA ID No. AZ5213820991; and Southwest Ground-Water Consultants, Inc., October 28, 2004, *Infiltration Study, OB/OD Treatment Facility, Kofa Firing Range*, U.S. Army Yuma Proving Ground, Yuma County, Arizona, EPA ID No. AZ5213820991.

ATTACHMENT 1A

FIGURES



LEGEND

Interstate Highway

U.S. Highway

APPROXIMATE SCALE
MILES

0 5 10

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Novi, Michigan 48377
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FIGURE 1A-1
SITE LOCATION

YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION

JULY 2016

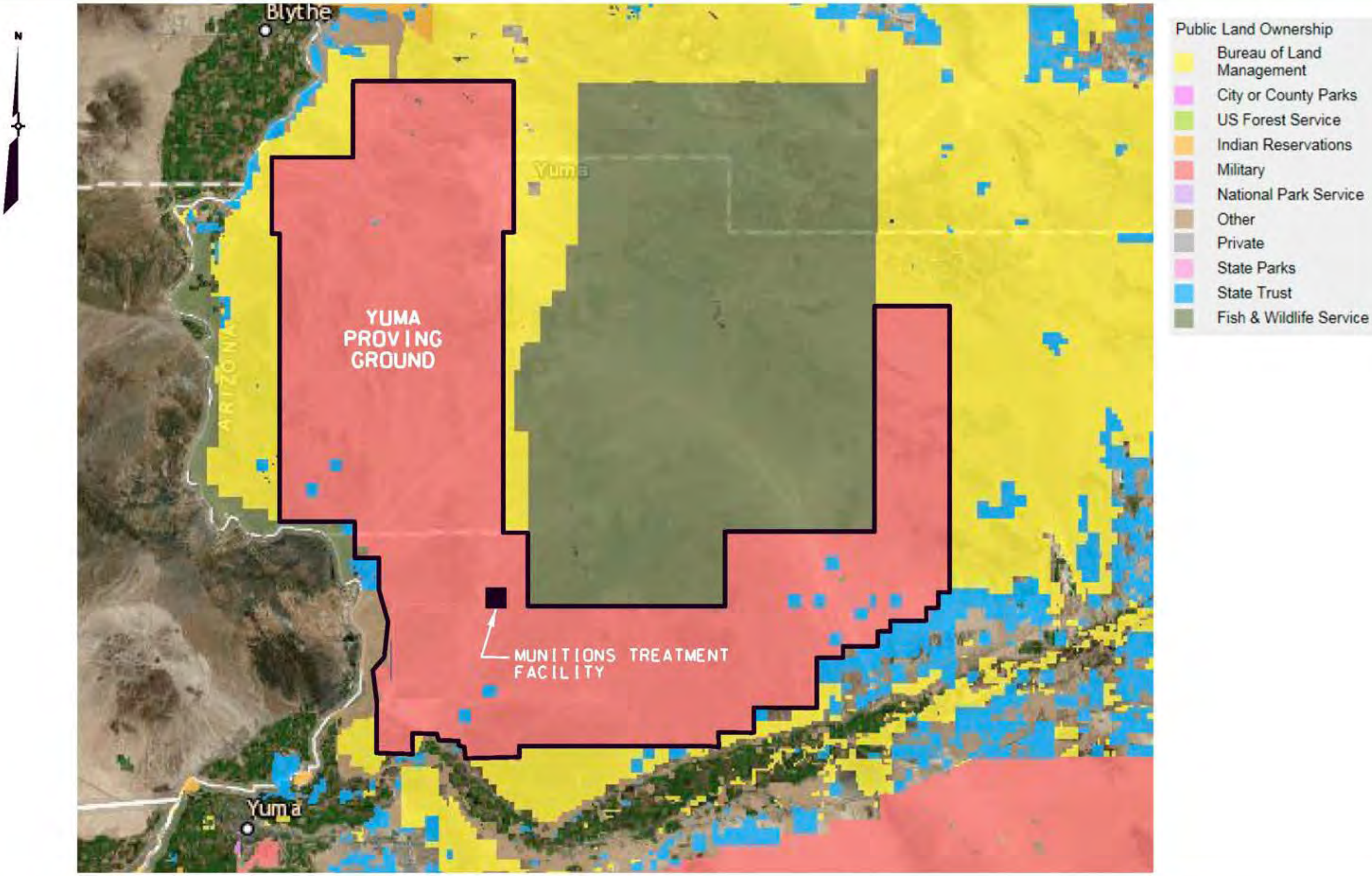
1165010006.3

2:07:58 PM
7/28/2016
L:\Shared\home\Public\bonderson\YUMA\DRAWINGS\FIGURE A1.dgn

8.5"x11"

7:34:06 AM
8/4/2016
L:\Shared\home\Public\banderson\YUMA\DRAWINGS\FIGURE A2 (SURROUNDING LAND USE).dgn

11x8.5 (in.)



NOTE:

1. SOURCE DATA: ARIZONA STATE LAND DEPARTMENT, http://gis.azland.gove

NOT TO SCALE

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Novi, Michigan 48377
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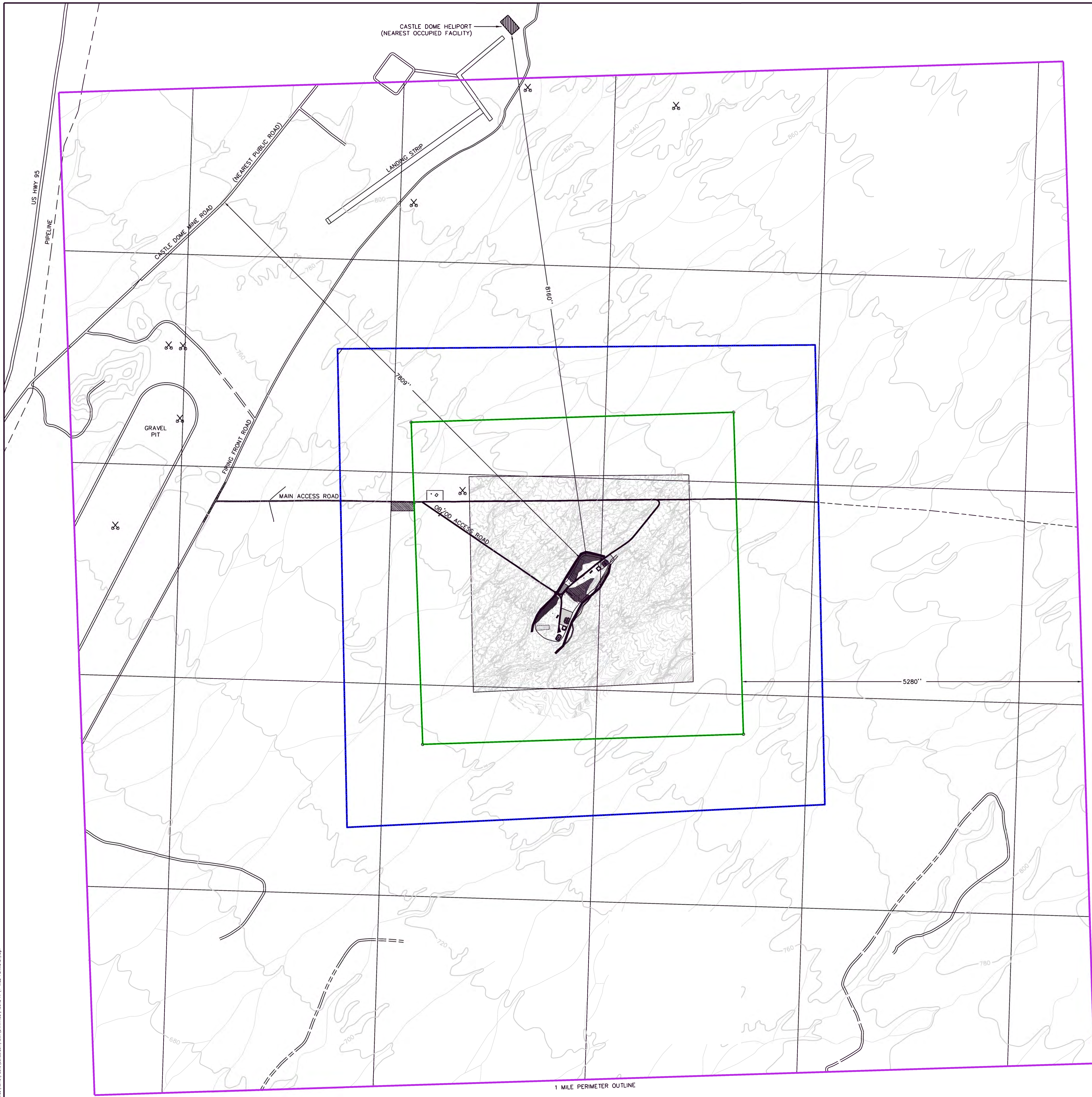
FIGURE 1A-2
SURROUNDING LAND USE

YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION

JULY 2016

1165010006.3



LEGEND:

(line)	USGS 20' CONTOUR
(line)	EXISTING FENCE LINE
(green line)	PROPERTY BOUNDARY
(blue line)	1000' PERIMETER BOUNDARY
(magenta line)	1 MILE PERIMETER BOUNDARY
(symbol)	GRAVEL PIT

NOTES:

1. THESE MAPS PREPARED USING DESIGN PACKAGE TITLED U.S. ARMY PROVING GROUND 100 YEAR FLOOD PLAIN PROTECTION DESIGN OB/OD SITE, SEALED 12/11/2002.
2. NO SURFACE WATERS EXIST ON THIS HAZARDOUS WASTE MANAGEMENT SITE.
3. SURROUNDING LAND USES ARE MILITARY RANGES.
4. THERE ARE NO INJECTION OR WITHDRAWAL WELLS ON THE SITE.
5. THERE ARE NO FENCES OR ACCESS GATES WITHIN 1000' OF THE ACTIVE HAZARDOUS WASTE MANAGEMENT AREA.
6. CONTOUR LINES ARE SHOWN AT 1' INTERVALS WITHIN THE AERIAL SURVEY BOUNDARY, AND AT 20' INTERVALS OUTSIDE THE AERIAL SURVEY BOUNDARY.
7. HORIZONTAL DATUM: COORDINATES ARE IN UTM SYSTEM CONVERTED FROM METRIC TO FEET AS PROVIDED BY PREMIERE ENGINEERING ON LETTER DATED 2/20/02

   VERTICAL DATUM: ELEVATIONS ARE IN NAVD29. BACKGROUND CONTOURS FROM COOPER AERIAL SURVEY PROJECT NUMBER 6097-020602.
8. ENTIRE AREA SHOWN IS CLASSIFIED AS "ZONE D" PER FEMA PANEL 0427C1000E, EFFECTIVE AUGUST 28, 2008, AND IS NOT WITHIN A 100 YEAR OR 500 YEAR FLOOD PLAIN. THE ACTIVE MUNITIONS TREATMENT FACILITY IS PROTECTED BY A STORMWATER PROTECTION BERM.
9. THIS DRAWING WAS ADAPTED FROM USGS TOPOGRAPHIC MAPS – MIDDLE MOUNTAIN SOUTH AND RED BLUFF MOUNTAIN NW AND DRAWING No. 003
10. THIS DRAWING WAS CREATED USING THE GUTIERREZ CANALES ENGINEERING CAD DRAWING.

REGIONAL GROUNDWATER FLOW DATA

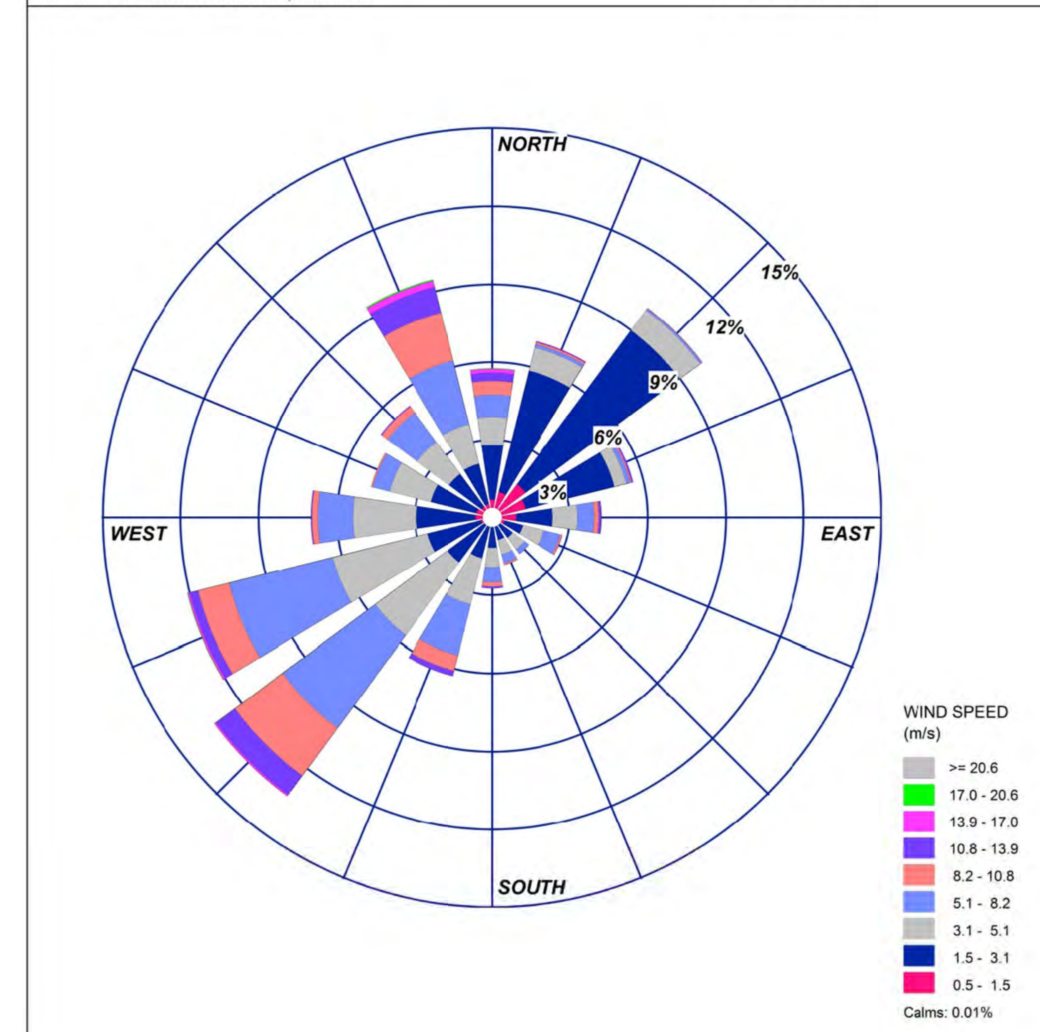
PROVIDED BY ENTECH ENGINEERS–
(HYDROLOGIC BOUNDARY AND POTENTIOMETRIC MAP 6-22-94)

GROUNDWATER FLOW DIRECTION

APPROXIMATE GROUNDWATER ELEVATION: 193' ABOVE MEAN SEA LEVEL.

WIND ROSE PLOT:
YUMA PROVING GROUNDS, AZ
YPG MET STATION AT 32.872 N; 114.33 W

DISPLAY:
Wind Speed
Direction (blowing from)



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	AVG. WIND SPEED: 4.35 m/s	DATE: 7/29/2016	PROJECT NO.: YPG RCRA PERMIT

WRPLOT View - Lakes Environmental Software

SCALE 0' 300' 600' 1,200'

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DATE:
DESIGNED BY:
DRAWN BY:
CHECKED BY:
APPROVED BY:

REV	DATE	REVISION DESCRIPTION	DRN	APP

YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION

MUNITIONS TREATMENT FACILITY
ONE MILE PERIMETER MAP

PROJECT NUMBER 1165010006.3
SCALE FT=217
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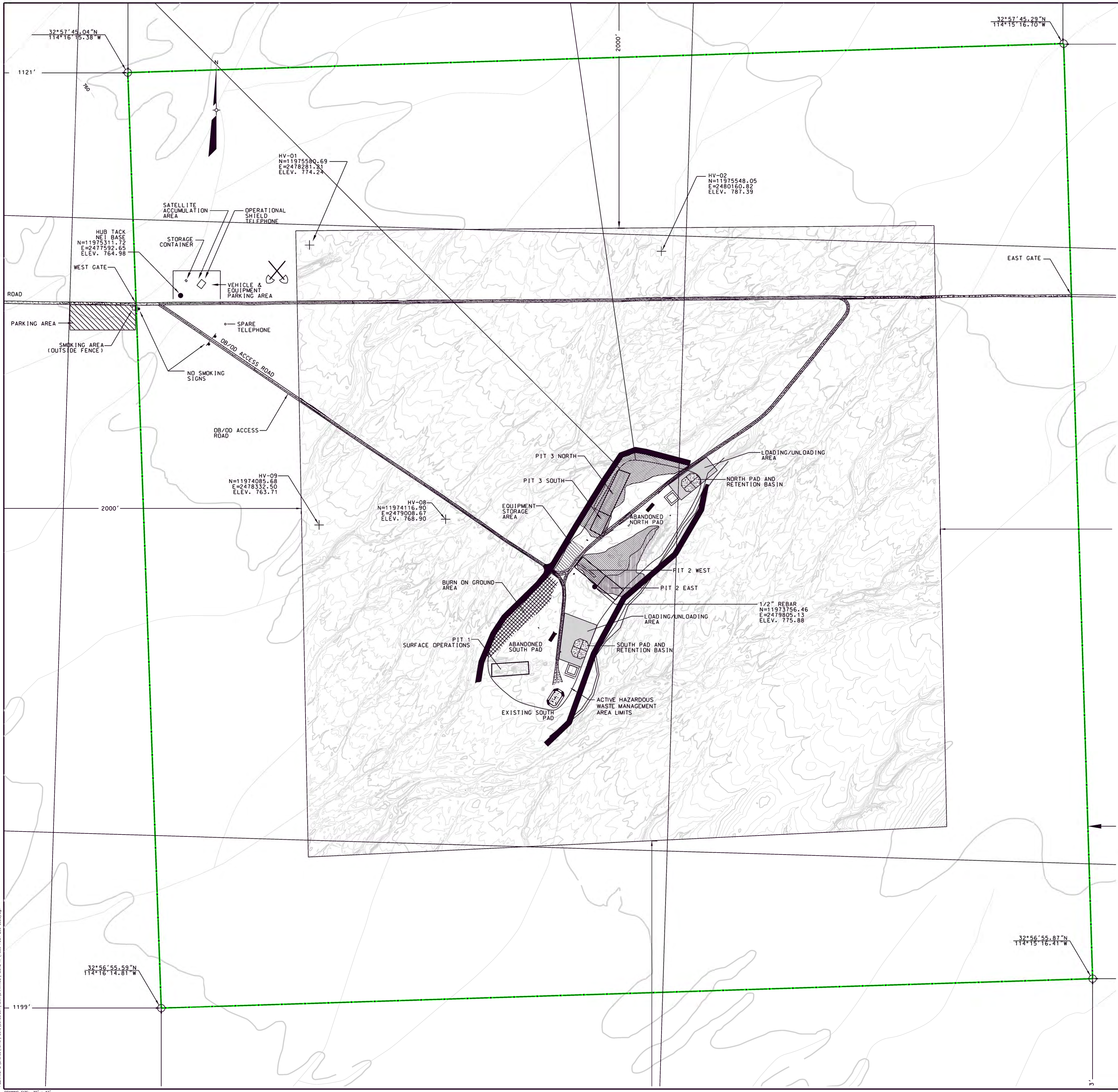
FIGURE 1A-3a

DRAWING SIZE: 30" x 42"



LEGEND:

- EXISTING CONTOUR
- EXISTING INDEX CONTOUR
- EXISTING FENCE LINE
- STORMWATER PROTECTION BERM
- CONCRETE PADS
- EXISTING DIRT ROAD
- EQUIPMENT STORAGE AREA
- BURN ON GROUND AREA
- LOADING/UNLOADING AREA
- PROPERTY BOUNDARY

NOTES:

1. THESE MAPS PREPARED USING DESIGN PACKAGE TITLED U.S. ARMY PROVING GROUND 100 YEAR FLOOD PLAIN PROTECTION DESIGN OB/OD SITE, SEALED 12/11/2002.
2. NO SURFACE WATERS EXIST ON THIS HAZARDOUS WASTE MANAGEMENT SITE.
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6. CONTOUR LINES ARE SHOWN AT 1' INTERVALS WITHIN THE AERIAL SURVEY BOUNDARY, AND AT 20' INTERVALS OUTSIDE THE AERIAL SURVEY BOUNDARY.
7. HORIZONTAL DATUM:
   COORDINATES ARE IN UTM SYSTEM CONVERTED FROM METRIC TO FEET AS PROVIDED BY PREMIERE ENGINEERING ON LETTER DATED 2/20/02

   VERTICAL DATUM:
   ELEVATIONS ARE IN NAVD29. BACKGROUND CONTOURS FROM COOPER AERIAL SURVEY PROJECT NUMBER 6097-020602.
8. ENTIRE AREA SHOWN IS CLASSIFIED AS "ZONE D" PER FEMA PANEL 0427C1000E, EFFECTIVE AUGUST 28, 2008, AND IS NOT WITHIN A 100 YEAR OR 500 YEAR FLOOD PLAIN. THE ACTIVE MUNITIONS TREATMENT FACILITY IS PROTECTED BY A STORMWATER PROTECTION BERM.
9. THIS DRAWING WAS ADAPTED FROM USGS TOPOGRAPHIC MAPS - MIDDLE MOUNTAIN SOUTH AND RED BLUFF MOUNTAIN NW AND DRAWING No. 003
10. THIS DRAWING WAS CREATED USING THE GUTIERREZ CANALES ENGINEERING CAD DRAWING.

REGIONAL GROUNDWATER FLOW DATA

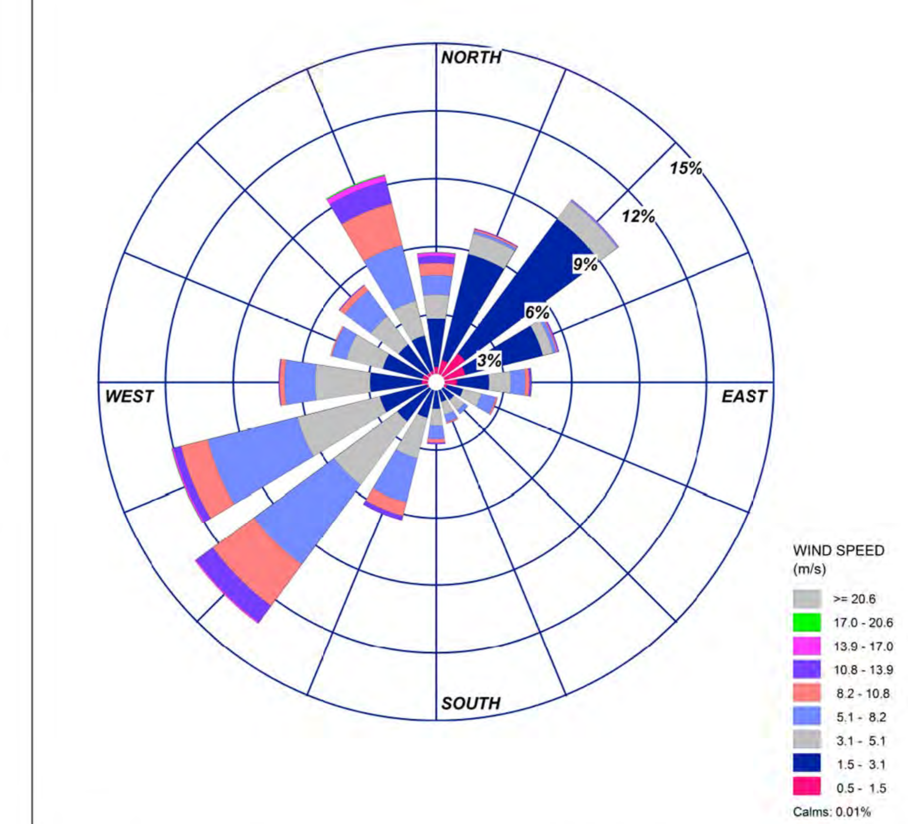
PROVIDED BY ENTECH ENGINEERS-
(HYDROLOGIC BOUNDARY AND POTENTIOMETRIC MAP 6-22-94)

GROUNDWATER FLOW DIRECTION

APPROXIMATE GROUNDWATER ELEVATION: 193' ABOVE MEAN SEA LEVEL.

WIND ROSE PLOT:
YUMA PROVING GROUNDS, AZ
YPG MET STATION AT 32.872 N; 114.33 W

DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Calms includes wind speeds between 0 and less than 0.5 m/s	Start Date: 1/1/2011 - 00:00 End Date: 12/31/2015 - 23:00	AECOM	
	CALM WINDS: 0.01%	TOTAL COUNT: 43823 hrs.	
	AVG. WIND SPEED: 4.35 m/s	DATE: 7/29/2016	PROJECT NO.: YPG RCRA PERMIT

WRPLOT View - Lakes Environmental Software

DATE:
DESIGNED BY:
DRAWN BY:
CHECKED BY:
APPROVED BY:

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REV	DATE	REVISION DESCRIPTION	DRN	APP

REVISIONS

YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION

MUNITIONS TREATMENT FACILITY PROPERTY BOUNDARY MAP

PROJECT NUMBER: 1165010006.3
SCALE: AS SHOWN
DRAWING NO: **FIGURE 1A-3b**

DRAWING SIZE: 30" x 42"

NORTH BURN PAD
LEGEND
WASH CENTERLINE
DRAINAGE PIPE
BERM (BY OTHERS)
RIP RAP SLOPE
CONCRETE PAVEMENT
DIRT ROAD
EXISTING CONTOUR
ELEVATION CONTOUR LINE
ELEVATION CONTOUR LINE (INDEX)
EXISTING SIGN
EXISTING TREE
GROUND ELEVATION
RIP-RAP ELEVATION
EDGE OF ROAD ELEVATION
TOP OF BERM ELEVATION
WASH CENTERLINE ELEVATION
CONCRETE ELEVATION
PAD SUMP
RETENTION BASIN SUMP
NORTH BURN PAD RETENTION BASIN
DETONATION PIT #3
DETONATION PIT #2
MATERIALS PILE
GRAVEL ROAD (TYPICAL)
12" HIGH BERM CONSTRUCTED FROM NATIVE MATERIALS (BY OTHERS)
STORM WATER PROTECTION BERM (TYPICAL)
FORMER BURN ON GROUND AREA
SOUTH BURN PAD
SOUTH BURN PAD RETENTION BASIN
INACTIVE SOUTH BURN PAD
DETONATION ON-GROUND AREA
PROCESS UNITS:
1. DETONATION ON-GROUND AREA
2. DETONATION PIT #2 - EAST TRENCH
3. DETONATION PIT #2 - WEST TRENCH
4. DETONATION PIT #3 - SOUTH TRENCH
5. DETONATION PIT #3 - NORTH TRENCH
6. NORTH BURN PAD
7. SOUTH BURN PAD
8. INACTIVE SOUTH BURN PAD (currently undergoing closure)
PROCESS CODE X01 APPLIES TO ALL PROCESS UNITS IN THE MUNITIONS TREATMENT FACILITY
SCALE 0' 15' 30' 60'
YUMA PROVING GROUND
MUNITIONS TREAMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION
SITE DETAIL DRAWING
PROJECT NUMBER 1165010006.3
SCALE AS SHOWN
DRAWING NO
FIGURE 1A-3c

TIME PLOTTED: 12:47:58 PM
DATE PLOTTED: 8/4/2016
FILENAME:

DRAWING SIZE:

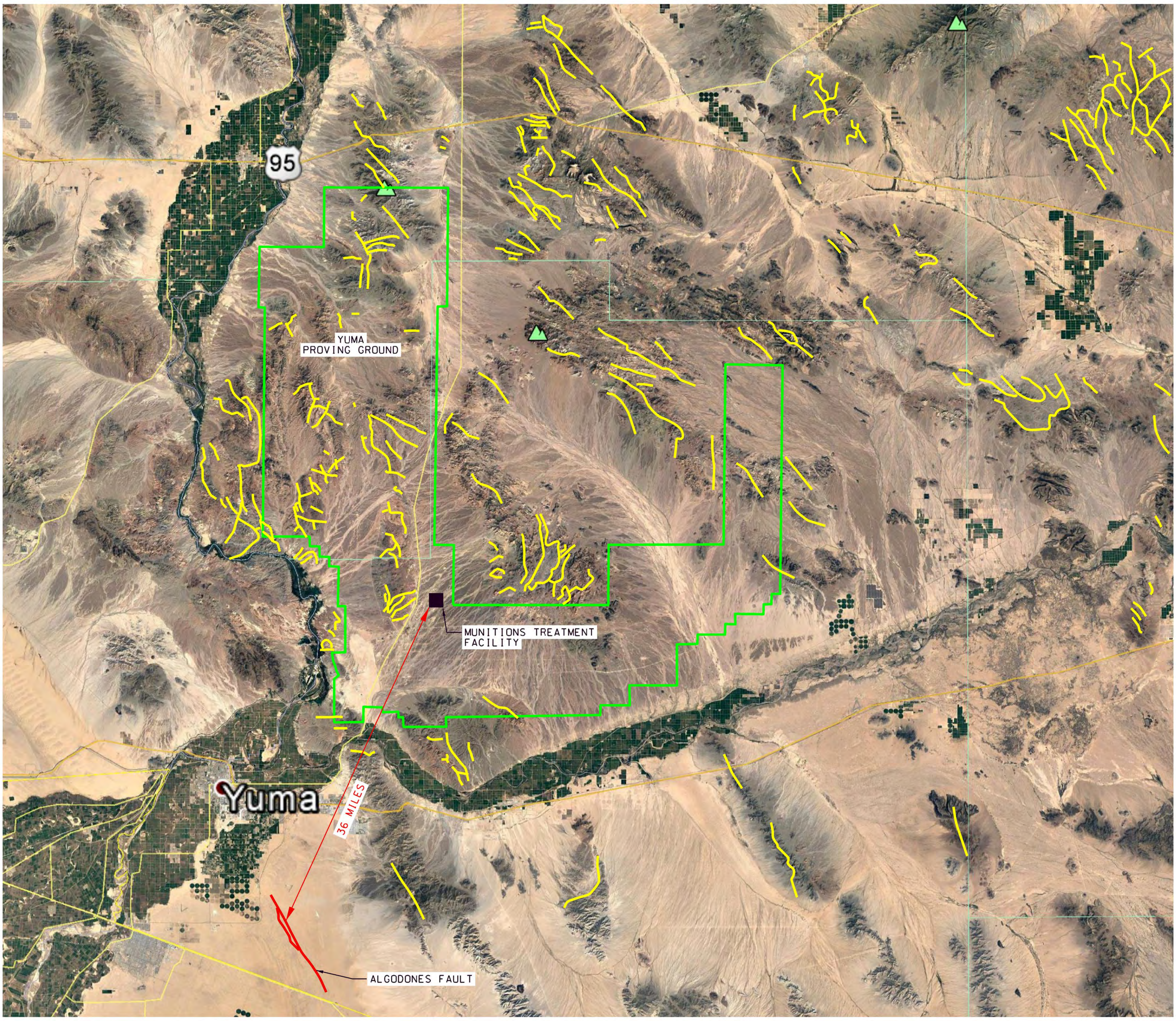
N

NOTE

1. Source for the data: Arizona Geological Survey (http://data.azgs.az.gov/hazard-viewer/)

LEGEND

- SEISMIC FAULT
- PROVING GROUND BOUNDARY
- DISTANCE FROM FAULT WITH DISPLACEMENT IN HOLOCENE TIME
- HOLOCENE ERA SEISMIC FAULT



APPROXIMATE SCALE
MILES
0 3 6 12

PROJECT NUMBER 1165010006.003	YUMA PROVING GROUND MUNITIONS TREATMENT FACILITY RCRA PERMIT RENEWAL APPLICATION		
SCALE AS SHOWN			
FIGURE NUMBER **FIGURE 1A-4**	**SEISMIC/FAULT DETAILS**		

REVISIONS

REV	DATE	REVISION DESCRIPTION	DRN	APP

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DATE:	
DESIGNED BY:	
DRAWN BY:	
CHECKED BY:	
APPROVED BY:	

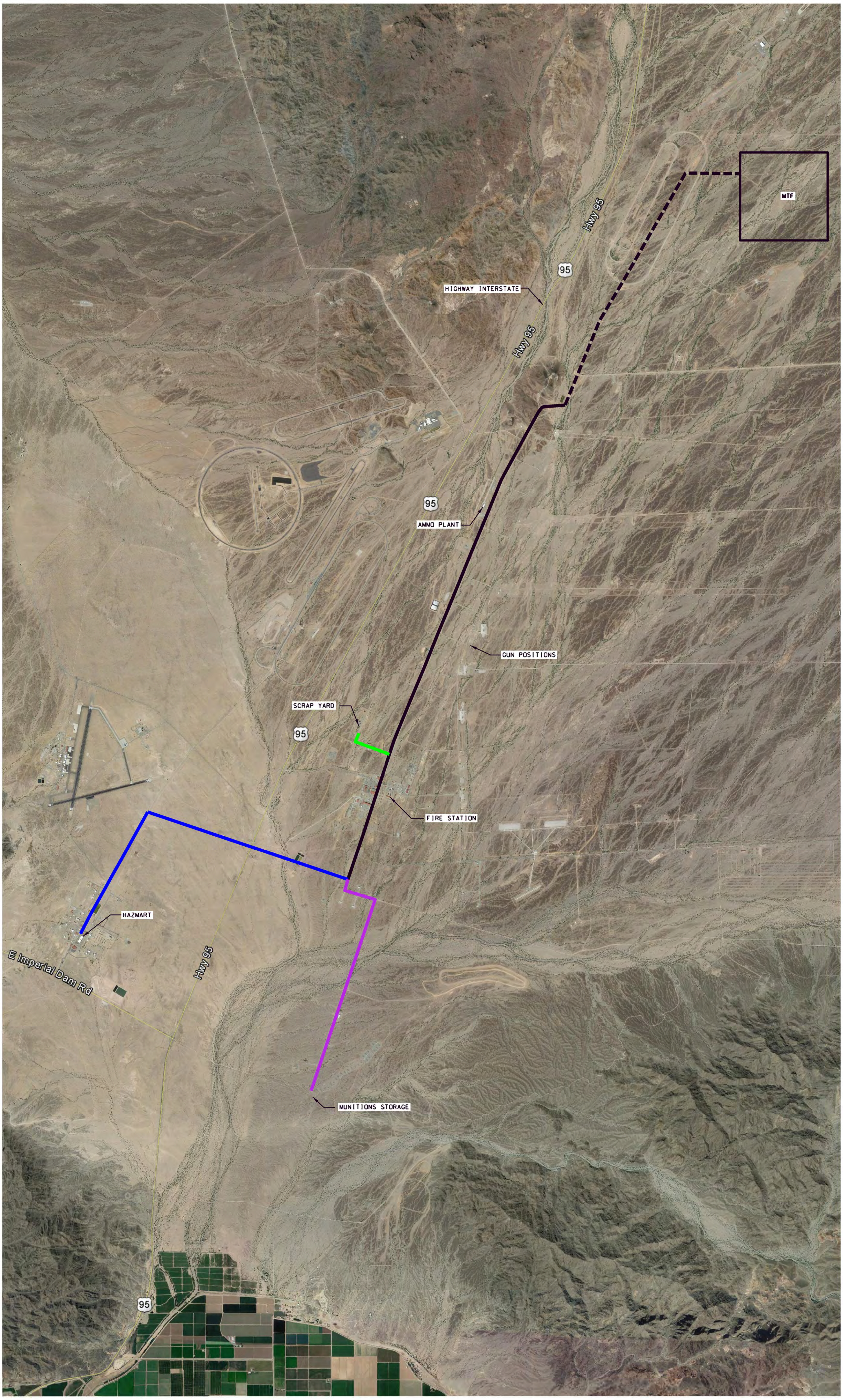
TIME PLOTTED: 3:30:02 PM
DATE PLOTTED: 7/29/2016
FILENAME: L:\Shared\home\Public\banderson\YUMA\DRAWINGS\FIGURE A5.dgn

DRAWING SIZE: 22" X 34"

N

LEGEND

- COMBINED MUNITIONS, METAL AND ASH ROUTE TO MTF (CONCRETE)
- COMBINED MUNITIONS, METAL AND ASH ROUTE TO MTF (GRAVEL)
- MUNITIONS ROUTE
- METAL ROUTE
- ASH ROUTE



0' 3,000' 6,000'
SCALE

FIGURE NUMBER	FIGURE 1A-5
SCALE	AS SHOWN
PROJECT NUMBER	116501006.003

YUMA PROVING GROUNDS
MUNITIONS TREAMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION

TRAFFIC PATTERNS AND ROADS TO THE MUNITIONS TREATMENT FACILITY

REVISIONS

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CHECKED BY:	
APPROVED BY:	

7:12:55 AM
8/4/2016
L:\Shared\home\Public\banderson\YUMA\DRAWINGS\FIGURE A6 (REGIONAL TOPOGRAPHY).dgn

11x8.5 (in.)

NOTE:

1. SOURCE DATA: ARIZONA STATE LAND DEPARTMENT, http://gis.azland.gove

NOT TO SCALE

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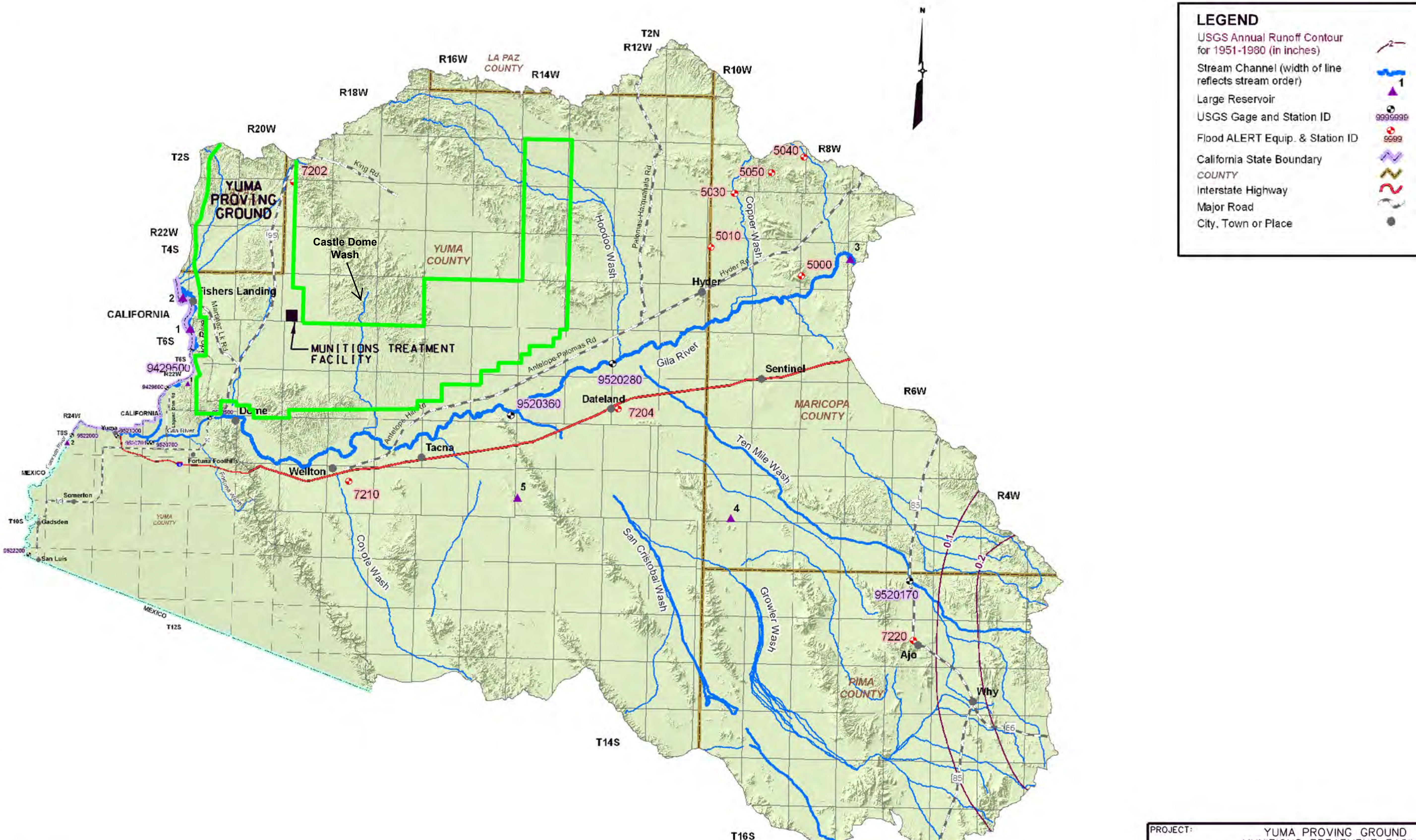
FIGURE 1A-6
REGIONAL TOPOGRAPHY
YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION

JULY 2016

1165010006.3



NOTE:

1. SOURCE DATA: ARIZONA DEPARTMENT OF WATER RESOURCES. www.azwater.gov

APPROXIMATE SCALE MILES 0' 3' 6'

PROJECT: YUMA PROVING GROUND MUNITIONS TREATMENT FACILITY RCRA PERMIT RENEWAL APPLICATION

SHEET TITLE: **SURFACE WATER INCLUDING STREAMS**

cti

PROJECT #: 1165010006.3

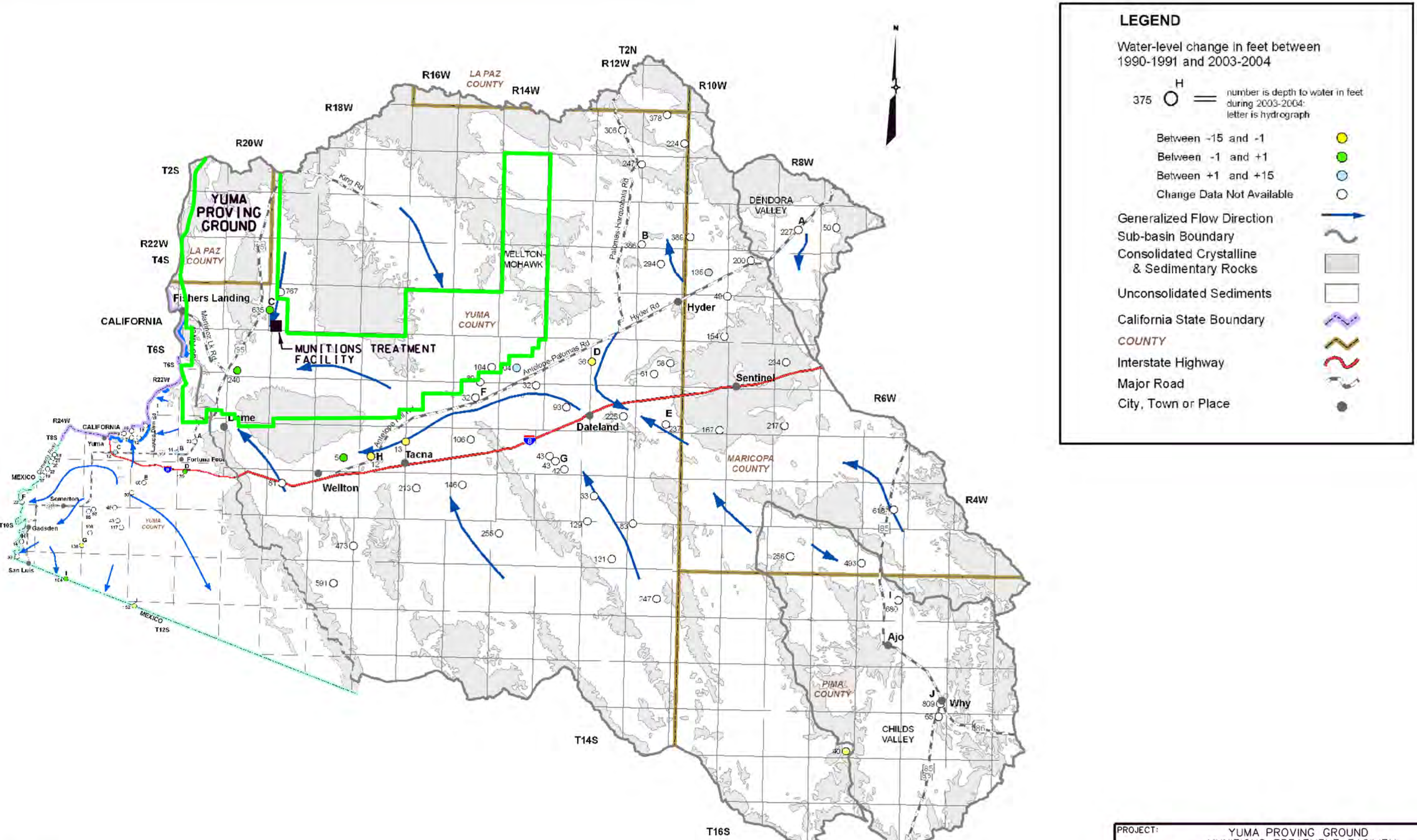
SCALE: AS SHOWN

DATE: JULY 2016

FIGURE NO. **FIGURE 1A-7a**

TIME PLOTTED: 8:09:43 AM
DATE PLOTTED: 8/4/2016
FILENAME: L:\Shared\home\Public\bonderson\YUMA\DRAWINGS\FIGURE A. (SURFACE WATER).dgn

DRAWING SIZE: 11"x17"



NOTE:

1. SOURCE DATA: ARIZONA DEPARTMENT OF WATER RESOURCES. www.azwater.gov

PROJECT:	YUMA PROVING GROUND MUNITIONS TREATMENT FACILITY RCRA PERMIT RENEWAL APPLICATION
SHEET TITLE:	GROUNDWATER REGIONAL FLOW
PROJECT #:	1165010006.3
SCALE:	AS SHOWN
DATE:	JULY 2016
FIGURE NO.	FIGURE 1A-7b

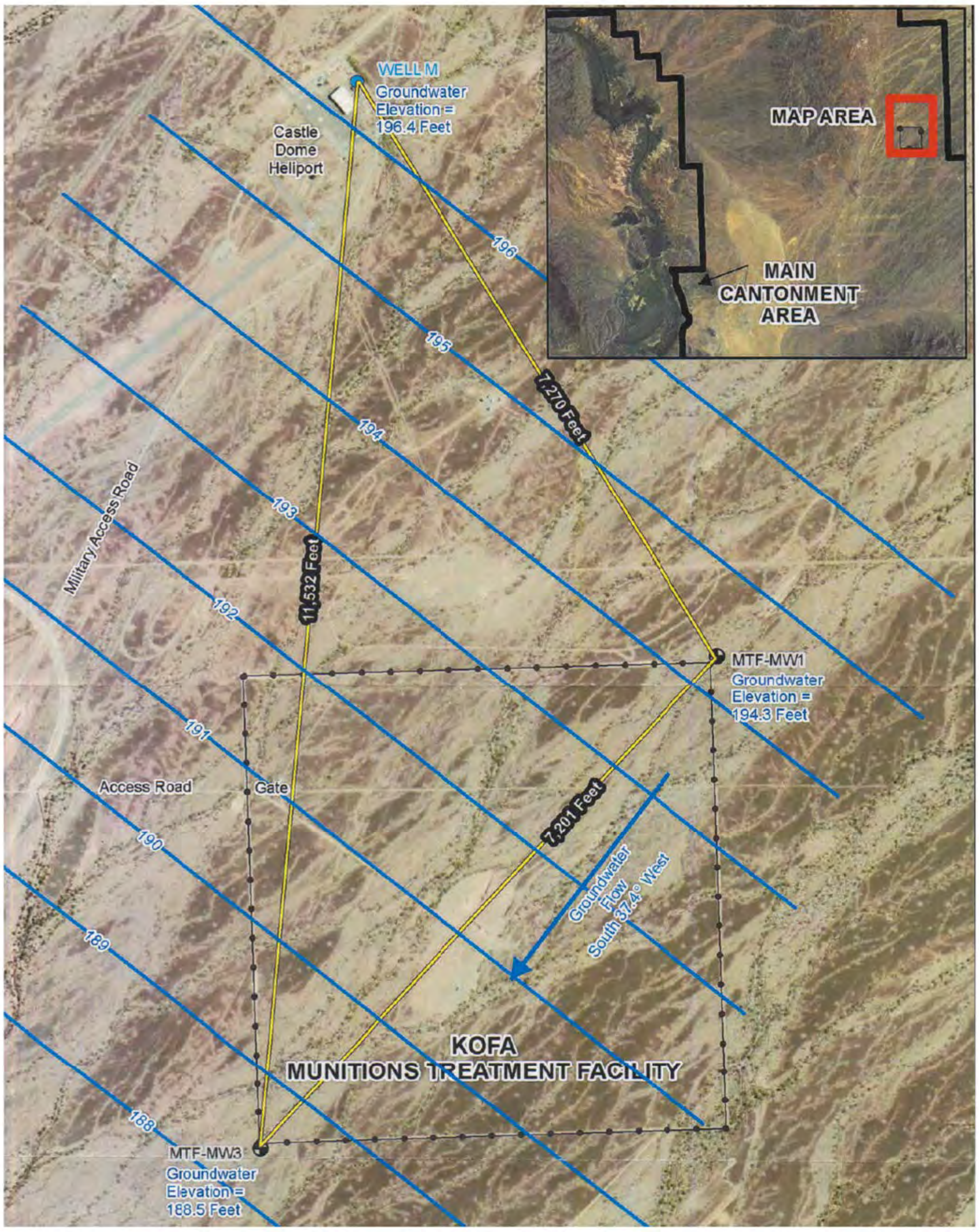
cti

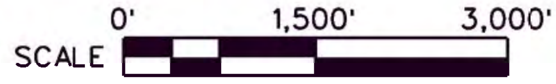
TIME PLOTTED: 8:05:57 AM
DATE PLOTTED: 8/4/2016
FILENAME: L:\Shared\home\Public\bonderson\YUMA\DRAWINGS\FIGURE A. (GROUNDWATER REGIONAL FLOW).dgn

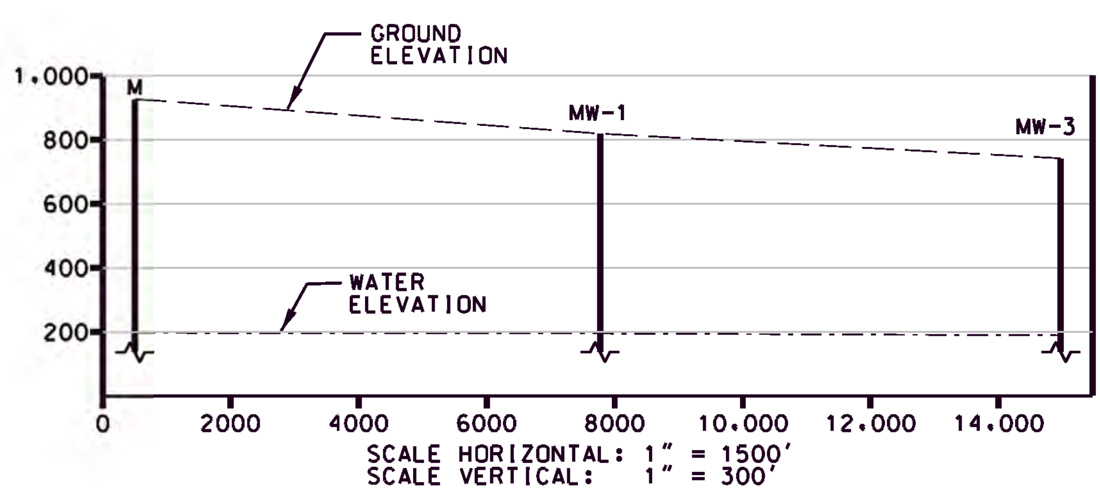
DRAWING SIZE: 11"x17"

TIME PLOTTED: 11:36:23 AM
DATE PLOTTED: 8/4/2016
FILENAME: L:\Shared\home\Public\banderson\YUMA\DRAWINGS\FIGURE D1 (POTENTIOMETRIC MAP).dgn

DRAWING SIZE: 11"x17"







LEGEND

- Groundwater Monitoring Well
- Production Well Location
- Groundwater Flow Direction
- Fence
- Groundwater Contour (1 Ft Interval)

Groundwater elevations shown are to the nearest 0.10 feet.

PROJECT: YUMA PROVING GROUND MUNITIONS TREATMENT FACILITY RCRA PERMIT RENEWAL APPLICATION

SHEET TITLE: **POTENTIOMETRIC MAP**

cti

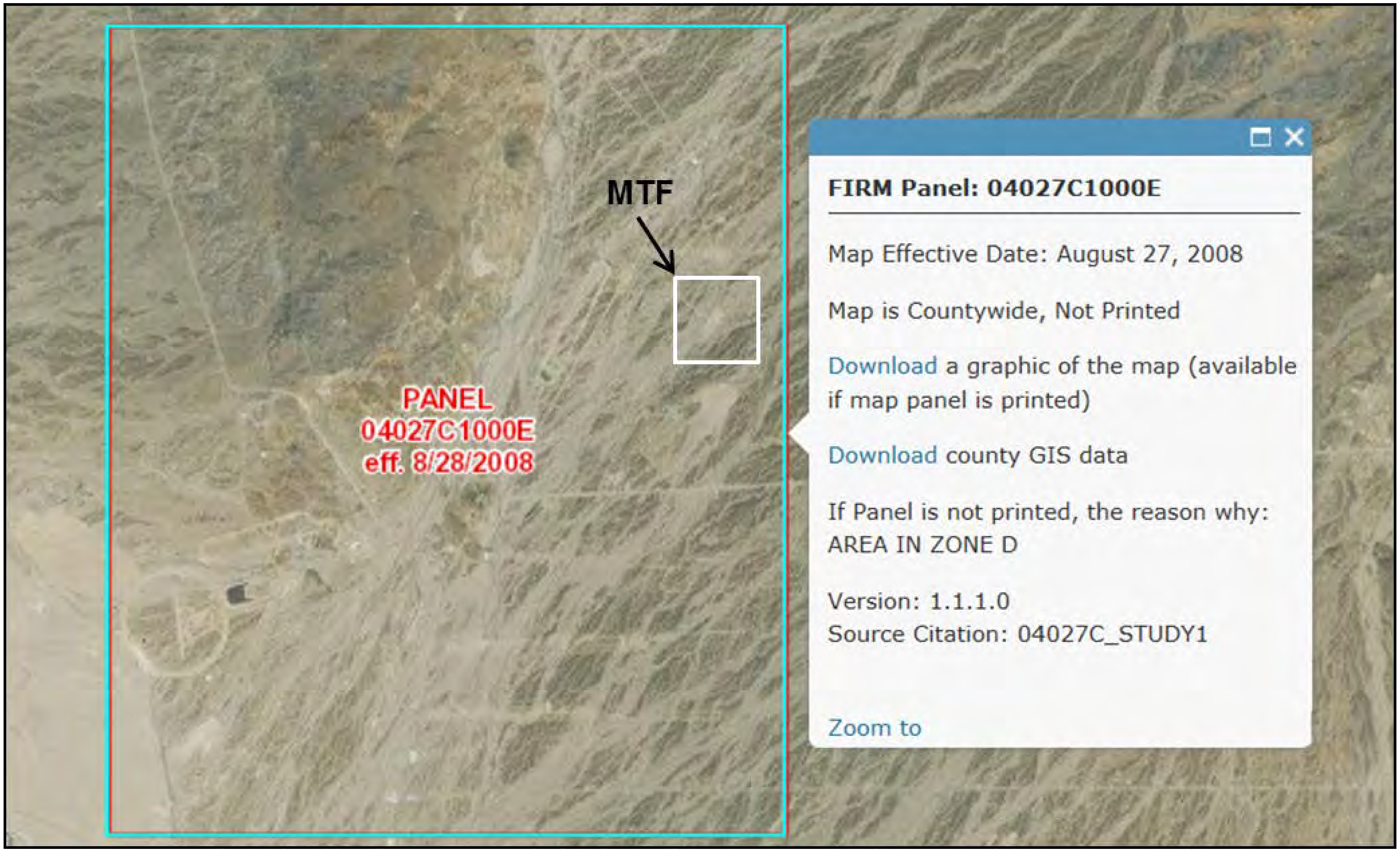
PROJECT #: 1165010006.3
SCALE: AS SHOWN
DATE: JULY 2016

FIGURE NO. **FIGURE 1A-7c**

NOTE:

1. SOURCE DATA: GROUNDWATER MONITORING PLAN 2014.

11x8.5 (in.)



SOURCE: http://fema.maps.arcgis.com/home/webmap/viewer.html?webmap=cbe088e7c8704464aa0fc34eb99e7f30&extent=-114.59473490567973,32.84266137903033,-113.93006205411814,33.032832090511754

Note: A printable FIRM Map is not availble for the subject area. The above image and data are screenshots of from FEMA's National Flood Hazard Layer (Official) website.

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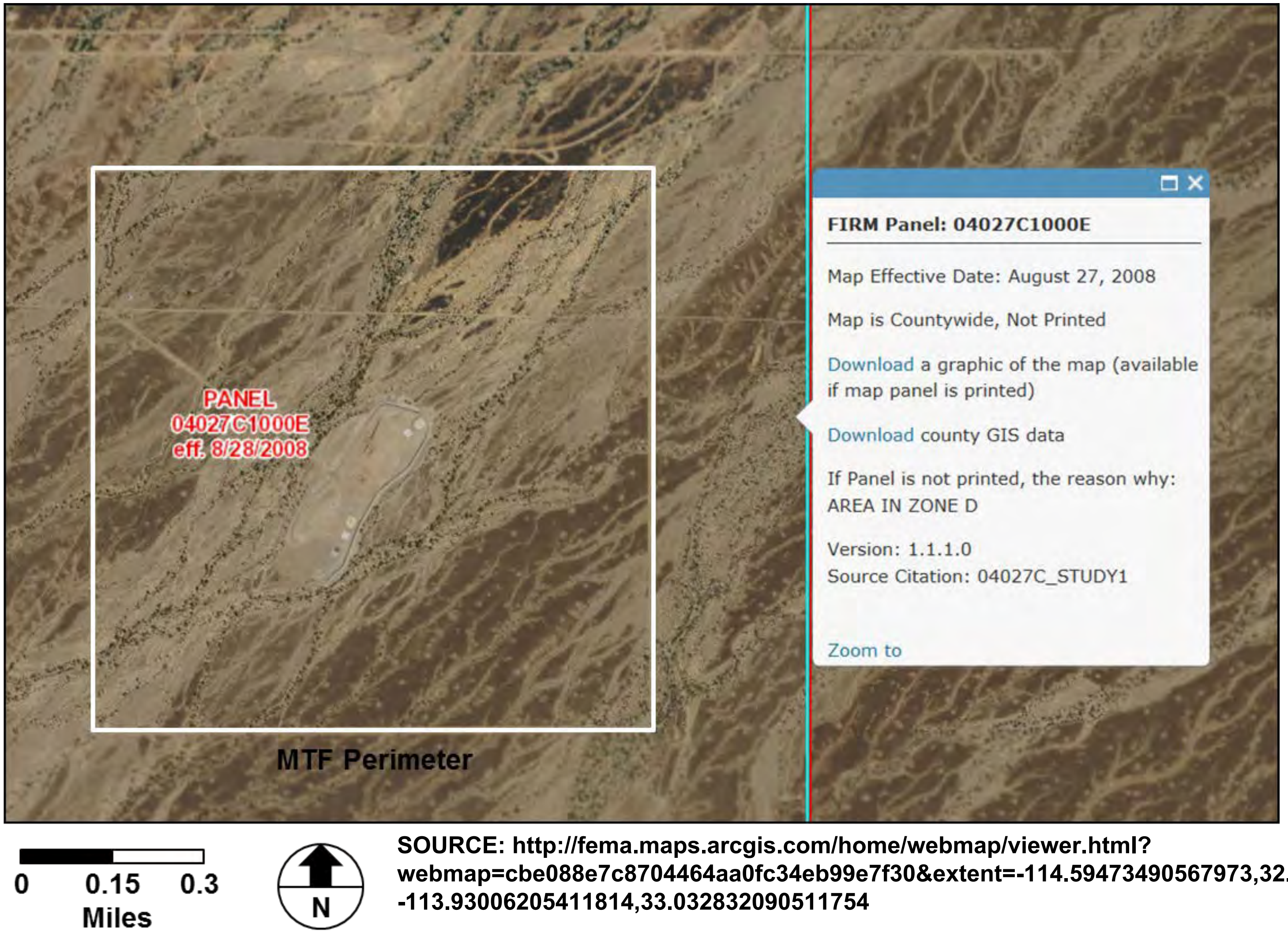
FIGURE 1A-8a
FIRM Panel 04027C1000E

YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION



SOURCE: http://fema.maps.arcgis.com/home/webmap/viewer.html?webmap=cbe088e7c8704464aa0fc34eb99e7f30&extent=-114.59473490567973,32.84266137903033,-113.93006205411814,33.032832090511754

Note: A printable FIRM Map is not availble for the subject area. The above image and data are screenshots of from FEMA's National Flood Hazard Layer (Official) website.

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FIGURE 1A-8b
MTF Within FIRM Panel 04027C1000E

YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION

ATTACHMENT 1B

2016 SWMU Status Update

ARIZONA HAZARDOUS WASTE MANAGEMENT PERMIT

EPA I.D. NO. AZ5213820991

U.S. ARMY GARRISON YUMA PROVING GROUND

PERMIT ATTACHMENT 2

MISCELLANEOUS UNITS

TABLE OF CONTENTS

CONTENTS PAGE

ATTACHMENTS

MISCELLANEOUS UNITS

The Open Burning / Open Detonation (OB/OD) Munitions Treatment Facility (MTF) at the U.S. Army Garrison Yuma Proving Ground (USAGYPG) is regulated as a miscellaneous unit as described in the Resource Conservation and Recovery Act (RCRA) regulations under Title 40 of the Code of Federal Regulations (CFR) section 264 Subpart X (264.600 to 264.603). The OB/OD MTF is used for the thermal treatment of waste propellants, explosive and pyrotechnic (PEP) munitions and materials.

2.1 SITE MAKEUP

The OB/OD MTF is in a remote location on the Kofa Firing Range. The OB/OD MTF is a fenced-in area of about 0.94 miles by 0.95 miles, or 572 acres (see Permit Attachment 1A, Figure A-3a). This is considered the active portion of the site (as defined in 40 CFR 260.10) since the distance from the OD pits and OB pads to the fence is greater than the protective distance to the property of others as defined in 40 CFR 265.382 (1,730 feet). The area of the site containing the OB pads and the OD pits is about 0.154 square kilometers (38.2 acres) and is sparsely vegetated. At present, there are eight operational units – three OB pads and five OD pits:

1. North Burn Pad and Retention Basin;
2. South Burn Pad and Retention Basin;
3. Inactive South Burn Pad;
4. Detonation On-Ground Area (formally referred to as Pit #1)
5. Detonation Pit #2-West;
6. Detonation Pit #2-East;
7. Detonation Pit #3-North; and
8. Detonation Pit #3-South.

The locations of the above units are shown in Permit Attachment 1 (Facility Description), Permit Attachment 1A Figure 1A-3c. The pits and pads at the site cover about 2.2 acres.

The inactive South Burn Pad at the southernmost end of the OB/OD MTF is inactive and undergoing closure. Information specific to this pad is not included the subsequent sections of this document.

Photographs of the OB/OD MTF are provided in Permit Attachment 2A (OB/OD MTF Photographs)

2.1.1 OB Pads

The OB units consist of the South Pad and North Pad, each 80 feet by 100 feet. There will be no more than two pads in operation at any one time. Rain that falls on the pads is directed from a pad sump to an adjacent storm water retention basin via double-walled underground piping.

Design details of the OB pads are provided in Permit Attachment 2 Section 2.2.2 and Permit Attachment 2B.

Construction of the two OB pads, basins and flood protection berm was completed March 27, 2014 in conformance with plans and specifications submitted to and approved by ADEQ, and in accordance with the 2007 Final Permit; Part I. General Permit Conditions, Schedule of Compliance. A class I permit modification request to finalize the addition of the new OB pads was approved by ADEQ on May 31, 2016.

The construction of the OB pads, stormwater retention basins and adjoining underground double-walled piping was done under the supervision of an independent Arizona registered PE. After construction was complete, a PE certified report stating the OB pads were constructed in accordance with the required standards, with any deviations noted, was completed. A copy of this report is included in Permit Attachment 2B. A topographic survey to provide an updated topographic map showing the elevated soil surrounding the OB Pads and Basins is included in Permit Attachment 2B. In addition, updated calculations showing that no storm water run-on will occur into the OB Pads and Basins are provided in Permit Attachment 2G.

2.1.2 OB Pans

Each pad has three pans. Each pan is approximately 5.5 meters (18 feet) long by 1.8 meters (6 feet) wide. The top of the pan is approximately 0.6 meters (2 feet) above the pad. Design of the OB pans is discussed in Permit Attachment 2 Section 2.2.2, and design details are provided in Permit Attachment 2C.

2.1.3 OD Units

The OD units consist of two open excavated trench areas designated as Detonation Pit #2 and #3, and one open flat surface area designated as Detonation On-Ground Area. All of these areas are used for OD of waste PEP ordnance.

Detonation Pits #2 and #3 are trenched areas approximately 50 feet wide and 10 to 15 feet deep. They have a soil berm dividing them into two pits each (total of four pits) where the majority of the OD operations occur. The Detonation On-Ground Area, which currently is an undefined open area with varying elevation differences of up to 5 feet, is used for surface/near surface treatment of items containing sub-munitions. Sub-munitions are not detonated below surface due to their potential burrow deeper into the soil, posing a safety concern. The layout of the OD units is shown in Permit Attachment 2B.

Ordnance items are placed on the bottom of the pits, covered with soil (ordnance containing sub-munitions generally are not covered), and detonated. Highly trained Ordnance Response Team (ORT) personnel perform all work in strict accordance with standard operating procedures (SOP) (see Permit Attachment 6 (OB/OD Operations)).

Following treatment by OD, ORT personnel inspect the area to recover any scrap metal fragments and PEP residues resulting from detonation (see Permit Attachment 2 Section 2.1.4). The ORT personnel are trained to extract all post-detonation scrap and PEP residues, and ensure that there is no risk of accidental explosion in the subsequent detonation due to fragments from the previous detonation. Any craters that develop in the pits are restored using heavy equipment.

2.1.4 Hazardous Waste Accumulation Area(s)

The OB/OD management unit has a satellite accumulation area that is located adjacent to the safety bunker. The accumulation area is located greater than 50 feet from the OB and OD treatment units. No waste explosives or ignitable oxidizers [EPA Hazardous Waste Codes D001 or D003] are accumulated (40 CFR 264.177) at this area. Further, no hazardous waste of any kind is stored at the OB/OD MTF.

All waste explosives are destroyed by OB/OD except for minor residuals. Minor residuals include OB ash residue and flash reducer (see Permit Attachment 2 Section 2.2.2.5), munitions scrap, and explosives filler (see Permit Attachment 2 Section 2.2.3.3), and metal or chemical residue (see Permit Attachment 2 Section 2.2.3.4). USAGYPG has certified that ORTs have the training and skills to remove all residuals from the OD areas and OB pads.

Waste ash is a byproduct of burning various propellants. Waste ash (potentially EPA Hazardous Waste) is accumulated in a 55-gallon drum and temporarily held at an area directly next to the safety bunker at the OB/OD MTF for subsequent transport to the USAGYPG Hazardous Materials Pharmacy (HAZMART) 90-day waste accumulation site. The safety bunker is approximately 730 meters (2400 feet) from the burn pads and trenches.

Metallic and non-metallic scrap (e.g., plastics) is managed differently. As described in the Waste Analysis Plan (WAP) (Permit Attachment 3), any scrap will first be visually inspected by a qualified person to determine if it exhibits hazardous waste characteristics of ignitability (D001) or reactivity (D003). If it is ignitable or reactive hazardous waste, it will be re-treated or managed as hazardous waste. If it is not ignitable or reactive hazardous waste, it will be moved to a location within the OB/OB MTF treatment area (the area defined by the flood control berm) for sorting and characterization for the hazardous waste characteristic of toxicity (40 CFR 261.24). If the waste does not exhibit the toxicity characteristic, it may be sent to a solid waste recycler or landfill. If the waste does exhibit the toxicity characteristic, it must be managed as hazardous waste and cannot be sent to a solid waste recycler or landfill. Both the visual inspection and the characterization must be documented as described in the WAP.

2.2 PROCESS INFORMATION

The flow diagram below illustrates the sequence of the general Ammo disposal process at the OB/OD MTF. Additional information on OB/OD MTF operations is provided in Permit Attachment 6 (OB/OD Operations).

AMMO RECOVERY FLOW DIAGRAM FOR OB/OD OPERATIONS

Receive Transfer Document from Ammo Management

↓

Schedule OB/OD Event(s)

↓

Receive Ammunition from Storage Location(s)

↓

Transport Ammo to OB/OD MTF for Disposal

↓

Perform OB/OD Daily Inspection

↓

Perform Disposal Operation w/QA Verifying Destruction

↓

Return Signed Document to Ammo Management

↓

Return Next Day For Cleanup Operations Of OB/OD MTF

2.2.1 Open Burn

Historical OB activities (1974-1986) occurred on a designated burn area on the ground. Surficial soils in this area were sampled in 1983 (YPG 2004c, Submittal 2). Twenty samples from 15 to 46 centimeters (6 to 18 inches) in depth were collected at the former burning pad location. The results documented elevated levels of lead and low levels of 2,4-dinitrotoluene. Because of this sampling effort and in response to stricter environmental requirements, all OB activities are now conducted in ceramic refractory-lined steel burn pans located on concrete pads. Since the summer of 1987, no OB activities have occurred directly on the ground.

2.2.1.1 Appropriateness of Treatment Methods

OB is a common technique the military utilizes to thermally treat unserviceable waste propellants. The OB/OD MTF at the USAGYPG installation is particularly well suited for this purpose. Through many years of OB/OD at numerous installations across the United States, this method has been demonstrated to be highly effective in thermally treating energetic materials. Data regarding the effectiveness of OB treatment is provided in Permit Attachment 6 (OB/OD Operations) Section 6.5.1.

Treatment operations are conducted in strict accordance with military safety standards and the Standard Operating Procedures (SOPs) for Operations (see Permit Attachment 6 (OB/OD Operations)). ORTs are highly trained by the military in the safe handling and destruction of waste military munitions (see Permit Attachment 13 (Training Plan)).

2.2.1.2 Containment System Description

Permit Attachments 2B and 2C provides descriptions and drawings of the OB pads, pans and retention basins. The layers of protections from pan to pad subsurface that protect the ground surface from contamination are sequenced as follows:

Layer Of Protection	Location
1. Castable Ceramic Refractory (Firecrete 125)	Inside Pan
2. Ceramic Fiber Board Liner (V-19 Block Insulation)	Inside Pan
3. Steel	Pan Frame And Support Legs
4. Refractory Material (Kaocrete 249C & Then Kaowool Paper)	Pad Surface
5. Sealant (RTV627 Waterproof Sealant, & SS4155 Primer)	Pad
6. Concrete (Nylon-Reinforced; #4 Steel Rebar; & PVC Pipe)	Pad
7. Sand	Pad
8. Native Fill	Pad
9. Sand	Pad
10. Liner (40 Mil High Density Polyethylene (HDPE))	Pad
11. Sand	Pad
12. Virgin Soil	Pad

The burn pans are of a welded steel construction, lined with refractory. The refractory is a monolithic pour with ceramic fiberboard used in the pour to form the expansion joints. The pan was tested to be watertight prior to the refractory installation. The pans are elevated on an integral steel base above the concrete pads. The pads are designed to retain all precipitation (up to 4.20 inches which is a 100-year, 24 hour storm event) and direct it to the associated retention basin. Procedures for addressing accumulated precipitation are contained in Permit Attachment

2 Section 2.2.1.8. For loading and unloading safety, a curb is not used on the pad perimeter; it is flush with the ground surface. The pad slopes inward from the perimeter. In addition, the soil area surrounding the pad is graded for drainage away from the pad, preventing run on of storm water.

Each pad has a grate covered concrete sump with a PVC pipe for directing stormwater flow into the adjacent retention basin, and a galvanized steel pipe to check for leaks through the concrete to the underlying sand/fill/sand material. The sump has no refractory material on its surface, but has waterproof sealant on the inside walls. The double-wall containment piping has an annular spacing between the inner 6-inch nominal diameter pipe and the outer 10-inch nominal diameter pipe. The Schedule-80 PVC inner pipe is supported inside the outer pipe by a polypropylene slide on brackets positioned with adhesive and centralizers. The annular space also allows for drainage.

The pad design incorporates a floating point design to allow for some ground vibration due to OD activities. The design is similar to the inactive south pad which had shown no vibration damage in its 8 plus years of operation.

2.2.1.3 OB Pad and Retention Basin Leak Inspection Provisions

Since liquids are not treated by OB, a permit required leak detection system is not incorporated in the design. There are provisions for visual leak inspection designed into the pad and retention basins. USAGYPG only plans to monitor these points after storm events, on a frequency specified in Permit Attachment 11 (Inspection Plan).

The visual leak inspection system is designed as a vertical monitoring pipe, with watertight cap, in each sump. The pipe extends underneath the concrete sump bottom into the sand layer above the HDPE liner. The hydraulic conductivity of the sand layer above the liner is no greater than or equal to 0.01 centimeters/second, and prevents localized clogging of the monitoring pipe by finer material. There is 6 inches of vertical space in the sand between the liner and the bottom of the monitoring pipe slotted screen. Although this will require a lot of fluid prior to detection, this thickness is required to protect the liner from damage by the monitoring pipe. The interstitial space will be inspected after storm events for liquids resulting from leaks from the pad above. At all times, the fluid level must be kept below 1 foot above the liner, or no more than 6 inches deep in the monitoring pipe.

To inspect the monitoring pipe in the retention basin, the water level in the sump must be less than the top of the monitoring pipe. If water is in the basin and the sump water level is above the pipe cap, then no inspection can be made. This demonstrates that the cap must always be completely closed and watertight.

2.2.1.4 OB Pan Precipitation Cover

The six OB pans are each fitted with an aluminum lid. The pan lid remains in place on each pan when not in use. When an OB event is conducted, the lid is completely removed from the pan

and not exposed to the OB heat source. This prevents potential thermal buckling and ensures the lids will fit the pan openings.
Because the lid is approximately 1-inch larger in horizontal dimensions than the pan, rainfall landing on the lid will trickle off and land on the pad. However, because the lid is not sloped, residual moisture may remain on top of the lid before evaporating.

Each lid is held in place on a pan with four wind tie downs using metal chains. One end the chain is connected to the lid, and the other end of the chain is connected to the pan (not the pad). Each of the four tie downs is located at different locations along the lid (see Permit Attachment 2C).

There are neoprene mats on the insides of aluminum lid to protect the pans from damage upon lid placement, and to ensure watertight fit upon placement. Neoprene is compatible with nitrates

2.2.1.5 Control of Releases of Ash and Residues During OB

Ash residue is contained in the burn pans after treatment. Following an SOP-mandated minimum 24-hour cool-down period, ash residue is removed from the pans and transferred to the satellite accumulation area adjacent to the safety bunker.

The pads are also cleaned of any visible ash or flash reducer that might result from OB. The horizontal dimensions of the OB pads were based on an analysis of the required pad size performed by Jason Associates Corporation (YPG 2004c, Submittal 5). The verification of the sizing was done by taking soil samples and analyzing for contaminants of potential concern (COPCs). Based on the study, the pans are centered on the pad with a minimum of 30 feet pad space surrounding the outside perimeter of the pans available to catch almost all kick-out.

2.2.1.6 Methods to Control Deterioration of OB Pads and Pans

Corrosion is a primary source of deterioration of the OB pad and pan materials. Corrosion is minimized as described in the following paragraphs.

<u>Pan and Pad Refractory.</u> The interior pan bottoms are lined refractory firebrick material. The compatibility of the refractory materials (mostly silica and alumina which are effectively inert solids) against PEP is not documented. The most likely PEP wastes were evaluated and no incompatibilities noted. A literature search revealed that other Department of Defense (DoD) facilities plan to use the refractory and have also noted no incompatibilities. Secondary waste (residues ash, etc.) is effectively inert and should be compatible with the refractory material.

It is expected that the refractory will have a minimum service life of 5 years. Data gained from other facilities using refractory liners indicate the service life will be much greater than 5 years based on actual operation. The pans and pads are visually inspected for integrity prior to each use. Damaged pads that exhibit minor deterioration are repaired (any waste generated is subject to Permit Attachment 3 (WAP)). Damaged pads that exhibit major deterioration are repaired or replaced under the supervision of an independent Arizona–registered P.E. pursuant to Permit Attachment 3 (WAP).

Pan and Pan Supports. Pans are elevated above the concrete pads. The pan attachments (e.g., grounding lugs, lid anchor, etc.) are made of rust resistant stainless steel. The pans and pan support legs are constructed with steel but are not zinc-coated (galvanized) as these are welded elements and welds would represent a break in the zinc layer. However, even without corrosion protection, the structural integrity of the pans will be maintained for sufficient life. The I-beams are of sufficient cross-section that support strength will be maintained even with the presence of surface rust. Also, the pans are elevated, have a lid to keep out rainwater, and are located in one of the most arid regions of the United States. Damaged pans that exhibit excessive deterioration are replaced. The old OB steel pans are sent to a solid waste metal recycler pursuant to the procedures described in Permit Attachment 3 (WAP).

Pad and Retention Basin Concrete/Soil. Harqua gravelly clay loam is highly corrosive to concrete and may likely exist at the site (YPG 2004c, Submittal 6-3). However, there will be minimal impact to the concrete from the soil since the concrete is separated from the soils by over excavation and placement of a sand layer and a liner. However, windblown dirt may land on the pad and basin. Additionally, the basin is designed to collect runoff from the soil between the pad and basin. Therefore, some sediment will enter the basin. The chemically resistant sealant in the pad sump and in the basin should prevent excessive concrete deterioration.

The potentially corrosive soils should not impact the PVC piping form the pads to the retentions basins. PVC piping is incompatible with solvents, phthalates, and ammonia, but is compatible with nitrate salts typical of propellants, ammonium dichromate and chloride, and aluminum. The PVC pipe/sump interface Epoxy resins are compatible with sodium nitrates.

2.2.1.7 Prevention of Accumulation of Precipitation in OB Pans

The pans are covered with aluminum lids when not in use to prevent the accumulation of rainwater into the pans. Treatment activities are not conducted during inclement weather. During all months of the year, evaporation exceeds precipitation, often dramatically.

2.2.1.8 Handling of Precipitation Accumulated in OB Pads and Retention Basin

Management of precipitation on the OB pads and in the OB retention basin is described in Permit Attachment 3 (WAP Section 3.2.5) and summarized in Permit Attachment 6 (OB/OD Operations Section 6.7).

As noted in Permit Attachment 2 Section 2.1.1, an improved storm water collection and retention basin has been implemented for the north and south pads capable of retaining the 100-year, 24-hour (4.20 inch) rain event plus a nominal freeboard and an extra allowance. This storm event equates to roughly 15.5 inches of water that will accumulate in the 2 foot deep retention basins. The width of the concrete (5 feet) surrounding the basin perimeter, is flush with the ground and could contribute an additional 1.5 inches water from three sides for this storm event. Therefore, the retention basins are designed to contain a nominal rain event filling the basin, as indicated by the gauging stripe on basin wall without requiring a removal action, and still have 4-inches of freeboard. This will prevent removal except for larger rain events, maximizing operational readiness.

It should be noted that the EPA has classified evaporation of non-hazardous waste wastewater containing explosive residue in a pit as a hazardous waste surface impoundment when the evaporation resulted in residue characterized as hazardous waste. However, ADEQ does not consider the OB retention basins at the USAGYPG base a hazardous waste surface impoundment since only de-minimis hazardous waste may exist in the rainwater and only small amounts of rainwater will infrequently exist in the basin (similar to standing rainwater in the OD pits after a rain event). This is because ‘visible’ OB ash on the OB pad is cleaned up within 24-hours after the burn event (similar to standing rainwater in the OD pits) and significant standing rainwater in the basin will be removed as appropriate. Further, the basin sump standpipe will be checked after it rains on a frequency required in Permit Attachment 11 (Inspection Plan). In the unlikely event the sediment residue accumulated in the basin is characterized as hazardous waste (e.g., D008 lead), the USAGYPG will notify ADEQ.

There will be no run-on onto the pad or retention basin that may require additional basin capacity. The pads and retention basins are contoured into native grade with positive drainage (greater than 0.75 foot relief). It is expected that with construction of the flood diversion berm, that no localized sheet flow or puddles will run onto the pads and basins. If a problem develops during operation of the pad and basin where significant and abnormally high rainfall enters the basin due to localized flooding within the interior area of the OB/OD MTF berm, then USAGYPG will coordinate with ADEQ.

2.2.1.9 Controls to Prevent Wind Dispersion of Ash and Other Residue

Following each treatment event, the lid is replaced after the pan has cooled to near ambient. When the Lead ORT deems it safe, the pans and pads are cleaned of all residues. This includes wind-blown dirt which may have been deposited onto the OB pad and retention basin prior to the OB event. The lid(s) are placed back onto the OB pan(s). The lid is approximately 170 pounds and has a flush tight fit affixed over the pan with tie downs on the exterior. The residues are bagged in plastic bags, the closed bags placed in a DOT-approved container on a truck, and transferred to the satellite accumulation area adjacent to the safety bunker. Residue bags are then taken out of the container on the truck and containerized in a 55-gallon drum at the satellite accumulation area. It should be noted that the container (drum or bag) the waste is transported in must be declared ‘RCRA Empty’ (40 CFR 261.7) prior to reuse, recycle or disposal. The container on the truck as well as the 55-gallon drum must be appropriately labeled in accordance with 40 CFR 262.34(c) when in use.

Ash removal from the pans does not occur during periods of high winds when dispersion could occur.

2.2.1.10 Ash and Residue Management

When the Lead ORT deems it safe, the pans and pads are cleaned of all residues. If a vacuum is utilized during the cleaning process, it must be declared 'RCRA Empty' prior to reuse. If the vacuum containing residues is to be transported to the satellite accumulation area, it must be appropriately labeled and not leak residues; else the vacuum or bagged residue must be placed in a labeled non-leaking container on the truck prior to transport to the bunker accumulation area. The residues are transferred to the satellite accumulation area adjacent to the safety bunker. Residues are bagged in plastic bags and containerized in a 55-gallon steel drum. The container on the truck as well as the DOT-approved 55-gallon drum must be appropriately marked (or labeled) in accordance with 40 CFR 262.34(c) when in use.

Prior to the drum filling or annually, whichever is first, ORT personnel will characterize the drum for disposal. Once characterized, and if determined to be hazardous waste, the drum will be transported to an installation 90-day HW accumulation area. The USAGYPG HAZMART arranges with the Defense Reutilization and Marketing Office (DRMO) in San Diego, California, for proper disposal at a permitted hazardous waste facility. If the ash and residue is characterized and determined not to be hazardous waste, it will be transported and disposed of at a permitted solid waste facility.

2.2.1.11 OB Operational SOPs

SOPs for OB operations are discussed in Permit Attachment 6 (OB/OD Operations).

2.2.1.12 Thermal Expansion and Heat Effects

The maximum temperature during OB of waste PEP (the 'burst' temperature) is in the range of 3000 degrees Fahrenheit (^{o}F) to 4940 ^{o}F, with 4500 ^{o}F used in design calculations. (YPG 2004c, Submittal 5; and YPG 2004c, Submittal 11). The materials of construction of the OB pan and the nearby OB pad must be able to accommodate this extremely hot temperature. First, the surface of adjacent materials (including the pad and sump surface) must be able to withstand the burst temperature. Second, the materials underneath the pan refractory surface must be able to accommodate the transfer of heat in it. Finally, transfer and dissipation of heat cause expansion and contraction of the materials of construction which may lead to cracking of the materials if the expansion joints between different materials are not large enough.

Consultants for the USAGYPG performed calculations and modeling of the heat transfer within the pan and pads. The table below shows the expected maximum temperature of each of the construction materials.

Construction Material	Modeled Peak Temperature	Max. Allowed Temperature
Open Burn Pan		
Castable Firecrete 125 Refractory Concrete	4500 F (top [A]) 919 F (bottom [A])	2600 F
Kaowool M-Board Expansion Joint Material	4500 F (top)	
Ceramic Fiberboard Expansion Joint	4500 F (top)	
Fiberboard Liner Vermiculite V-19 Block Insulation	919 F (top)	1900 F
Galvanized Steel (Pan, Supports, Channels, Etc.)	890 F (bottom)	
Open Burn Pad Area In Contact With Pan		
4" Kaocrete 249C (High Lime Concrete)	4500 F (burst) 890 F (top) 327 F (bottom)	
1/8" Kaowool Paper	327 F	2300 F
RTV627 Water Sealant	327 F	
SS4155 Primer	327 F	
Concrete	327 F (top) 107 F (bottom)	
Kaowool M Board (Fiber Board Expansion Joint Material In Concrete)	327 F (top)	2300 F
Open Burn Pad Sump Area		
Zinc-Coated Carbon Steel Grate (Neenah)	4500 F (burst)	
PVC Schedule 80 Double-Walled Pipe	4500 F (burst)	140 F (60 C)
Epoxy Expandable Dry Pack (For Pipe/Concrete Interface In Sump)	4500 F (burst)	
Galvanized Steel (Monitoring Pipe, Slotted Screen, & Cap)	4500 F (burst)	
Chemical Resistant/Waterproof Sealant On Top Sump Concrete	4500 F (burst)	
Sump Concrete	4500 F (burst)	

Notes:

A. All “top” and “bottom” temperatures are those determined by modeling transfer of heat within materials. ‘Burst” temperatures are those due to instantaneous exposure. (YPG 2004c, Submittal 5-3d).
B. The URS Air Modeling report gives a max. temp. of 1922 to 3000 K (3000 to 4940 F) (YPG 2004c, Submittal 11).
C. Other references: 1 (YPG 2004c Application), 2 (Perry’s Chem Eng HB), 3 (Pocket HB p320)

2.2.2 Open Detonation

2.2.2.1 Appropriateness of Treatment Technology

Open detonation is commonly used by the military to treat unserviceable ordnance items. It is a proven and effective treatment method. The OD treatment area at the USAGYPG OB/OD MTF is particularly well suited for this purpose. Data regarding the effectiveness of OD treatment is provided in Permit Attachment 6 (OB/OD Operations) Section 6.5.2.

Treatment operations are conducted in strict accordance with military safety standards and the SOP for operations (see Permit Attachment 6 (OB/OD Operations)). ORTs are highly trained in the safe handling and destruction of waste military munitions (see Permit Attachment 13 (Training Plan)).

2.2.2.2 Description of OD Unit

The OD trenches at the USAGYPG installation are simply dug trenches, not engineered structures. The trenches are graphically presented in Permit Attachment 2D. These drawings were generated from the 2002 topographic mapping data. Based on historic information, the pit size shown has changed only slightly, getting wider at the base due to explosive activity. The USAGYPG will maintain the pit size by adding fill but not removing soil. The side slopes of the OD pits will not be steeper than 1.5H: 1V (or 33.7 degrees) to comply with the 29 CFR 1926.652(b)(1)(i) construction safety standard for excavations. The estimated volumes of the OD trenches are provided in Permit Attachment 2E.

The soils beneath the trenches have been repeatedly compacted by historic detonation activity. It is expected that historic detonation activity has produced a layer of low permeability material beneath some regions of the trenches. These compacted regions combined with the annual rainfall amounts may form a dense calcified layer mitigating the potential for migration. However, explosions on the above or any naturally-occurring caliche layer would likely disturb the layer and may result in an increased potential for vertical migration of fluids.

2.2.2.3 Inspection, Monitoring, and Maintenance Plan

The two OD trench areas and one OD flat area are inspected in association with each treatment event. Treatment area grounds are inspected to recover any unreacted PEP and munitions scrap resulting from OD operations and to ensure that no live munitions escape detonation. USAGYPG has certified that its ORT technicians have been trained to detect and remove all live munitions present after detonation. Each OD operation ejects small amounts of soil from the trench. The trenches are maintained on an as-needed basis. Soils are sourced from one of two locations: the original borrow pile from the trench excavations and adjacent soils that were ejected. In some cases, it has been noted that small pieces of explosives filler materials may not be consumed in the operation and therefore may spread small pieces of materials around the site. The site is inspected and maintained for this situation in accordance with Permit Attachment 11 (Inspection Plan). Any craters formed are restored using ORT equipment.

2.2.2.4 Ash and Residue Management

Visible ash is not generated through the OD process. Some residues may be present and the area is inspected for residues, either metal or chemical. The visible residues are removed as a part of the operations. See Permit Attachment 6 (OB/OD Operations Section 6.6.2) for management of OD-generated scrap residue that may or may not be contaminated with PEP.

Additionally, soil sampling of the OD pits and surrounding soils is required every 5 years of operation to determine if non-visible residue exists that are in concentrations that pose a significant risk to human health and the environment.

Also, during closure of these OD units, sampling of soils in the trenches is addressed in the Permit Attachment 14 (Closure Plan).

2.2.2.5 Run-on and Runoff Management

In general, run-on and runoff issues are relatively minor.

Late summer and winter thunderstorms occasionally cause enough runoff to generate flow through area washes and sheet flow across the site. As stated in Permit Attachment 1 Section 1.4.2, installation of berms surrounding the entire OB/OD MTF site will prevent flash flooding of the OD pits #2 and #3 trenched areas. The design of these engineered storm water and flood control devices is based on engineering estimates of runoff provided in Permit Attachment 2F, and supported by recent surface hydrologic analysis provided in Permit Attachment 2G.

The Detonation On-Ground Area was never part of the runoff control design implemented for Pits #2 and #3 as this area was never physically trenched. Referencing Permit Attachment 2B, Site Grading Plan Sheet #3, the general topography of the Detonation On-Ground Area (shown as Pit #1 in the drawing) is similar to areas immediately to the east. The shallow depressions in the Detonation On-Ground Area are likely due to past detonation effects and erosion, and are not the result any deliberate trenching activity. For the purposes of runoff management, the Detonation On-Ground Area is considered no different than the dirt areas between the various treatment units, and represents part of the natural drainage area with the OB/OD MTF.

Additional information on the berm that surrounds three sides of the OB/OD MTF are provided in Attachments 2A and 2B.

The OD trenches are only influenced by the local area (area inside the berms) during storm events. An analysis of the surface area-influencing run-on into the pits and pit volume was completed, using conservative estimates. The volume of rainfall run-on into the pit from the local area plus the rainfall onto the pit was determined not to exceed the volume of the pit in the worst-case 100-year 24-hour storm event. Therefore, no run-off from the pit to the outside area can occur.

However, it is possible a large amount of rain water could accumulate within the pit. To prevent the potential de-minimis chemical contamination from seeping deeper into soil where excavation would be impracticable (there is no contingent hazardous waste landfill closure provision in this permit), the built-up dirt areas surrounding the pits will be elevated to prevent run-on (similar to the soil surrounding the OB pads). As a back-up, USAGYPG will characterize standing rainwater and removed it from the OD pits. To accomplish the latter, the trench base should be shaped equivalent or similar to the OB pad design (slight slope to a sump) in order to pump out the water.

2.2.3 OB/OD MTF Specific Transportation Procedures

USAGYPG explosive ordnance transportation procedures were modified at the request of ADEQ to address the explosion risks when transporting explosive materials over the flood protection berm at the OB/OD MTF. These changes are detailed in Permit Attachment 2H.

2.3 REFERENCES

The following documents from the 2007 RCRA Permit issued by ADEQ are incorporated by reference into this 2016 renewal permit:

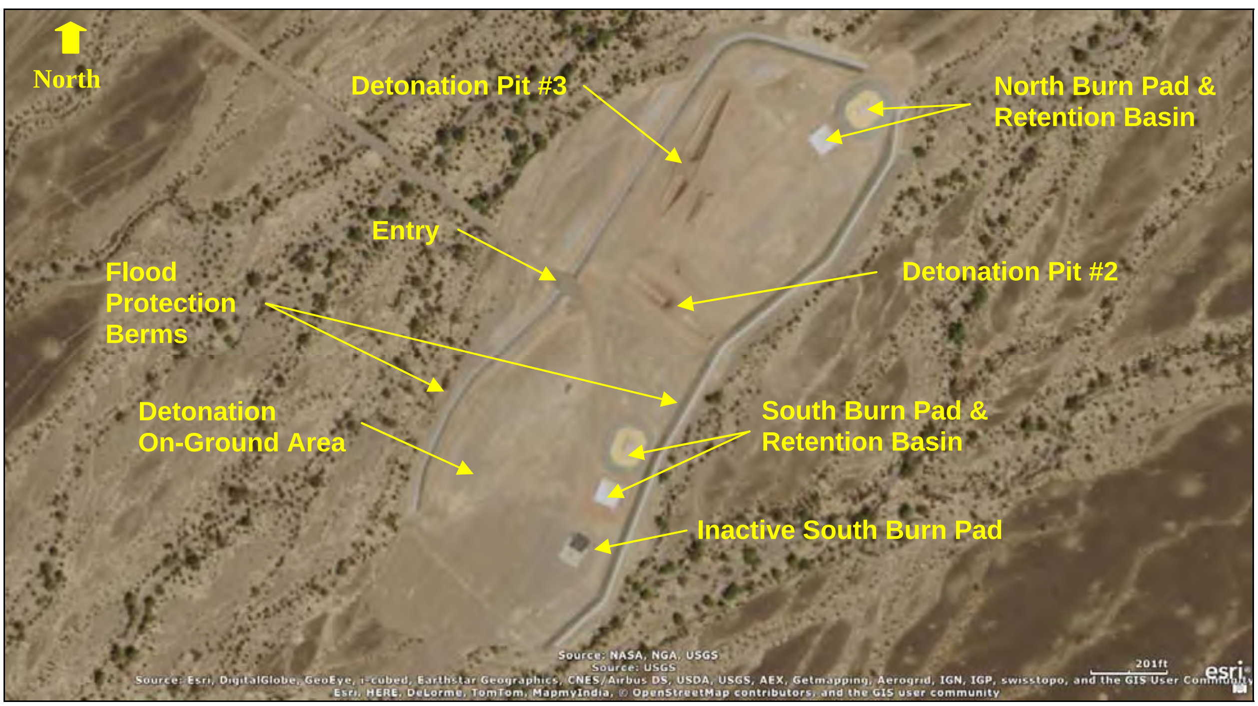
YPG 2004c — RCRA Operating Permit Application, Open Burn/Open Detonation Facility, U.S. Army Yuma Proving Grounds, prepared by Jason Associates Corporation, September 2004 Update.

- YPG 2004c, Submittal 2: *"U.S. Army Yuma Proving Ground, Historical Records Review, OB/OD Site"*, August 2004
- YPG 2004c, Submittal 5, Item 5-3c: "*OB/OD Pad Size Evaluation"* prepared by Jason Associates Corporation.
- YPG 2004c, Submittal 6-3: "*Soil Survey of the U.S. Army Yuma Proving Ground, Arizona, parts of La Paz and Yuma Counties",* by Christopher C. Cochran, Soil Conservation Service, 1991.
- YPG 2004c, Submittal 11, Item 1: "*Response to Comments Relating to Air Quality, RCRA Part B Application, Yuma Proving Grounds, Open Burn/Open Detonation@,* prepared by URS, dated July 29, 2004, sealed by Robert Farmer, Arizona registered Chemical Professional Engineer.

ATTACHMENT 2A

OB/OD MTF PHOTOGRAPHS

Aerial Image 1 – Munitions Treatment Facility Perimeter



Aerial Image 2 – Munitions Treatment Facility and Major Features

Approximate Photo Locations and Viewing Angles

Photo 1 – Entry Into The Munitions Treatment Facility and Flood Protection Berms

Photo 2 – Outside of Munitions Treatment Facility Flood Protection Berm Southwest of Entry

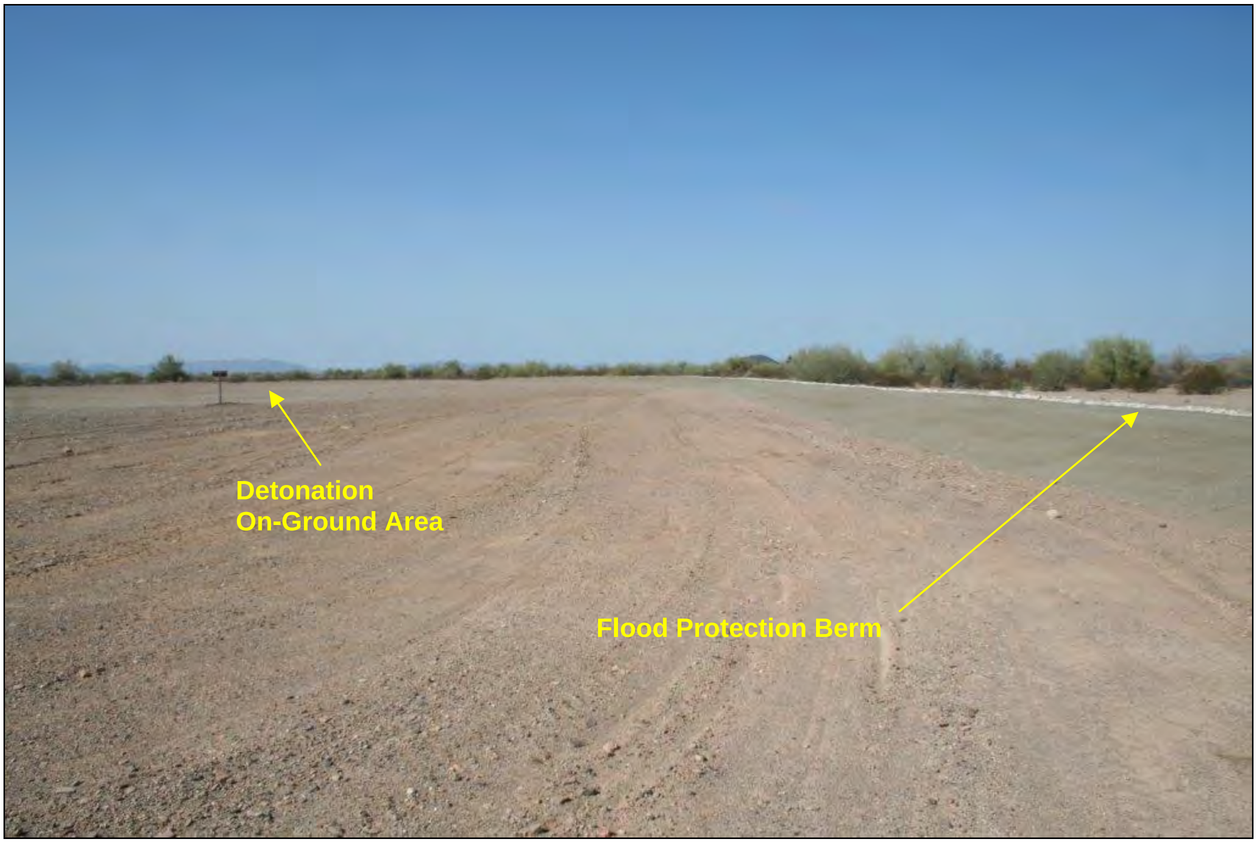


Photo 3 – Inside of Munitions Treatment Facility Flood Protection Berm Southwest of Entry and Location of Detonation On-Ground Area

Photo 4 – Outside of Munitions Treatment Facility Flood Protection Berm Northeast of Entry

Photo 5 – Inside of Munitions Treatment Facility Flood Protection Berm Northeast of Entry and Detonation Pit #3


Photo 6 – Munitions Treatment Facility Detonation Pit #3 Trench (1 of 2) Facing Northeast

Photo 7 – Munitions Treatment Facility Detonation Pit #3 Trench (2 of 2) Facing Southwest

Photo 8 – Munitions Treatment Facility Facing Northeast
Towards the North Burn Pad

**Photo 9 – Munitions Treatment Facility Facing Northeast
Towards the North Burn Pad and Retention Basin**

**Photo 10 – Munitions Treatment Facility Facing Southwest
Towards the North Burn Pad and Burn Pans (3)**

Photo 11 – Munitions Treatment Facility North Burn Pad Burn Pans (3)

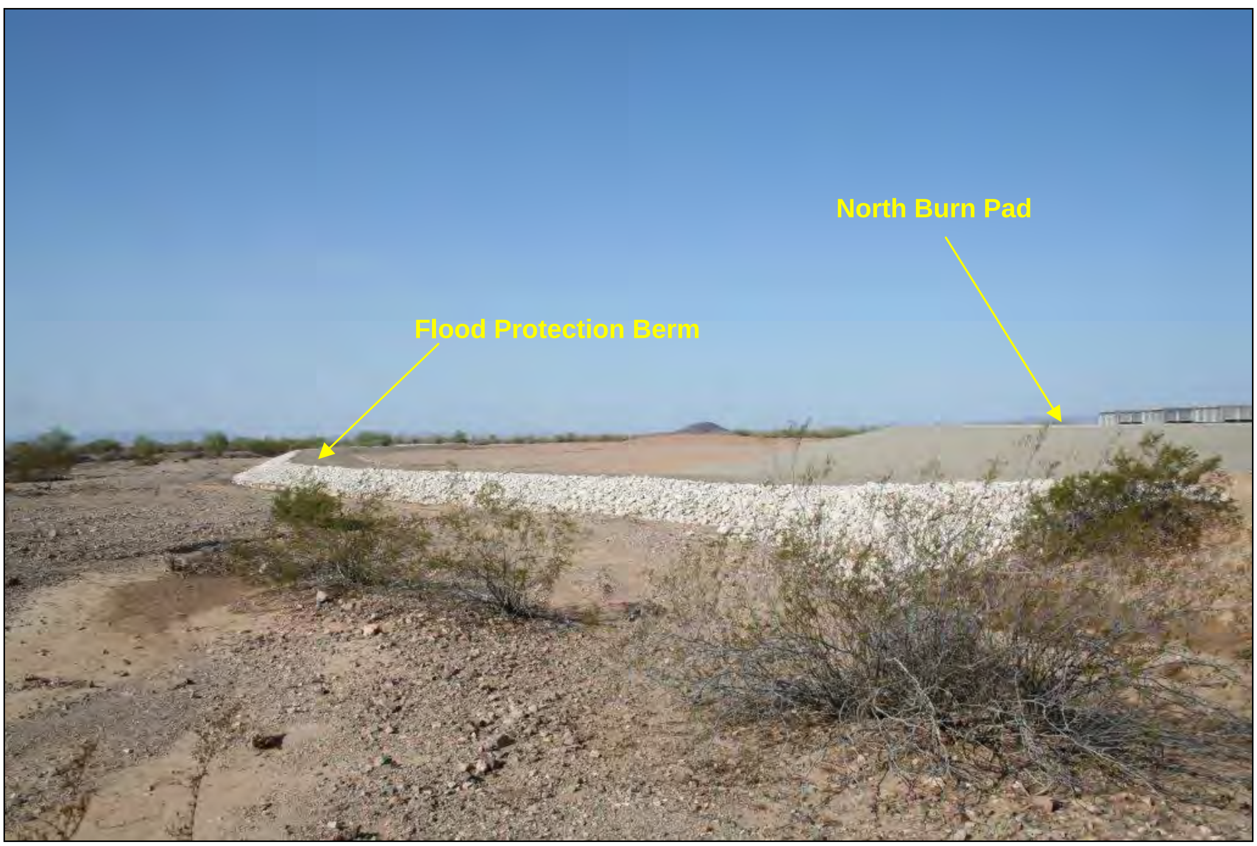


Photo 12 – Outside of Munitions Treatment Facility Flood Protection Berm Southwest of the North Burn Pad

Photo 13 – Munitions Treatment Facility Detonation Pit #2 Trench (1 of 2) Facing Southeast and Southeast Inside Edge of Flood Protection Berm

Photo 14 – Munitions Treatment Facility Detonation Pit #2 Trench (2 of 2) Facing Northwest and Inside of Entry

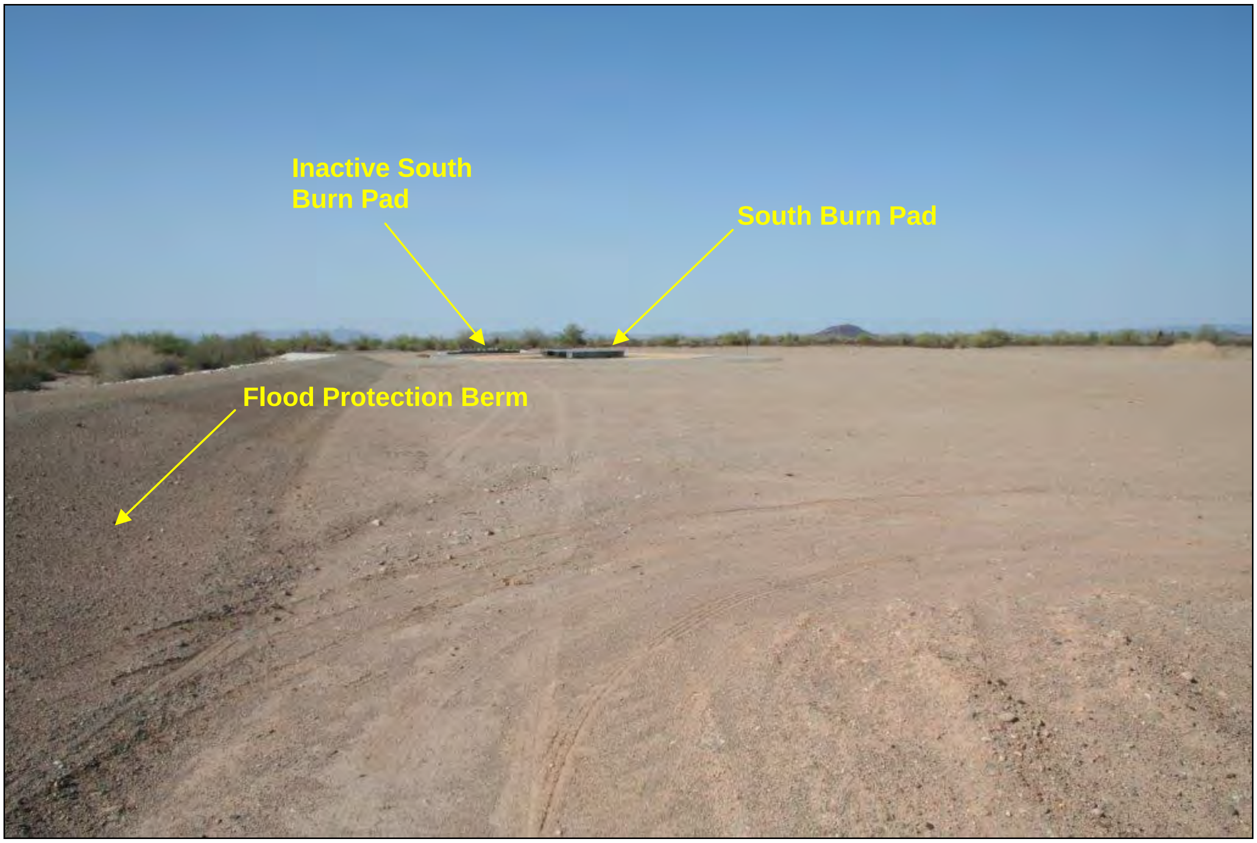


Photo 15 – Inside Southeast Edge of Munitions Treatment Facility Flood Protection Berm Facing Southeast to the South Burn Pad

Photo 16 – Outside Southeast Edge of Munitions Treatment Facility Flood Protection Berm Facing Northwest to the South Burn Pad

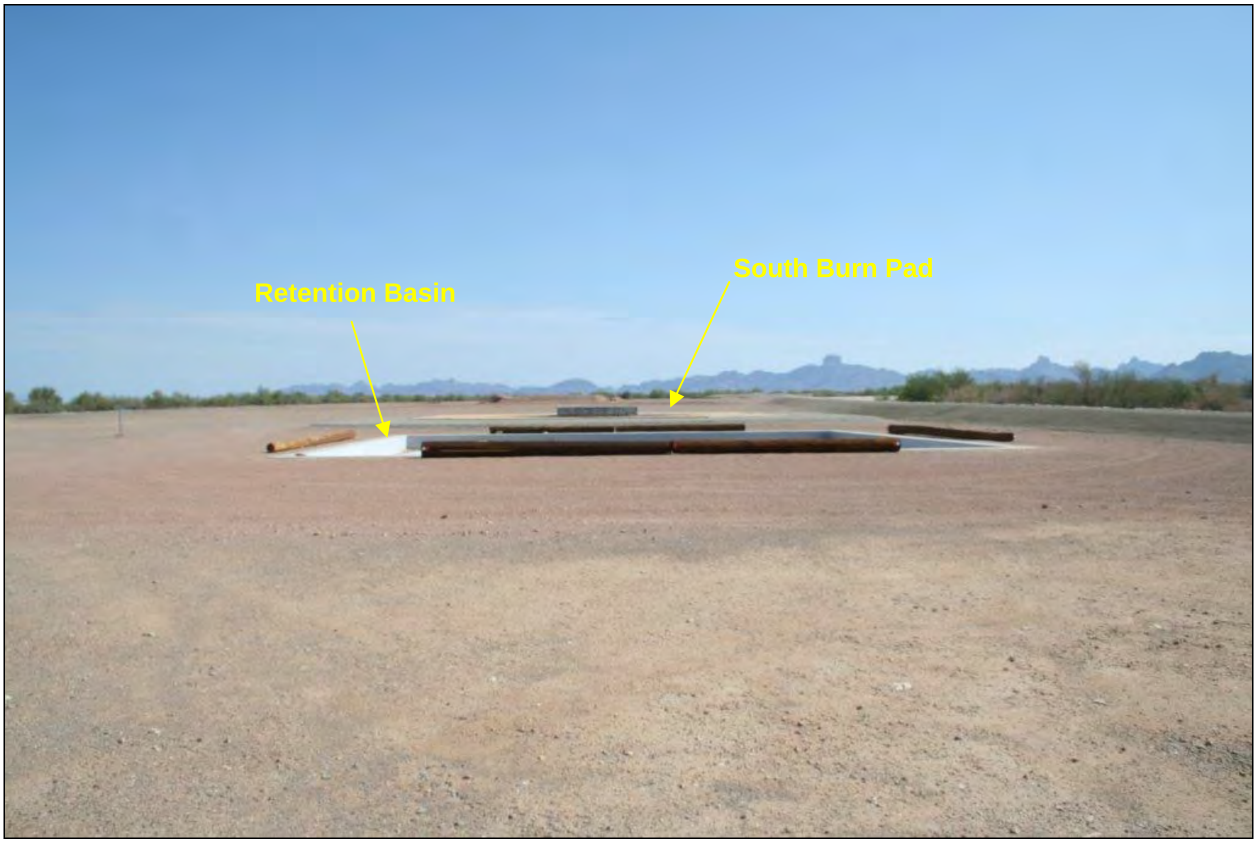


Photo 17 – Munitions Treatment Facility Facing North Towards the South Burn Pad and Retention Basin

Photo 18 – Munitions Treatment Facility Facing Southeast Towards the South Burn Pad, Retention Basin and Burn Pans (3)


Photo 19 – Munitions Treatment Facility South Burn Pad and Burn Pans (3)


Photo 20 – Munitions Treatment Facility Facing Southeast
Towards the Inactive South Burn Pad (currently undergoing closure)

ATTACHMENT 2B

OPEN BURN PADS AND BASINS, OPEN DETONATION PITS AND BERM DRAWINGS

Gutierrez Canales Engineering, P.C.
1851 W. 24th Street Yuma, AZ 85364 Office: 928.317.1401 Fax 928.344.0112
www.gcepc.com

April 15, 2014

Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, Arizona 85007

Attention: **Mr. Rajendra Paode**
Reference: **Munitions Treatment Facility – Yuma Proving Ground**
HWMA Permit – Facility EPA I.D. No. AZ5213820991

Dear Mr. Paode,

Please accept this letter as my certification that the above referenced project was, to the best of my knowledge, constructed in conformance with the approved plans and specifications submitted to ADEQ for the development of the project permit. Any deviation during construction from the approved plans has been noted on the concurrently submitted "As-Built" plans.

Should you have any questions regarding this certificate of completion, please feel free to contact me at (928) 344-8374.

Sincerely,
GUTIERREZ CANALES ENGINEERING, P.C.

Antonio Alvarez, P.E.
Project Engineer

Registered Professional Engineer (Civil)
CERTIFICATE NO.
51919
ANTONIO
ALVAREZ
DATE SIGNED 4-15-14
ARIZONA, U.S.A.
EXP. DATE 3-31-17

Gutierrez Canales Engineering
1851 W. 24th Street
(928) 344-8374
Email: ogalindo@neiaw.com
Yuma, Arizona 85364
Fax (928) 726-6994
* Civil * Survey * Architecture
* Environmental * Geotechnical
* Special Inspections

SPECIAL INSPECTION DAILY REPORT

Project: OB / OD Site (North & South Pads) **Report No.** 12

Address: YPG OB / OD Site **Permit #** NA

Contractor: Sybrant **GCE Project No.** 13GC005

Date: 3/19/2014 **Time Arri:** 11:00 am **Weather:** clear, 73' F

Architect: NA **Engineer:** Gutierrez Canales Engineering

DESCRIPTION OF INSPECTION MADE AND LOCATIONS:

1) Inspection/ witness of low pressure test of the burnt pad drains (North and South pads) to retention basins also (North and South). Pressure was set at 7 psig at both pads with no drop. MAG 615.10 test calls for 4 psig with an allowable drop and there was no drop at both tests. Tests PASS.

ITEMS REQUIRING CORRECTIONS:

Signed: Oscar Galindo **Title:** Special Inspector

ICC I.D. No: 5087248- 47, 84, 86, 92, S1, S2

Registered Professional Engineer (Civil)
CERTIFICATE NO.
51919
ANTONIO
ALVAREZ
DATE SIGNED 4-10-14
ARIZONA, USA
EXP. DATE 3-31-17

U.S. ARMY PROVING GROUND

NEW DEMOLITION - OB/OD SITE
NEW NORTH PAD & NEW SOUTH PAD ASBUILTS

MARCH 2014

U.S. ARMY
YPG

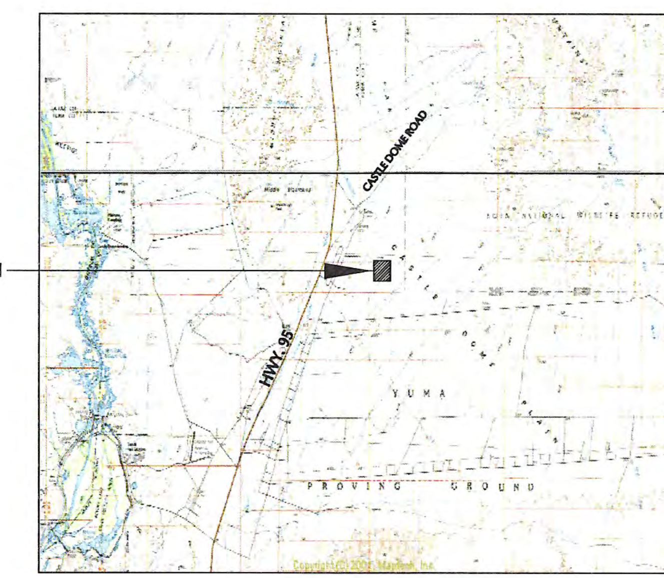
PREPARED FOR:

US ARMY PROVING GROUND
ENVIRONMENTAL SCIENCES
YUMA, AZ 85365

PROJECT LOCATION MAP
NTS

INDEX OF DRAWINGS

PROJECT LOCATION

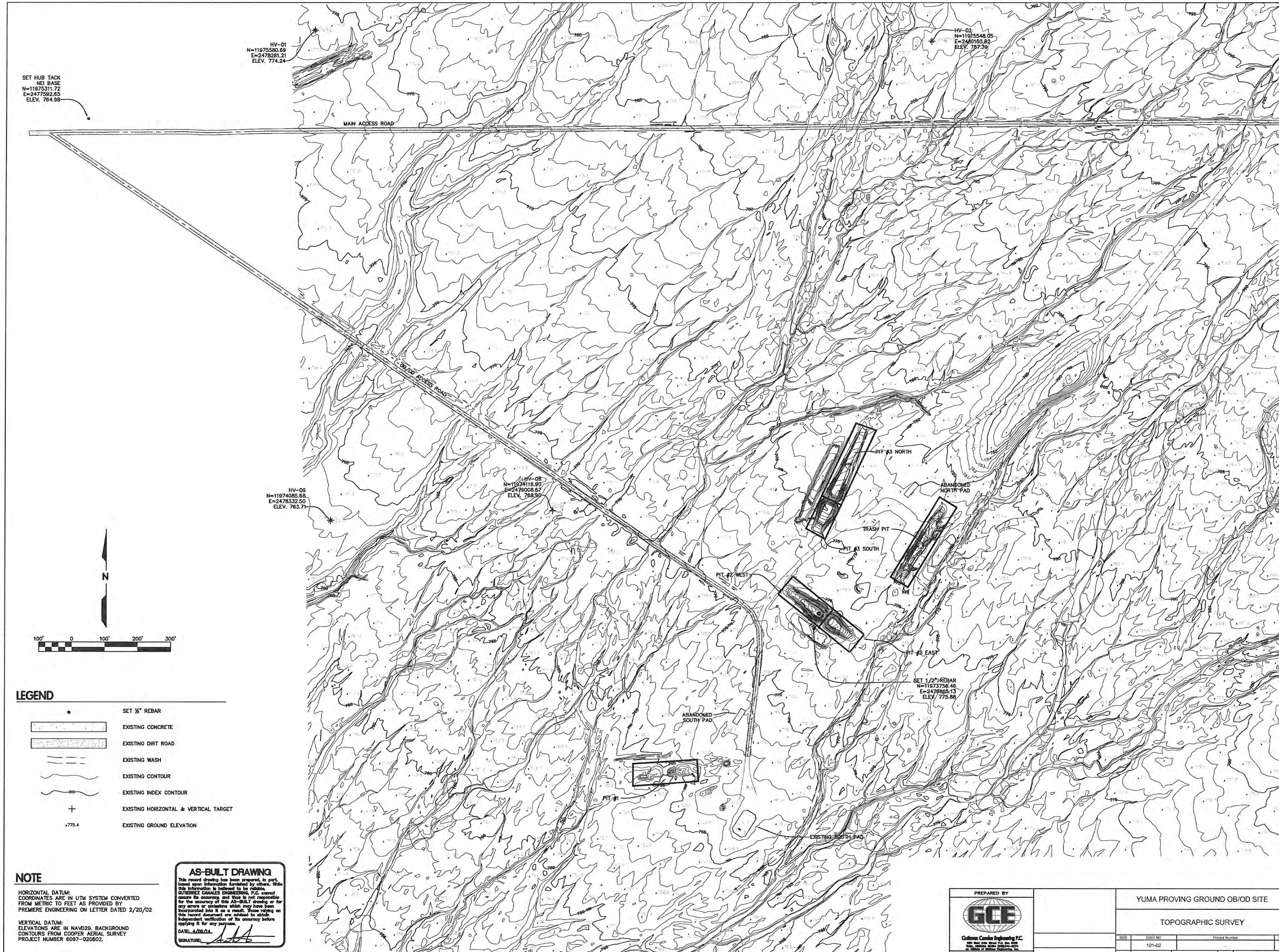


VICINITY MAP
NTS

AS-BUILT DRAWING
This record drawing has been prepared, in part, based upon information furnished by others. While this information is believed to be reliable, GUTIERREZ CANALES ENGINEERING, P.C. cannot assure its accuracy, and thus is not responsible for the accuracy of this AS-BUILT drawing or for any errors or omissions which may have been incorporated into it as a result. Those relying on this record document are advised to obtain independent verification of its accuracy before applying it for any purpose.
DATE: 4/08/14
SIGNATURE:

PREPARED BY
GCE
Gutierrez Canales Engineering P.C.
1881 West 24th Street P.O. Box 6029
YUMA, ARIZONA 85364 (928)344-8374
an Affiliate of Nichlaus Engineering, Inc.
GCE PROJECT NO:04GC007

YUMA PROVING GROUND OB/OD SITE					
COVER SHEET					
SIZE	DWG NO		Project Number		REV
	101-01		.		0
SCALE	NTS	March 2014	SHEET	1 OF 6	



LEGEND

•	SET ½" REBAR
	EXISTING CONCRETE
	EXISTING DIRT ROAD
	EXISTING WASH
	EXISTING CONTOUR
300	EXISTING INDEX CONTOUR
+	EXISTING HORIZONTAL & VERTICAL TARGET
▪775.4	EXISTING GROUND ELEVATION

NOTE

HORIZONTAL DATUM:
COORDINATES ARE IN UTM SYSTEM CONVERTED FROM METRIC TO FEET AS PROVIDED BY PREMIERE ENGINEERING ON LETTER DATED 2/20/02

VERTICAL DATUM:
ELEVATIONS ARE IN NAVD29. BACKGROUND CONTOURS FROM COOPER AERIAL SURVEY PROJECT NUMBER 6097-020602.

AS-BUILT DRAWING

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DATE: 4/08/14

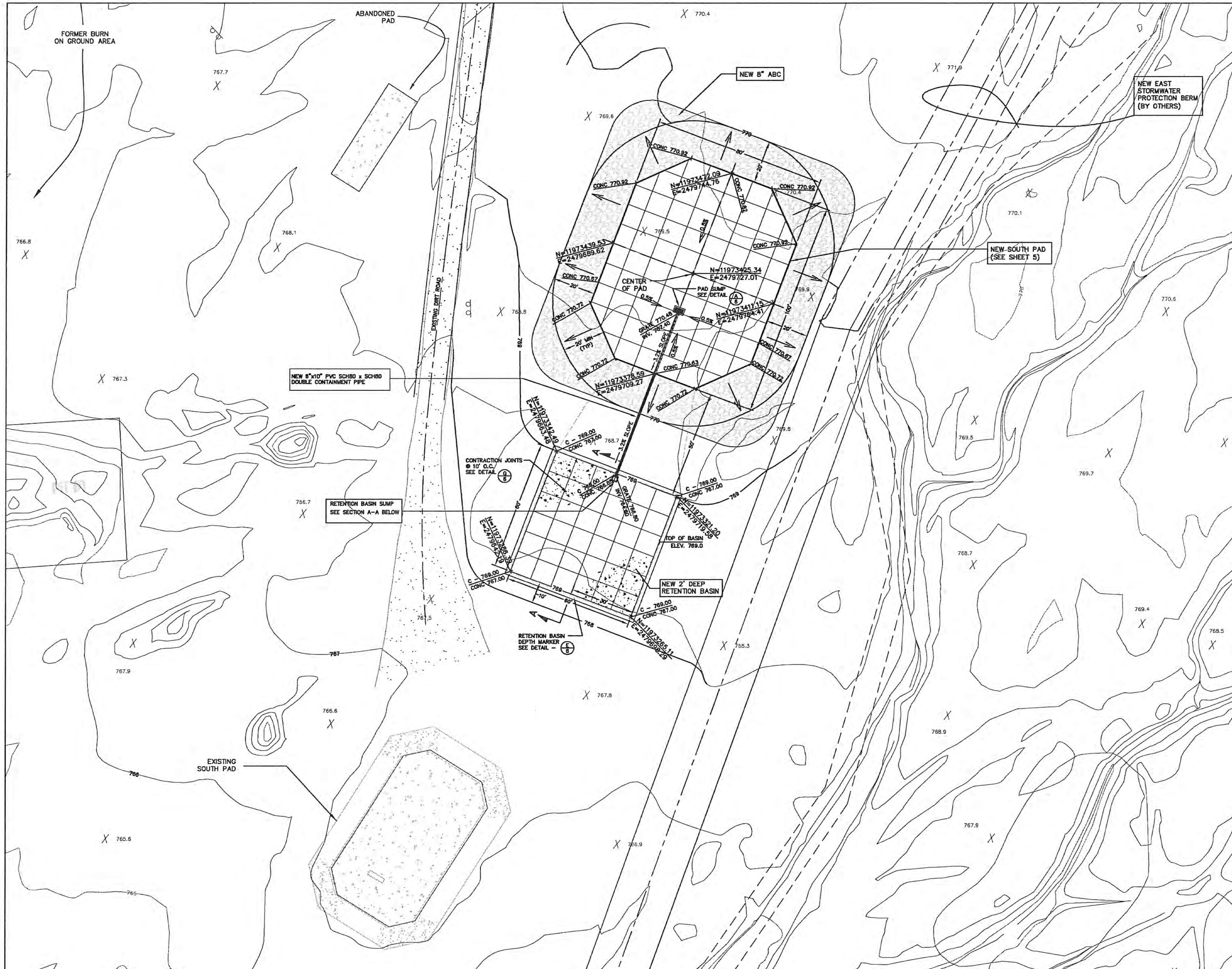
SIGNATURE:

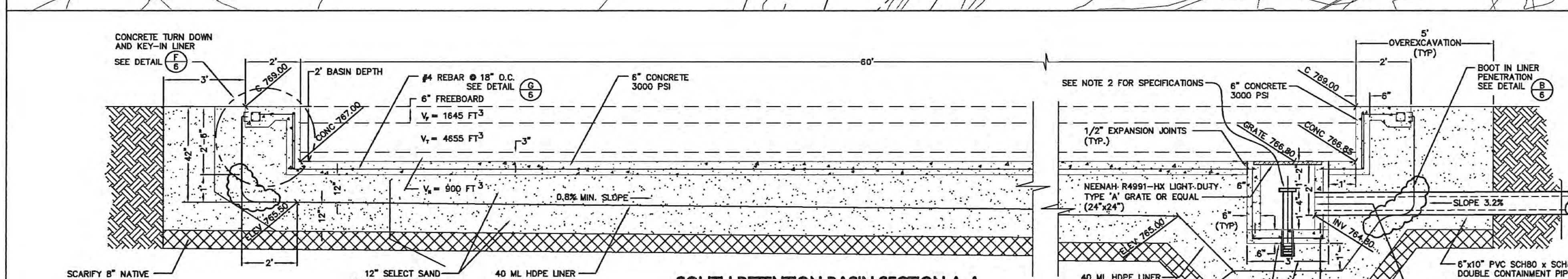
PREPARED BY

Gutierrez Canales Engineering P.C.

GCE PROJECT NO04GC007

YUMA PROVING GROUND OB/OD SITE				
TOPOGRAPHIC SURVEY				
SIZE	DWG NO	Project Number		REV
	101-02	.		0
SCALE	1"=100'	Marcch 2014	SHEET	2 OF 6





SOUTH RETENTION BASIN SECTION A-A

N.T.S.

SOUTH STORMWATER RETENTION BASIN CALCULATIONS:

VOLUME REQUIRED CALCULATIONS:

AREA= 100 FT X 80 FT = 8,000 FT^2 – 4 CORNERS @ 200 FT^2/EA = 7,200 FT^2
(PAD)

AREA= 60 FT X 60 FT = 3,600 FT^2
(BASIN)

AREA= 40 FT X 50 FT + 2($\frac{1}{2}$)(50)(10) = 2500 FT^2
(SURFACE)

AREA= 13,300 FT^2
(TOTAL)

100YR STORM OF 24 HOUR DURATION:

$\frac{\text{4.2 INCHES}}{\text{24 HOURS}}$ (FROM DRAINAGE REPORT)

REQUIRED= $\frac{\text{4.2 IN}}{\text{24 HR}}$ X 24 HR X $\frac{\text{1 FT}}{\text{12 IN}}$ X 13,300 FT^2 = 4655 FT^3

VOLUME REQUIRED= 4655 FT^3

THE RETENTION BASIN SHALL BE PUMPED OUT WHEN THE DEPTH EXCEEDS 3". THREE INCHES (3") IS ALLOWED TO REMAIN IN THE BOTTOM OF THE RETENTION BASIN DURING TESTING OPERATIONS. THIS 3" DEPTH RESULTS IN AN ADDITIONAL VOLUME CALCULATED AS FOLLOWS:
V_N = 60' X 60' X .25' (3" OF STORMWATER IN BASIN)
V_N = 900 FT^3

TOTAL VOLUME REQUIRED = 4655 FT^3 + 900 FT^3
V_T = 5555 FT

BASIN CAPACITY PROVIDED:
60' X 60' X 2' DEEP = 7200 FT^3

7200 FT^3 > 5555 FT^3

FREEBOARD PROVIDED = 7200 FT^3 – 5555 FT^3
V_F = 1645 FT^3

FREEBOARD DEPTH = $\frac{\text{1645 FT}^3}{\text{60' X 60'}}$ = 0.46 FT = 6" FREEBOARD PROVIDED

LEGEND

- NEW STORMWATER PROTECTION BERM (BY OTHERS)
- NEW 8" ABC PERIMETER
- EXISTING CONCRETE
- NEW CONCRETE
- EXISTING DIRT ROAD
- EXISTING CONTOUR
- NEW CONTOUR
- X 775.4 EXISTING GROUND ELEVATION
- EXISTING WASH
- CENTERLINE OF NEW PAD
- C 781.00 / CONC 770.80 NEW CURB ELEVATION / NEW CONCRETE ELEVATION
- GRATE=770.53 / INV=768.53 NEW TOP OF GRATE ELEVATION / NEW INVERT ELEVATION
- SURFACE DRAINAGE DIRECTION

NOTES

1. SUMPS TO BE MAINTAINED CLEAR OF DEBRIS AND SEDIMENT.
2. INSTALL 4" DIA. GALVANIZED PIPE WITH WATERTIGHT REMOVABLE WELL PLUG AT TOP OF PIPE IN RETENTION BASIN SUMP. COVER SLOTTED PIPE WITH DEBRIS SCREEN. PROVIDE 5" DIA. HOLE FOR 4" DIA. PIPE AND FILL VOID WITH EPOXY EXPANDABLE DRY PACK AT PIPE PENETRATION OF SUMP BOTTOM.

AS-BUILT DRAWING
This record drawing has been prepared, in part, based upon information furnished by others. While this information is believed to be reliable, GUTIERREZ CANALES ENGINEERING, P.C. cannot assure its accuracy, and thus is not responsible for the accuracy of this AS-BUILT drawing or for any errors or omissions which may have been incorporated into it as a result. Those relying on this record document are advised to obtain independent verification of its accuracy before applying it for any purpose.
DATE: 4/08/14
SIGNATURE:

N

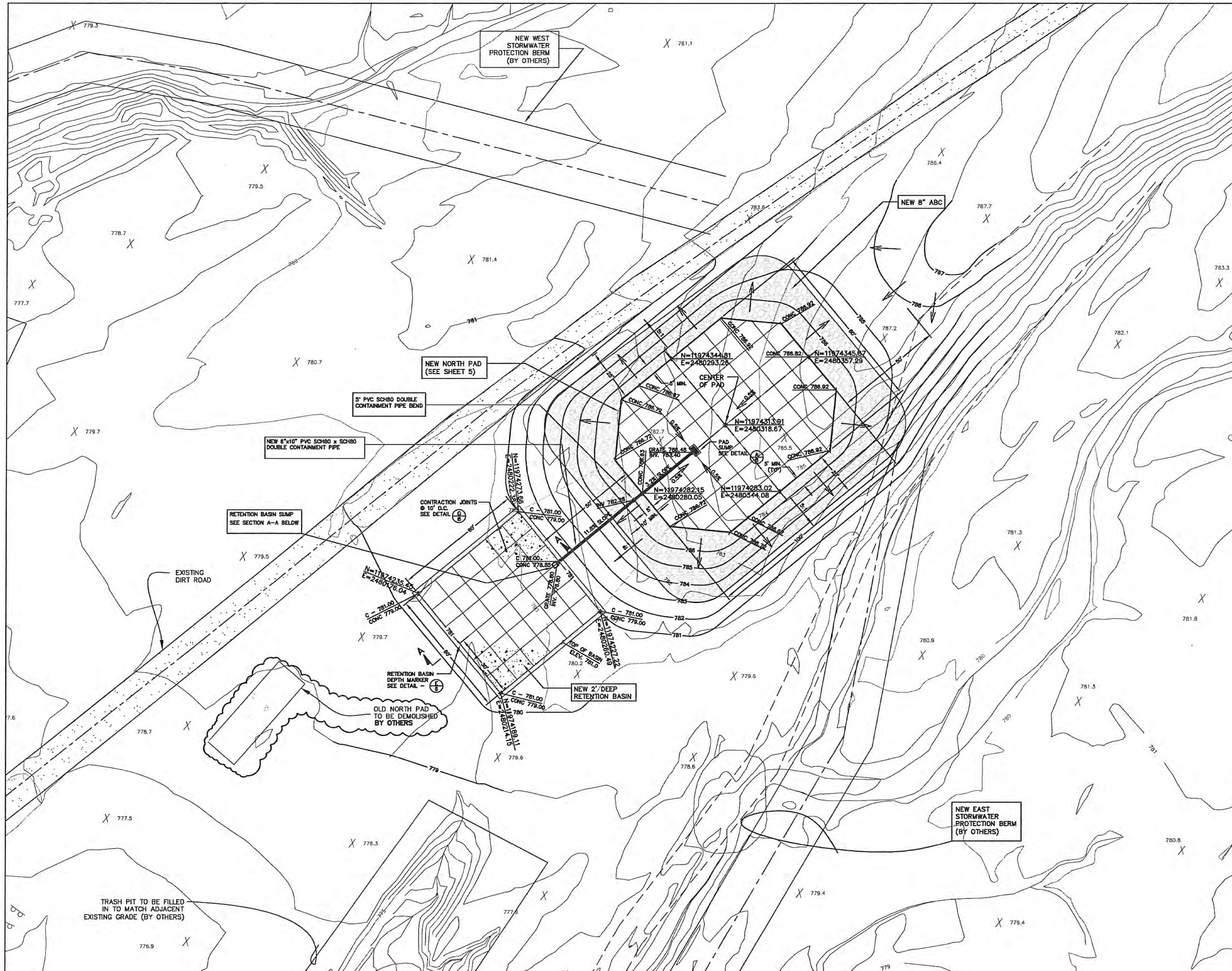
20' 0 20' 40' 60'

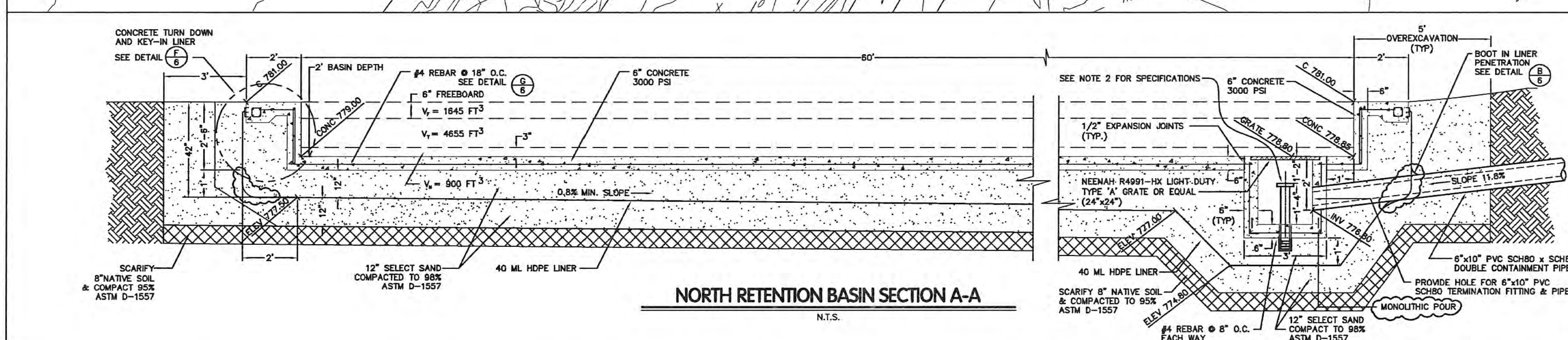
PREPARED BY
GCE
Gutierrez Canales Engineering P.C.
GCE PROJECT N004GC007

YUMA PROVING GROUND OB/OD SITE

SOUTH PAD
SITE/GRADING PLAN

SIZE	DWG NO	Project Number		REV
	101-03	.		0
SCALE	1"= 20'	March 2014	SHEET	3 OF 6





NORTH RETENTION BASIN SECTION A-A

N.T.S.

SOUTH STORMWATER RETENTION BASIN CALCULATIONS:

VOLUME REQUIRED CALCULATIONS:

AREA= 100 FT X 80 FT = 8,000 FT^2– 4 CORNERS @ 200 FT^2/EA = 7,200 FT^2
(PAD)

AREA= 60 FT X 60 FT = 3,600 FT^2
(BASIN)

AREA= 40 FT X 50 FT + 2(½)(50)(10) = 2500 FT^2
(SURFACE)

AREA= 13,300 FT^2
(TOTAL)

100YR STORM OF 24 HOUR DURATION:

$\frac{4.2 \text{ INCHES}}{24 \text{ HOURS}}$ (FROM DRAINAGE REPORT)

REQUIRED= $\frac{4.2 \text{ IN}}{24 \text{ HR}}$ X 24 HR X $\frac{1 \text{ FT}}{12 \text{ IN}}$ X 13,300 FT^2= 4655 FT^3

VOLUME REQUIRED= 4655 FT^3

THE RETENTION BASIN SHALL BE PUMPED OUT WHEN THE DEPTH EXCEEDS 3". THREE INCHES (3") IS ALLOWED TO REMAIN IN THE BOTTOM OF THE RETENTION BASIN DURING TESTING OPERATIONS. THIS 3" DEPTH RESULTS IN AN ADDITIONAL VOLUME CALCULATED AS FOLLOWS:
V_N = 60' X 60' X .25' (3" OF STORMWATER IN BASIN)
V_N = 900 FT^3

TOTAL VOLUME REQUIRED = 4655 FT^3+ 900 FT^3
V_T = 5555 FT

<u>BASIN CAPACITY PROVIDED:</u>
60' X 60' X 2' DEEP = 7200 FT^3

7200 FT^3 > 5555 FT^3

FREEBOARD PROVIDED = 7200 FT^3 – 5555 FT^3
V_F = 1645 FT^3

FREEBOARD DEPTH = $\frac{1645 \text{ FT}^3}{60' \text{ X } 60'}$ = 0.46 FT = 6" FREEBOARD PROVIDED

LEGEND

- NEW STORMWATER PROTECTION BERM (BY OTHERS)
- NEW 8" ABC PERIMETER
- EXISTING CONCRETE
- NEW CONCRETE
- EXISTING DIRT ROAD
- EXISTING CONTOUR
- NEW CONTOUR
- EXISTING GROUND ELEVATION
- EXISTING WASH
- CENTERLINE OF NEW PAD
- NEW CURB ELEVATION / NEW CONCRETE ELEVATION
- NEW TOP OF GRATE ELEVATION / NEW INVERT ELEVATION
- SURFACE DRAINAGE DIRECTION

NOTES

1. SUMPS TO BE MAINTAINED CLEAR OF DEBRIS AND SEDIMENT.
2. INSTALL 4" DIA. GALVANIZED PIPE WITH WATERTIGHT REMOVABLE WELL PLUG AT TOP OF PIPE IN RETENTION BASIN SUMP. COVER SLOTTED PIPE WITH DEBRIS SCREEN. PROVIDE 5" DIA. HOLE FOR 4" DIA. PIPE AND FILL VOID WITH EPOXY EXPANDABLE DRY PACK AT PIPE PENETRATION OF SUMP BOTTOM.

AS-BUILT DRAWING

This record drawing has been prepared, in part, based upon information furnished by others. While this information is believed to be reliable, GUTIERREZ CANALES ENGINEERING, P.C. cannot assure its accuracy, and thus is not responsible for the accuracy of this AS-BUILT drawing or for any errors or omissions which may have been incorporated into it as a result. Those relying on this record document are advised to obtain independent verification of its accuracy before applying it for any purpose.

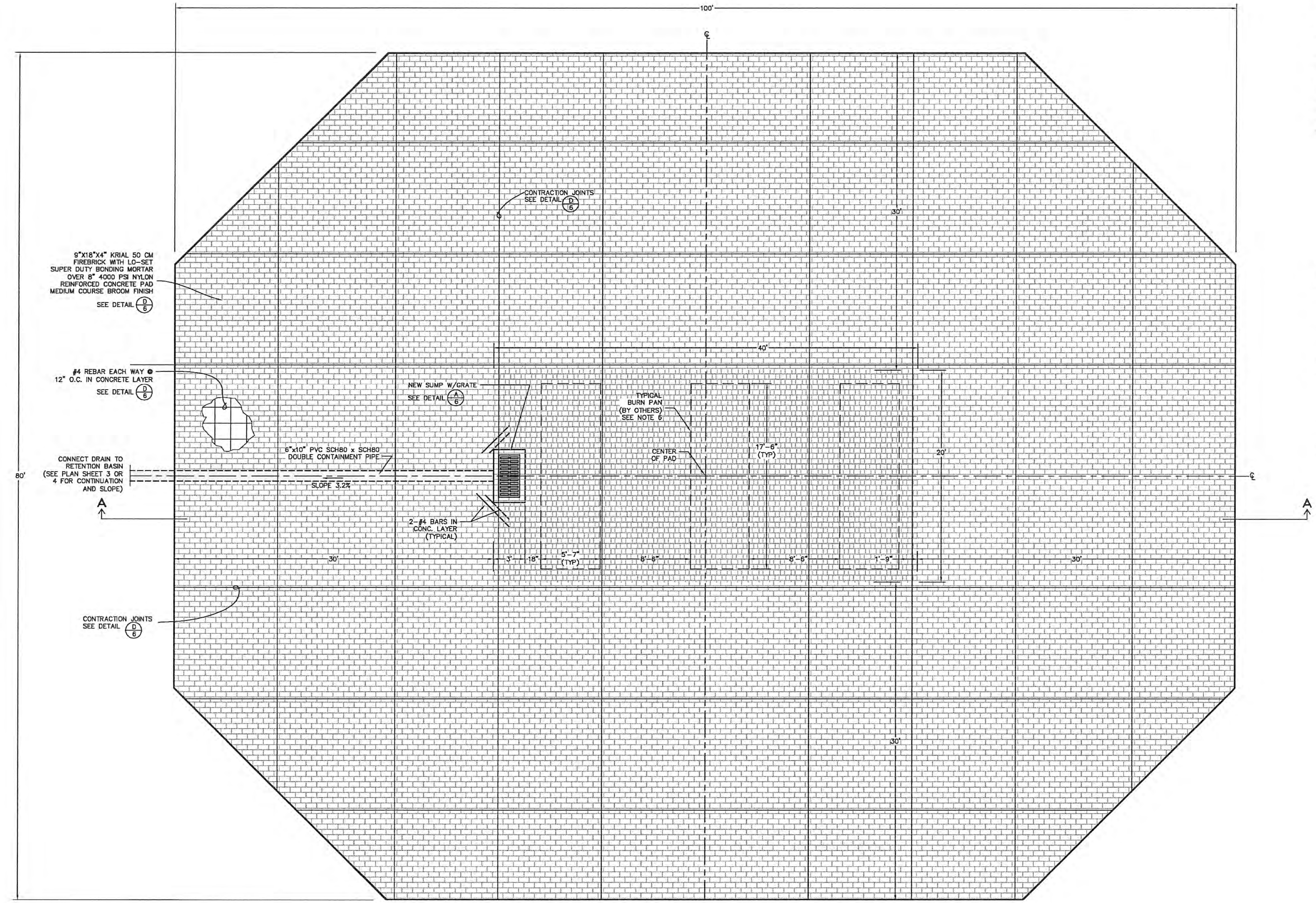
DATE: 4/08/14

SIGNATURE:

N

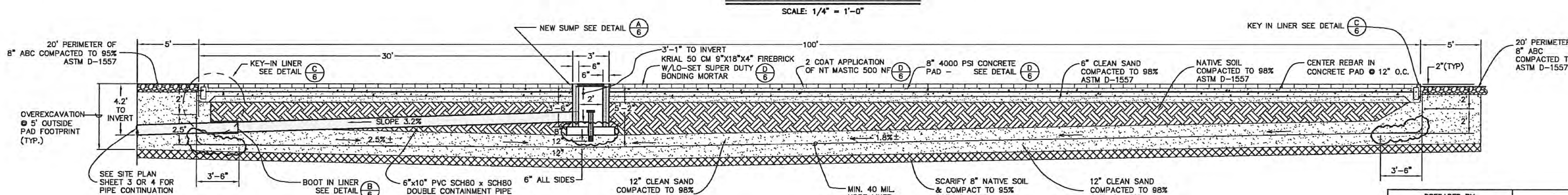
20' 0 20' 40' 60'

PREPARED BY		YUMA PROVING GROUND OB/OD SITE			
Gutierrez Canales Engineering P.C.		NORTH PAD SITE/GRADING PLAN			
		SIZE	DWG NO 101-04	Project Number .	REV 0
GCE PROJECT NO04GC007		SCALE 1"= 20'	March 2014	SHEET 4 OF 6	



TYPICAL PAD PLAN VIEW

SCALE: 1/4" = 1'-0"



TESTING PAD SECTION A-A

SCALE: 1/4" = 1'-0"

LEGEND:

- NEW 4000 PSI CONCRETE LAYER OVERLAIN BY KRIAL 50CM FIREBRICK
- KRIAL 50 CM FIREBRICK
- NATIVE FILL
- SELECT SAND
- ABC
- PAD CENTERLINE

NOTES:

1. CONCRETE SLAB SHALL BE POURED IN ONE CONTINUOUS POUR AND SHALL BE VIBRATED IN PLACE TO REMOVE VOIDS.
2. CONCRETE SHALL CURE FOR 28 DAYS PRIOR TO PLACEMENT OF KRIAL 50 CM
3. KRIAL 50 CM PAD SHALL BE PLACED FOLLOWING THE MANUFACTURERS INSTRUCTION MANUAL.
4. REPAIRS TO KRIAL 50 CM PAD SHALL BE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTION MANUAL.
5. PIPE LEAKAGE TESTING IS REQUIRED FOR BOTH CONTAINMENT PIPE AND CARRIER PIPE. WATER PRESSURE TESTING SHALL BE DONE IN ACCORDANCE WITH AWWA STANDARD C600 SECTION 4.1. IF AIR TESTING IS ELECTED BY THE CONTRACTOR IT SHALL BE IN ACCORDANCE WITH MAG SECTION 615.10. TESTING SHALL ALSO FOLLOW MANUFACTURER'S (SPEARS) RECOMMENDATIONS FOR DOUBLE CONTAINMENT PIPE.

   ROUTINE PRESSURE TESTING OF DOUBLE-WALL PIPE SHALL BE CONDUCTED BY OWNER.
6. BURN PANS WILL BE LINED WITH A SINGLE 4 INCH LAYER OF KRIAL 50 CM FIREBRICK TO BE INSTALLED ON THE INTERIOR BOTTOM SURFACE AND INTERIOR VERTICAL WALLS OF PANS. FIREBRICK TO BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

AS-BUILT DRAWING

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DATE: 4/08/14

SIGNATURE:

PREPARED BY

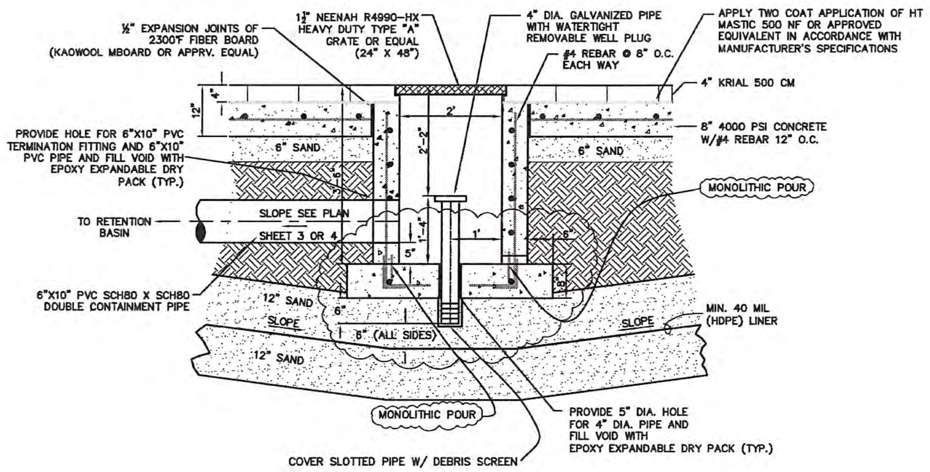
Gutierrez Canales Engineering P.C.

GCE PROJECT NO04GC007

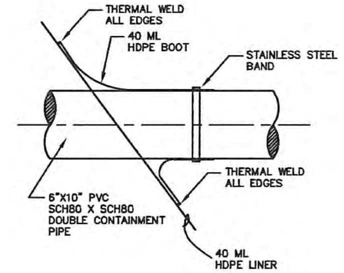
YUMA PROVING GROUND OB/OD SITE

NEW TESTING PAD & RETENTION BASIN PLAN & SECTIONS

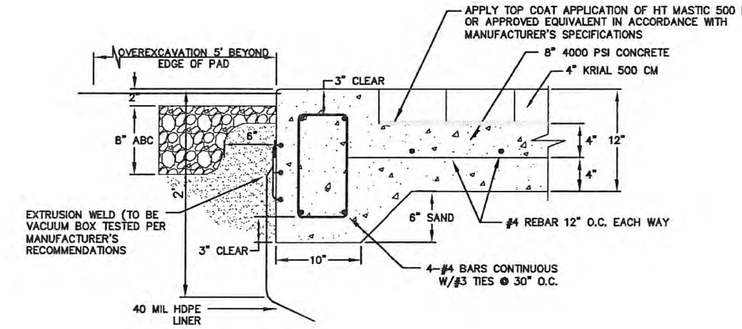
SIZE	DWG NO	Project Number	REV
	101-05	.	0
SCALE	AS NOTED	March 2014	SHEET 5 OF 6



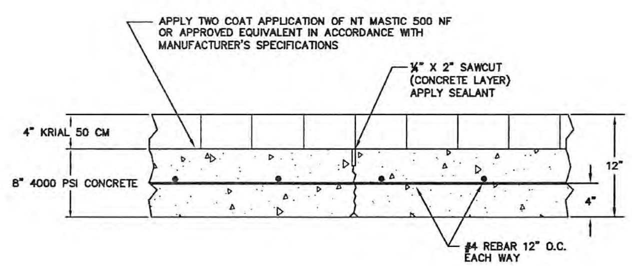
PAD SUMP DETAIL (A/6)
SCALE: 1:16



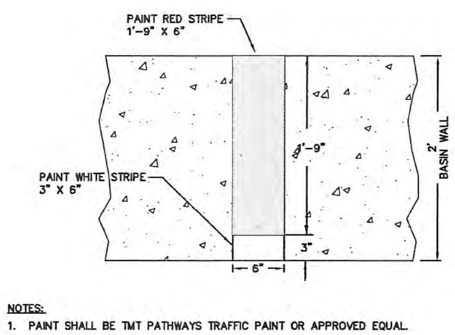
BOOT @ LINER PENETRATION (B/6)
N.T.S.



CONCRETE TURNDOWN AND KEY IN LINER AT PAD (C/6)
SCALE: 1:8

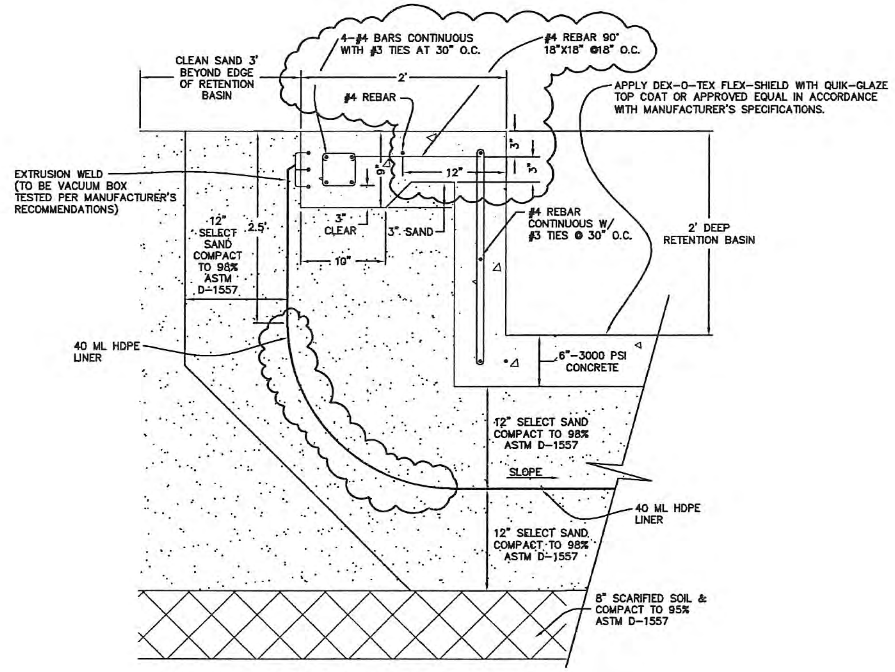


TYPICAL PAD SECTION & CONTRACTION JOINT (D/6)
N.T.S.

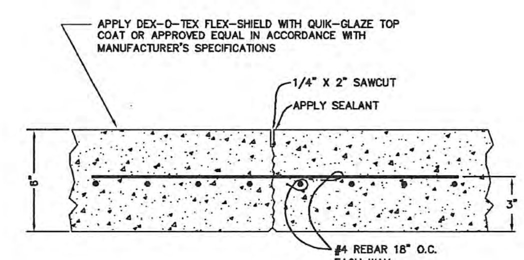


NOTES:
1. PAINT SHALL BE TMT PATHWAYS TRAFFIC PAINT OR APPROVED EQUAL.

RETENTION BASIN DEPTH MARKER (E/6)
N.T.S.



CONCRETE TURNDOWN & KEY IN LINER AT RETENTION BASIN (F/6)
N.T.S.



CONTRACTION JOINT AT RETENTION BASIN (G/6)
N.T.S.

AS-BUILT DRAWING
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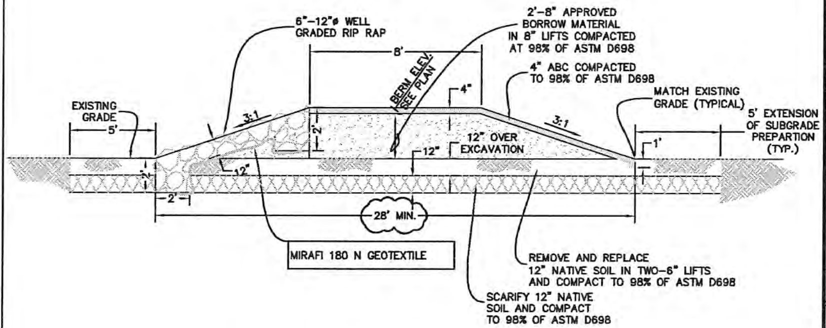
DATE: 4/08/14
SIGNATURE:

PREPARED BY
GCE
Gutierrez Canales Engineering P.C.
GCE PROJECT N0D04GC007

YUMA PROVING GROUND OB/OD SITE

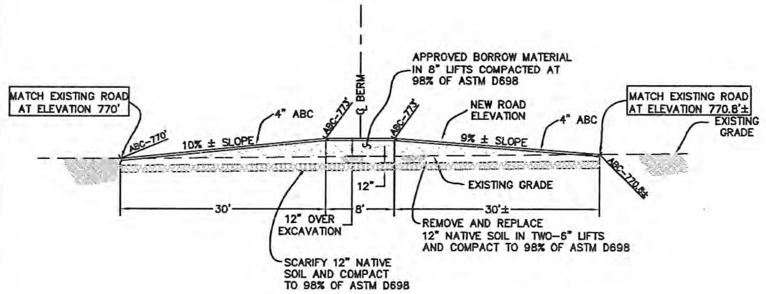
NEW TESTING PAD & RETENTION BASIN SECTIONS & DETAILS

SIZE	DWG NO	Project Number	REV
	101-06	-	0
SCALE: AS NOTED	March 2014	SHEET	6 OF 6



TYPICAL STORMWATER PROTECTION BERM

N.T.S. A/3



ACCESS ROAD CROSSING

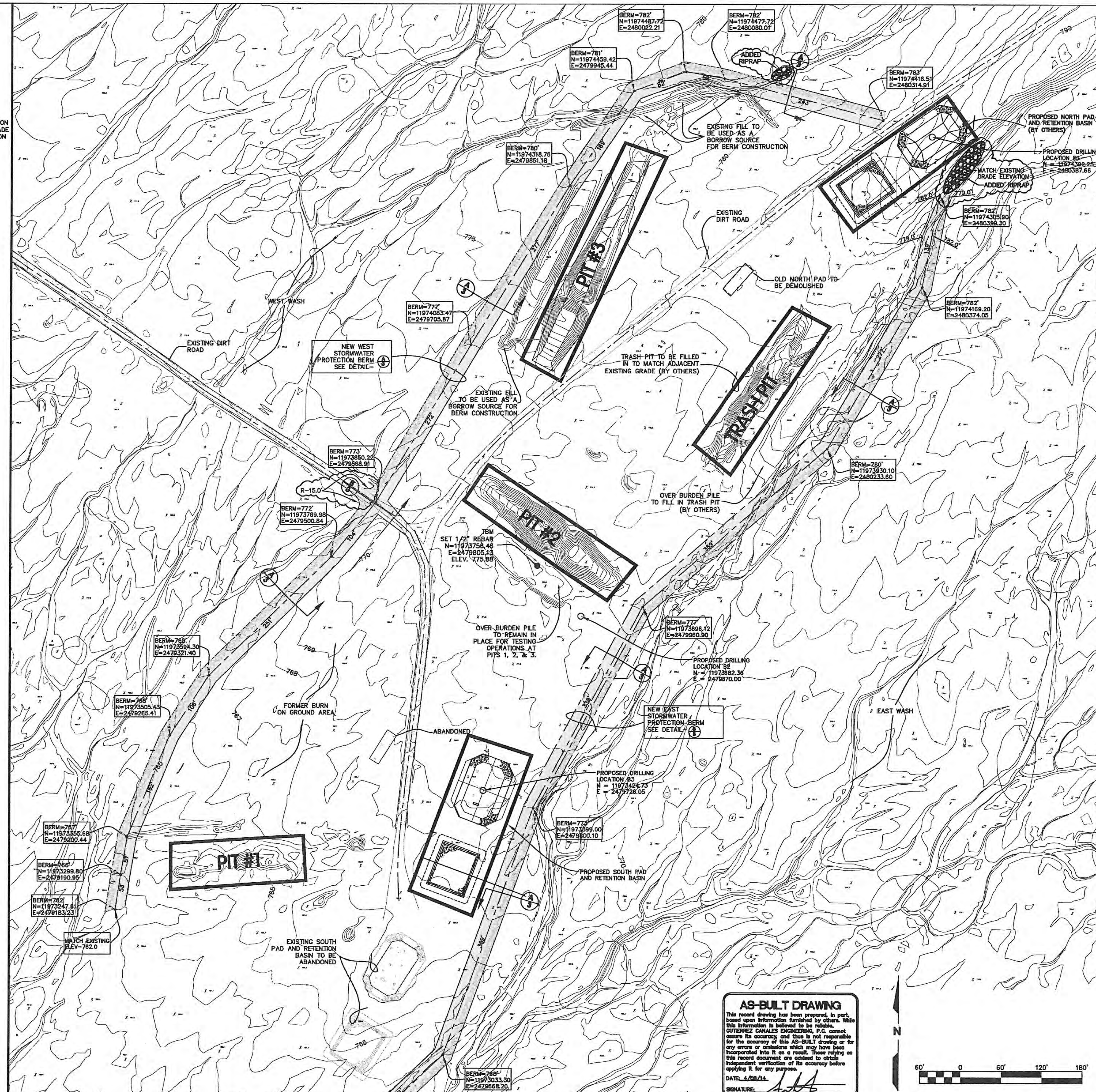
N.T.S. B/3

ESTIMATED MATERIAL QUANTITIES:

ITEM	QUANTITY (IN PLACE)
IMPORTED FILL	5425 CY
EARTHWORK	14120 SY
6"-12"ø RIP RAP(12" THICK)	4500 SY
MARAFI 180N GEOTEXTILE	56620 FT^2
4" ABC	6630 SY
MC-250 SEAL COAT (0.15 GAL/SY)	995 GAL

LEGEND

- SET ½" REBAR
- NEW STORMWATER PROTECTION BERM
- NEW 6"-12"ø RIP RAP
- EXISTING CONCRETE
- EXISTING DIRT ROAD
- EXISTING CONTOUR
- EXISTING INDEX CONTOUR
- EXISTING HORIZONTAL & VERTICAL TARGET
- x 775.4 EXISTING GROUND ELEVATION
- EXISTING WASH



AS-BUILT DRAWING

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DATE: 4/08/14

SIGNATURE:

PREPARED BY

Gutierrez Canales Engineering P.C.

GCE PROJECT NO:02GC008

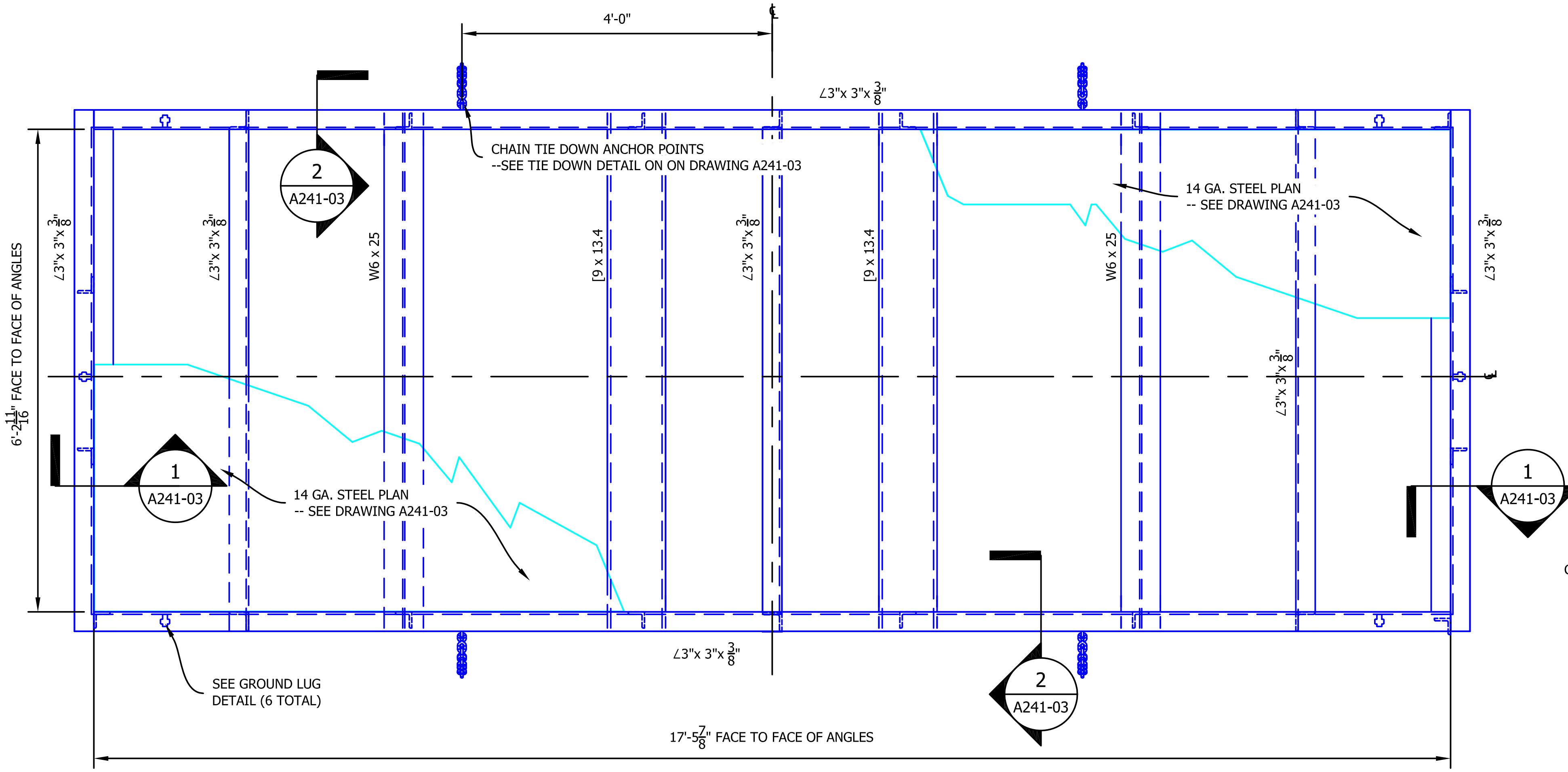
YUMA PROVING GROUND OB/OD SITE

SITE/GRADING PLAN

SIZE	DWG NO	Project Number		REV
	.	2315.234.2		0
SCALE	1"= 60'	March 2014	SHEET	3 OF 3

ATTACHMENT 2C

OPEN BURN PAN DESIGN



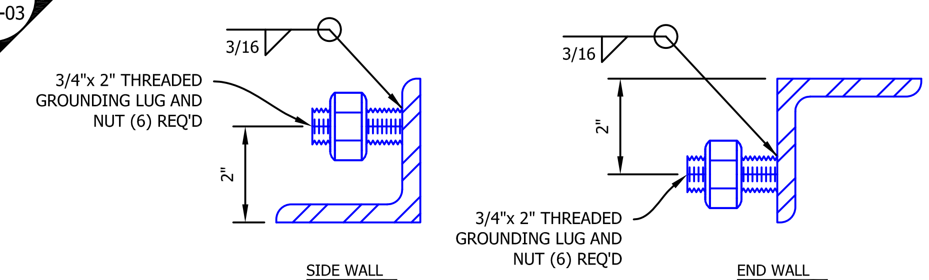
PLAN VIEW

1/2" = 1'-0"

EXPIRES 12/31/2015

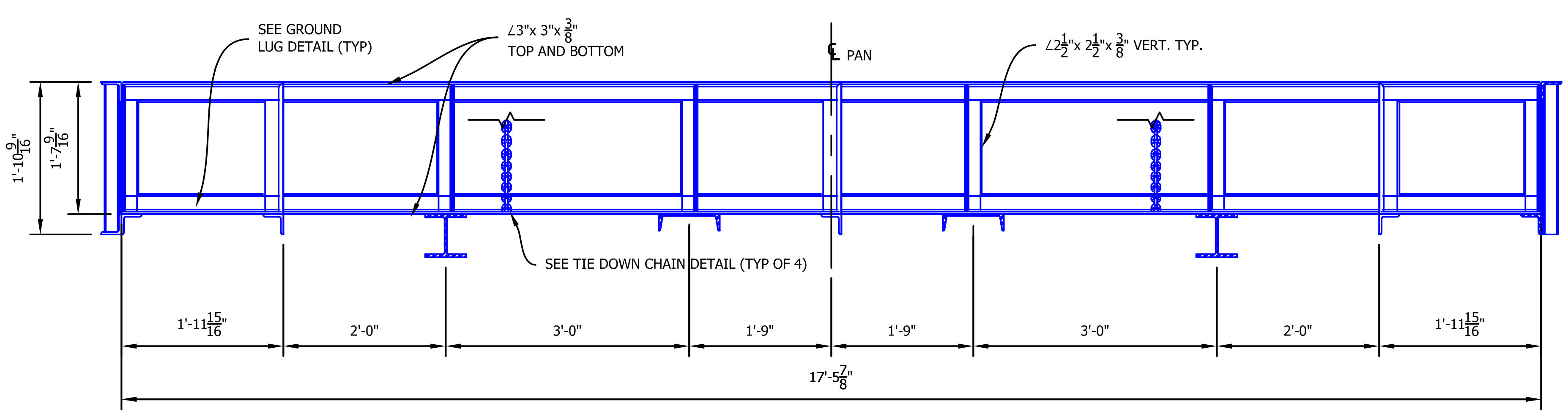
GENERAL NOTES:

1. STEEL SHAPES SHALL CONFORM TO ASTM S72 HIGH STRENGTH, LOW ALLOY STEEL, FY=50 KSI MIN.
2. FIBER BOARD LINER SHALL BE THERMAL CERAMICS V-19 BLOCK INSULATION OR APPROVALED EQUAL.
3. STRUCTURAL STEEL WELDING SHALL BE IN ACCORDANCE WITH AWS D 1.1-98 STRUCTURAL WELDING CODE-STEEL.
4. WELDING FOR 14 GA. PAN SHALL BE IN ACCORDANCE WITH AWS. D 1.3-98 STRUCTURAL WELDING CODE-STEEL SHEET.
5. ALL BRICK 18"X 9"X 4" RESCO; KRIAL 50 CMSEPARATED BY 1/16" MORTAR JOINT
6. THE DOWN CHAINS SHALL BE 3/8" STEEL CHAIN NACM GRADE 43.
7. ANCHOR WIRE AND NUTS SHALL BE 310 STAINLESS STEEL.
8. THREADED GROUNDLING LUGS AND NUTS SHALL BE 316 STAINLESS STEEL.
9. PRIOR TO INSTALLATION OF CERAMIC MATERIALS, WATER TEST THE PAN FOR VISIBLE LEAKING. REPAIR ANY VISIBLE LEAKS BY RE-WELDING THE LEAK AREA THEN RE-TEST FOR LEAKS UNTIL THE PAN IS LEAK FREE.
10. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF THE BURN PAN TO THE ENGINEER FOR REVIEW PRIOR TO FABRICATION.
11. 14 GA. PAN SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A653 CEO COATING.
12. STRUCTURAL STEEL FRAME SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123 AFTER FABRICATION.



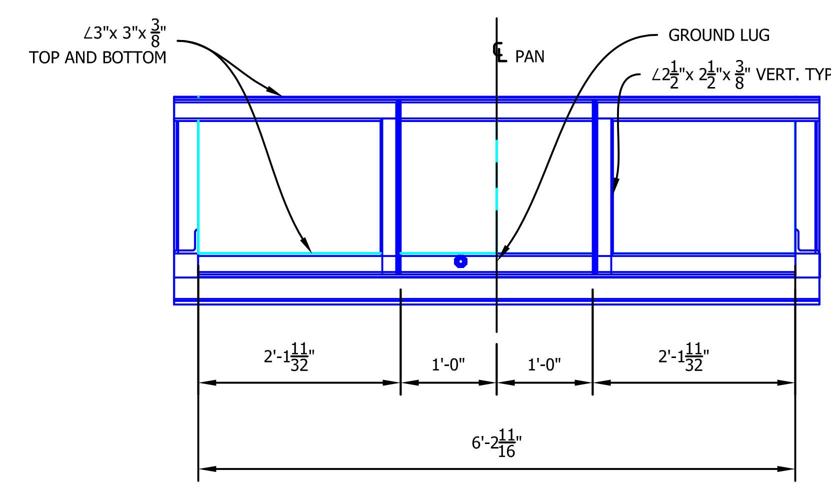
TYPICAL GROUND LUG DETAIL

3" = 1'-0"



FRONT ELEVATION

1/2" = 1'-0"



SIDE ELEVATION

1/2" = 1'-0"

ENGINEERING ASSOCIATES, PSC
3142 Winchester Avenue
Ashland, KY 41101
Phone (606) 324-6644
Fax (606) 324-2542

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TITLE
OPEN BURN PAN
STEEL FRAME
PLAN AND ELEVATIONS

CUSTOMER
SYBRANT CONSTRUCTION
7275 N. 67TH AVENUE
GLENSDALE, AZ 85301

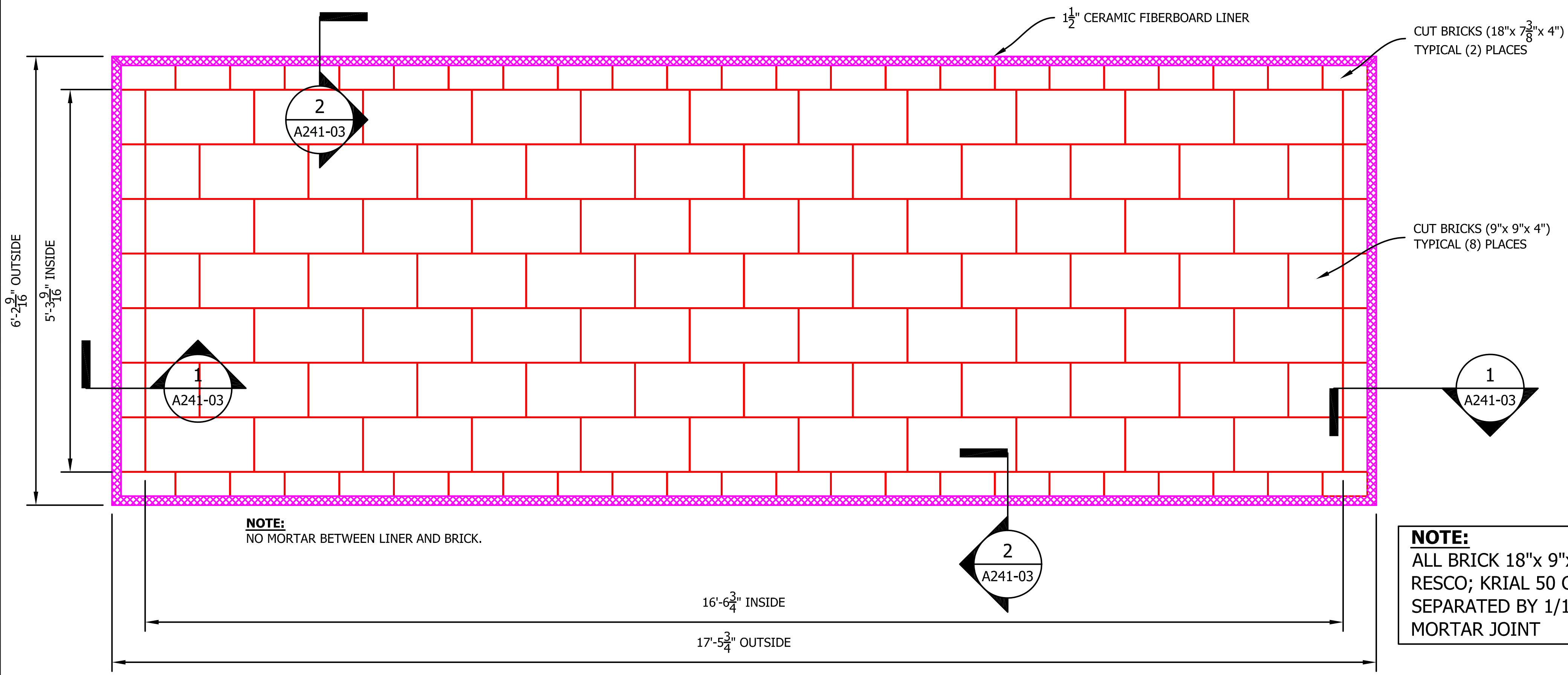
REV.	DESCRIPTION	DATE
0	RELEASED FOR FABRICATION	6/25/2013

JOB A241
DATE 6/19/2013
DRAWN BY MLC

A241-02

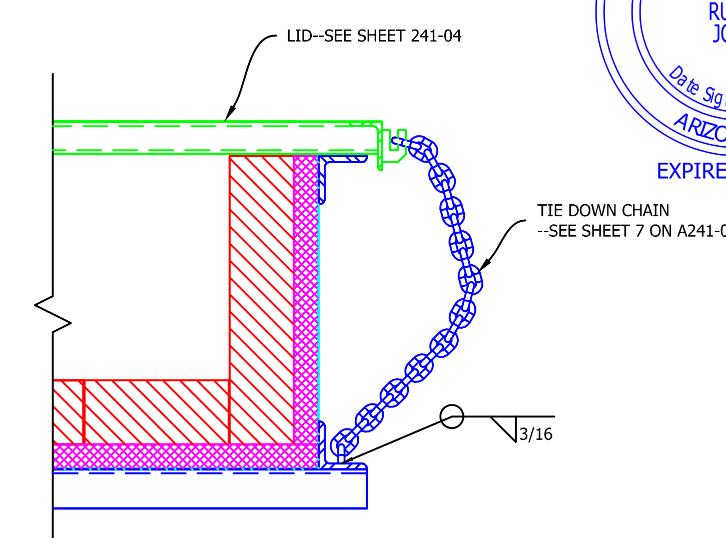
0

Revision No. 1



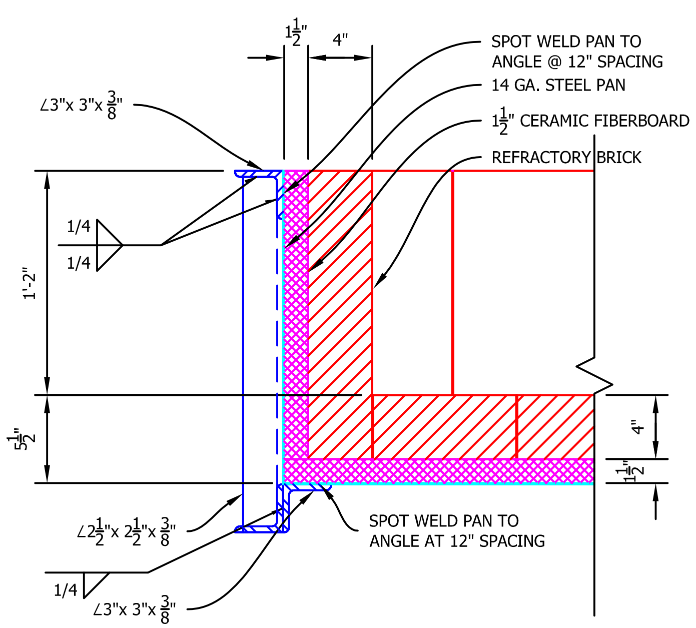
REFRACTORY BRICK AND LINER LAYOUT PLAN VIEW
1/2" = 1'-0"

NOTE:
ALL BRICK 18"x 9"x 4"
RESCO; KRIAL 50 CM
SEPARATED BY 1/16"
MORTAR JOINT

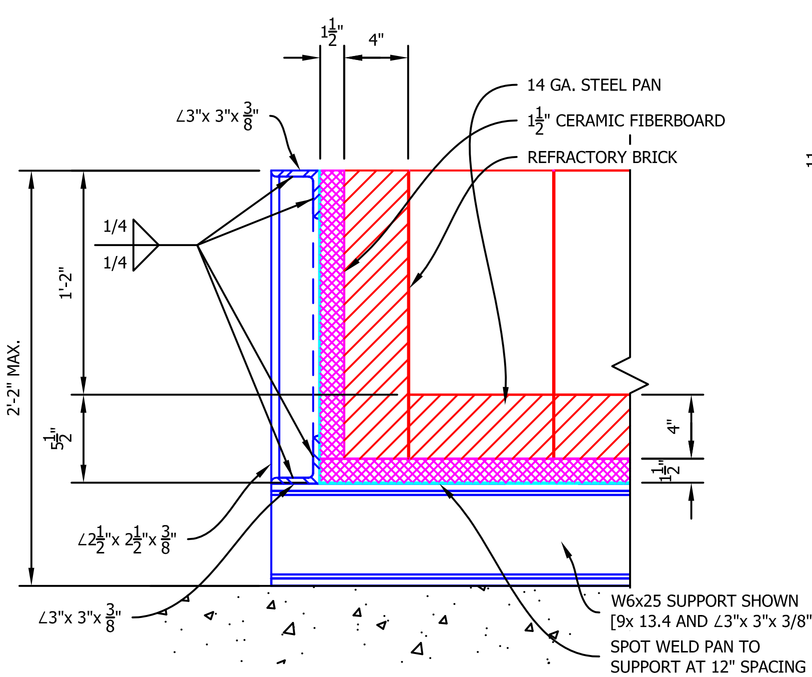


TIE DOWN CHAIN DETAIL
1" = 1'-0"

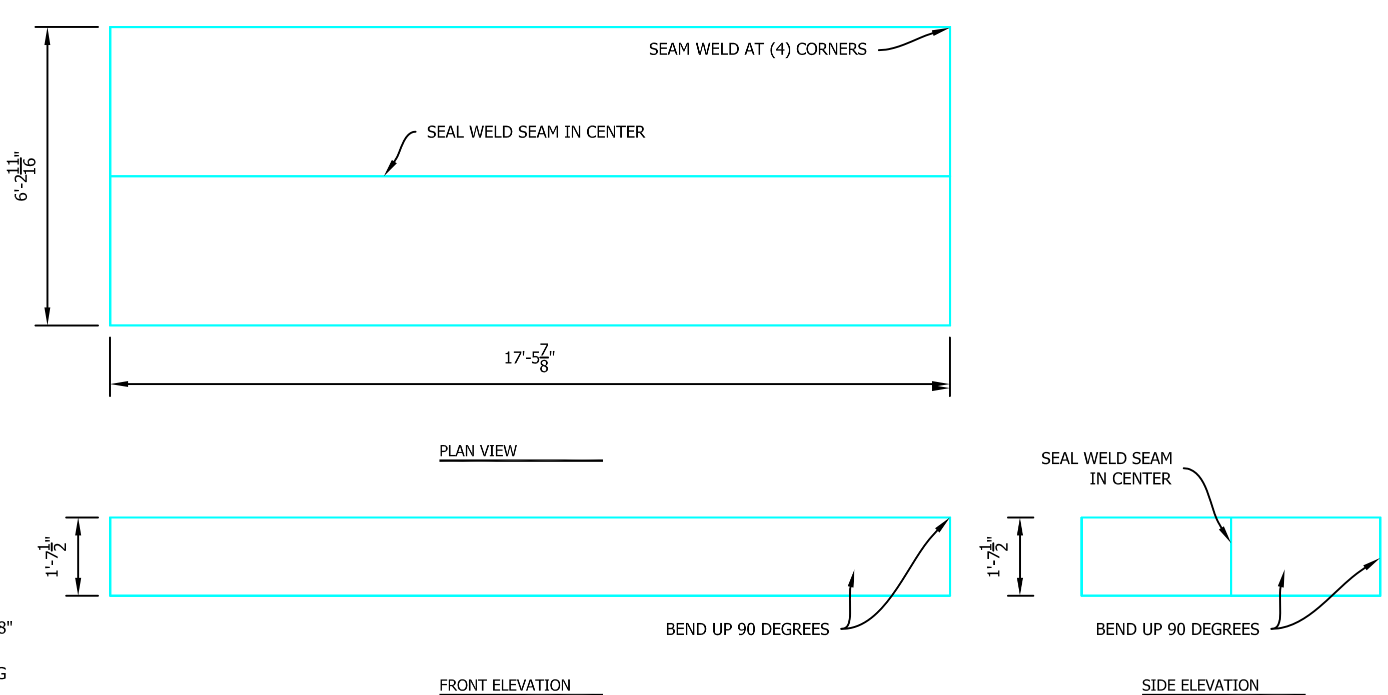
Registered Professional Engineer (Mechanical)
CERTIFICATE NO.
54006
RUSSELL
JONES
Date Signed ....
ARIZONA, U.S.A.
EXPIRES 12/31/2015



1 A241-03 TYPICAL END WALL SECTION
1" = 1'-0"



2 A241-03 TYPICAL SIDE WALL SECTION
1" = 1'-0"



14 GA. STEEL PAN
1/4" = 1'-0"

ENGINEERING ASSOCIATES, PSC
3142 Winchester Avenue
Ashland, KY 41101
Phone (606) 324-6644
Fax (606) 324-2542

TITLE
OPEN BURN PAN
BRICK AND FIBERBOARD LINING
AND PAN
SECTIONS AND DETAILS

CUSTOMER
SYBRANT CONSTRUCTION
7275 N. 6TH AVENUE
GLENSDALE, AZ 85301

REV.	DESCRIPTION	DATE
0	RELEASED FOR FABRICATION	6/25/2013

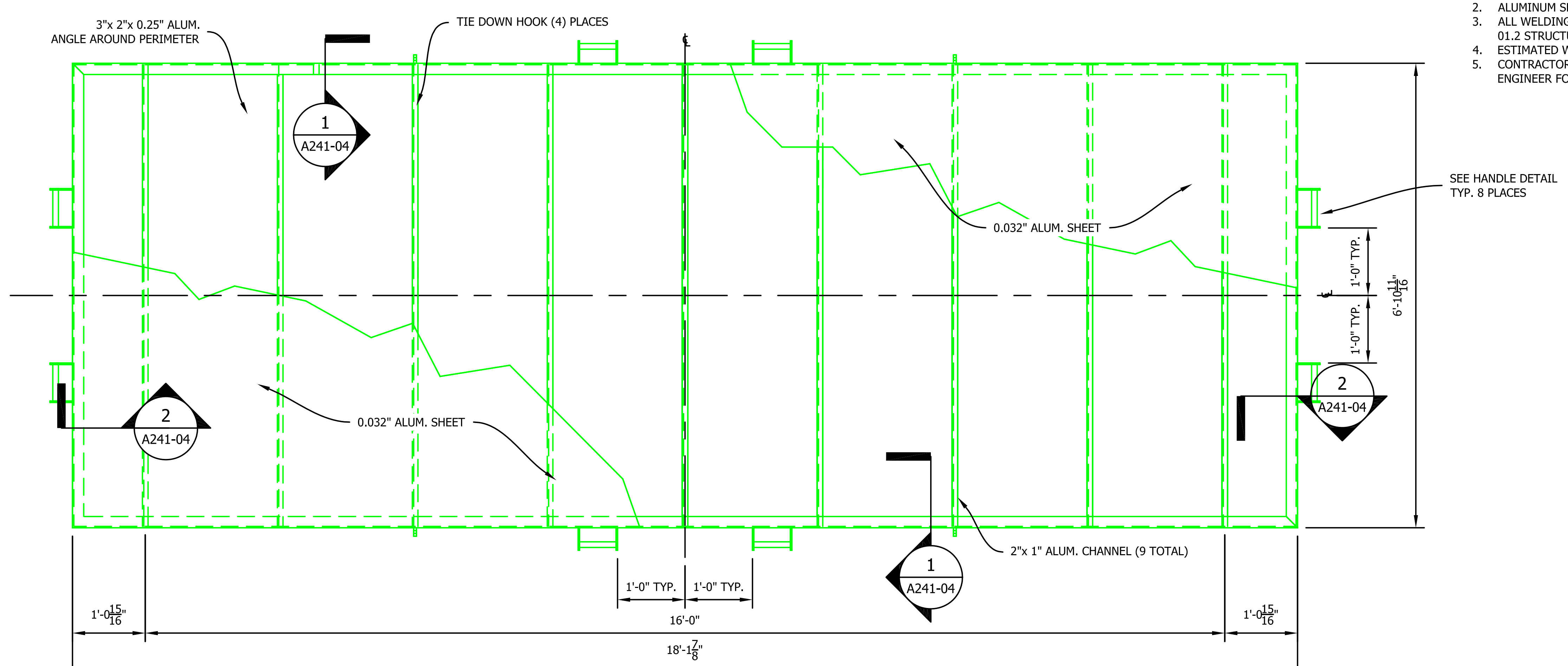
JOB A241
DATE 6/20/2013
DRAWN BY MLC

A241-03
0

LID NOTES:

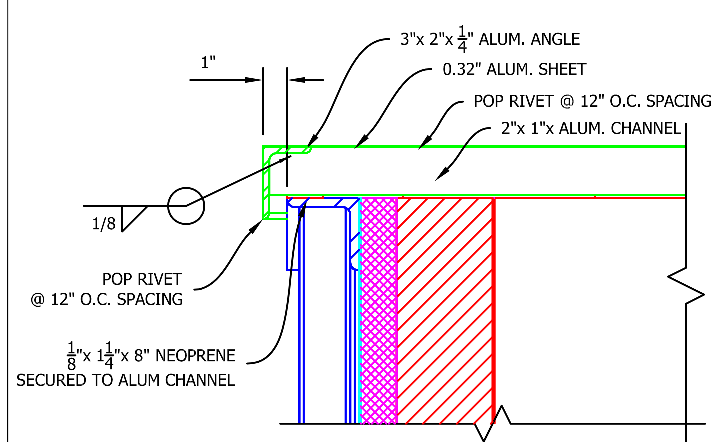
1. ALUMINUM CHANNELS, ANGLES AND BARS SHALL CONFORM TO ASTM B221, ALLOY 6061-T6.
2. ALUMINUM SHEET SHALL CONFORM TO ASTM B209, ALLOY 6061-T6.
3. ALL WELDING FOR ALUMINUM SHALL BE IN ACCORDANCE WITH ASW 01.2 STRUCTURAL WELDING CODE-ALUMINUM.
4. ESTIMATED WEIGHT OF THE ALUMINUM LID = 200 POUNDS.
5. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF THE LID TO THE ENGINEER FOR REVIEW PRIOR TO FABRICATION.

Registered Professional Engineer (Mechanical)
CERTIFICATE NO.
54006
RUSSELL JONES
Date Signed ....
ARIZONA, U.S.A.
EXPIRES 12/31/2015



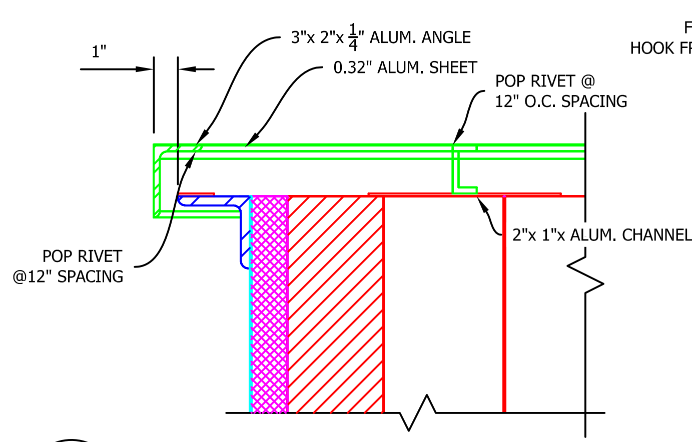
LID PLAN

1/2" = 1'-0"



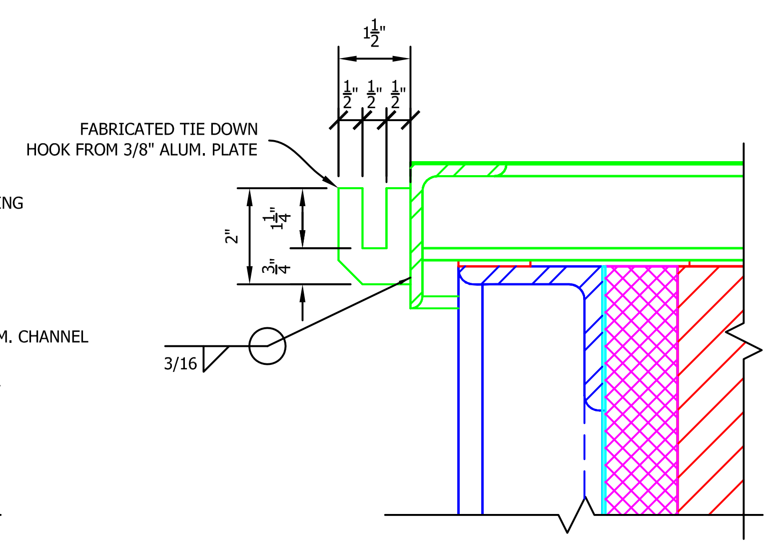
1 A241-04 TYPICAL SIDE WALL SECTION

1 1/2" = 1'-0"



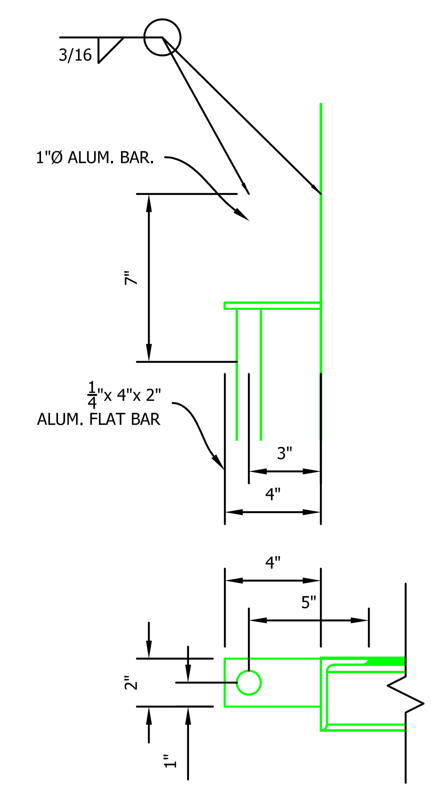
2 A241-04 TYPICAL END WALL SECTION

1 1/2" = 1'-0"



TIE DOWN DETAIL

3" = 1'-0"



HANDLE DETAIL PLAN AND SECTION

1 1/2" = 1'-0"

ENGINEERING ASSOCIATES, PSC
3142 Winchester Avenue
Ashland, KY 41101
Phone (606) 324-6644
Fax (606) 324-2542

TITLE: OPEN BURN PAN LID SECTIONS AND DETAILS

CUSTOMER: SYBRANT CONSTRUCTION 7275 N. 67TH AVENUE GLENSDALE, AZ 85301

REV.	DESCRIPTION	DATE
0	RELEASED FOR FABRICATION	6/25/2013

JOB A241
DATE 6/19/2013
DRAWN BY MLC

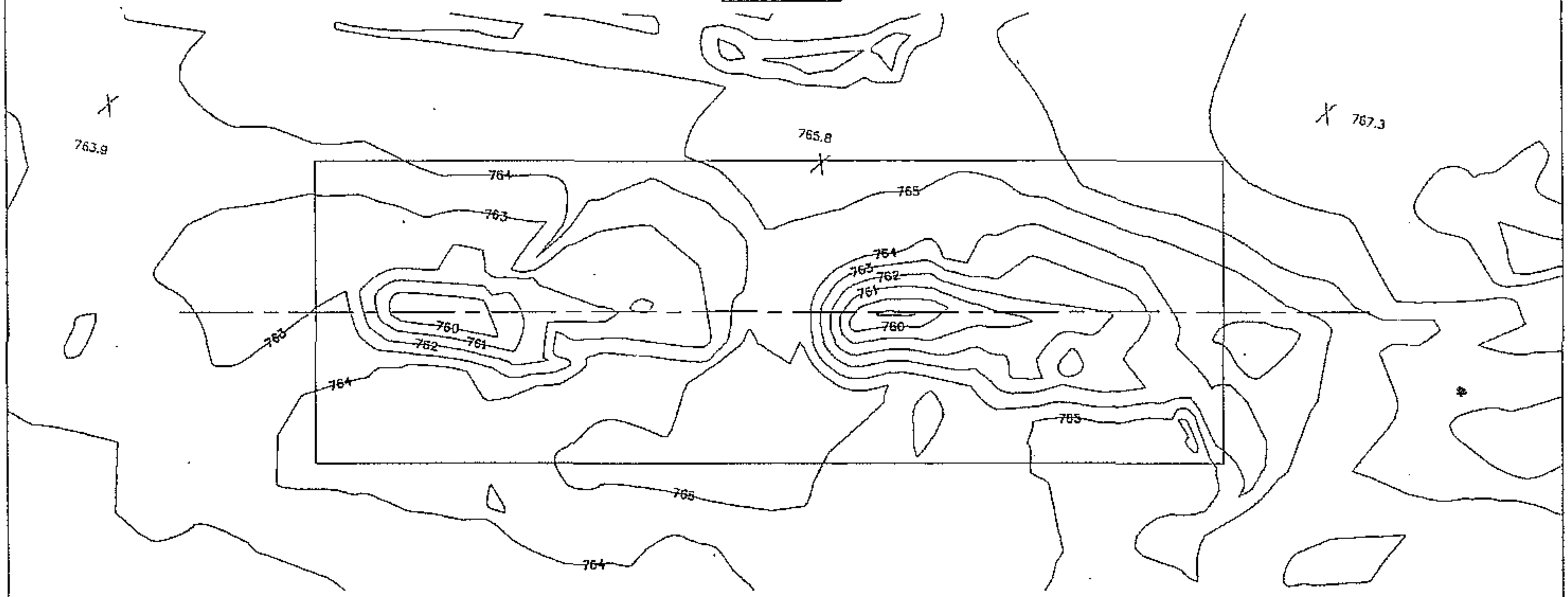
A241-04

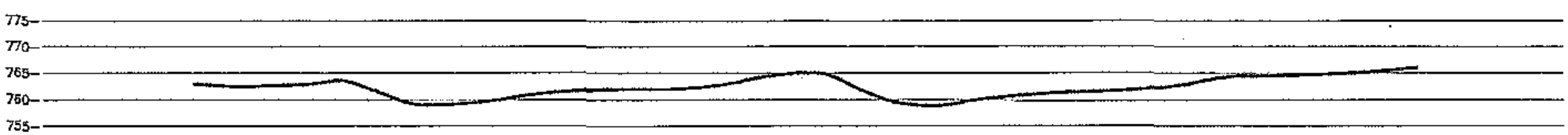
0

ATTACHMENT 2D

OD PIT DRAWINGS

PIT 1 - PLAN VIEW

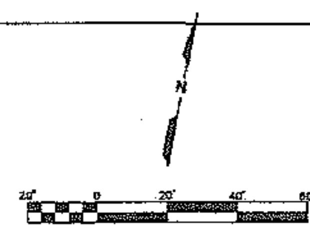




PIT 1 - PROFILE

LEGEND

765	EXISTING 5' CONTOUR
762	EXISTING 1' CONTOUR



YUMA PROVING GROUND OB/OD SITE

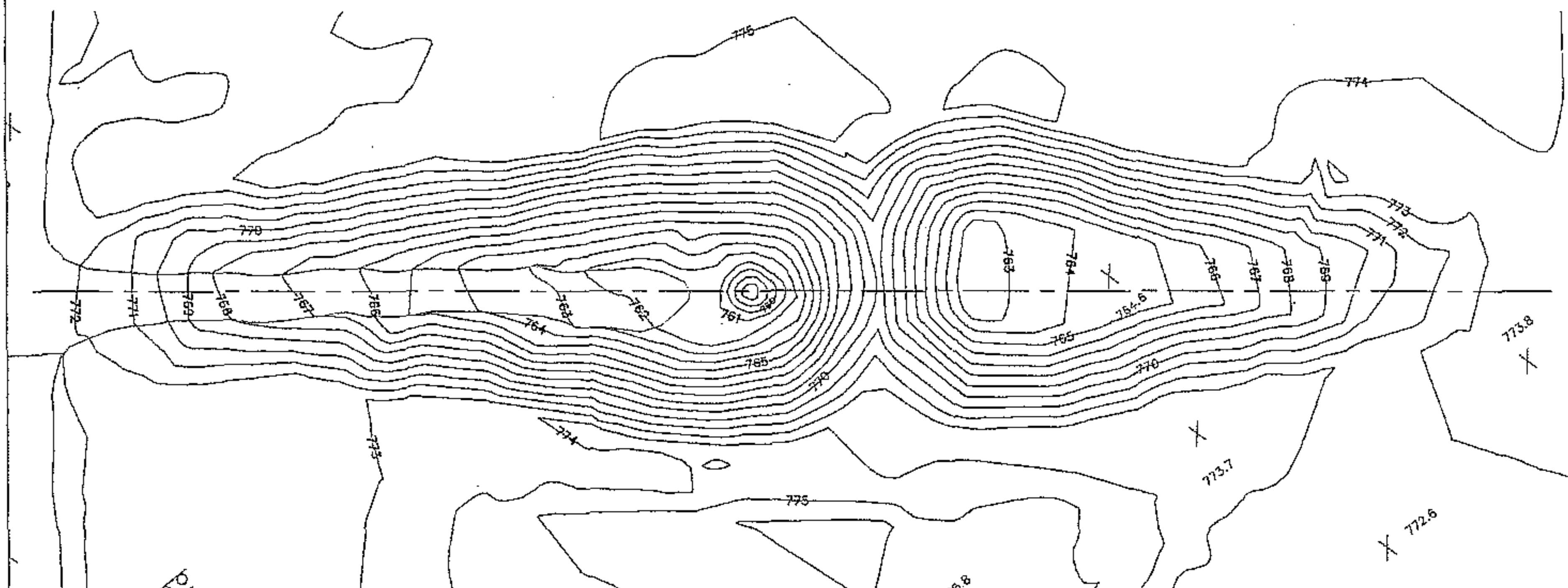
RCRA PART B
PIT 1 - PLAN & PROFILE

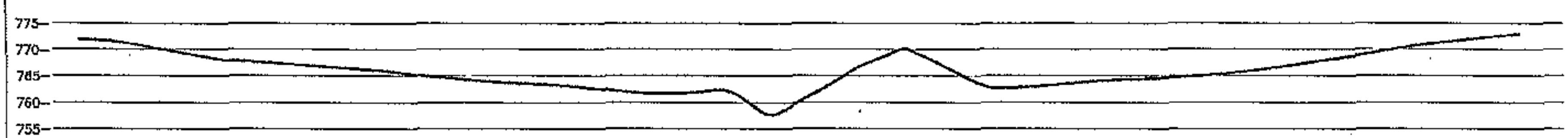
SCALE:	AS SHOWN
DATE:	JUNE 2004
DES. BY:	SSC
DRAWN BY:	BEH
SURVEYED BY:	X.X.X.
JOB. No.:	02-076
FILE No.:	XX-XX-XX

Nicklaus Engineering Inc.
1851 West 24th Street, P.O. Box 6028
YUMA, ARIZONA 85364 (928)344-8574

SHEET 1
OF 3

PIT 2 - PLAN VIEW



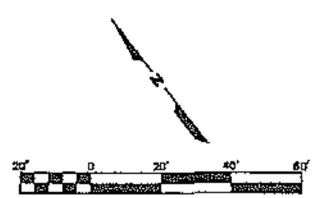


PIT 2 - PROFILE

LEGEND

765 EXISTING 5' CONTOUR

762 EXISTING 1' CONTOUR



YUMA PROVING GROUND OB/OD SITE

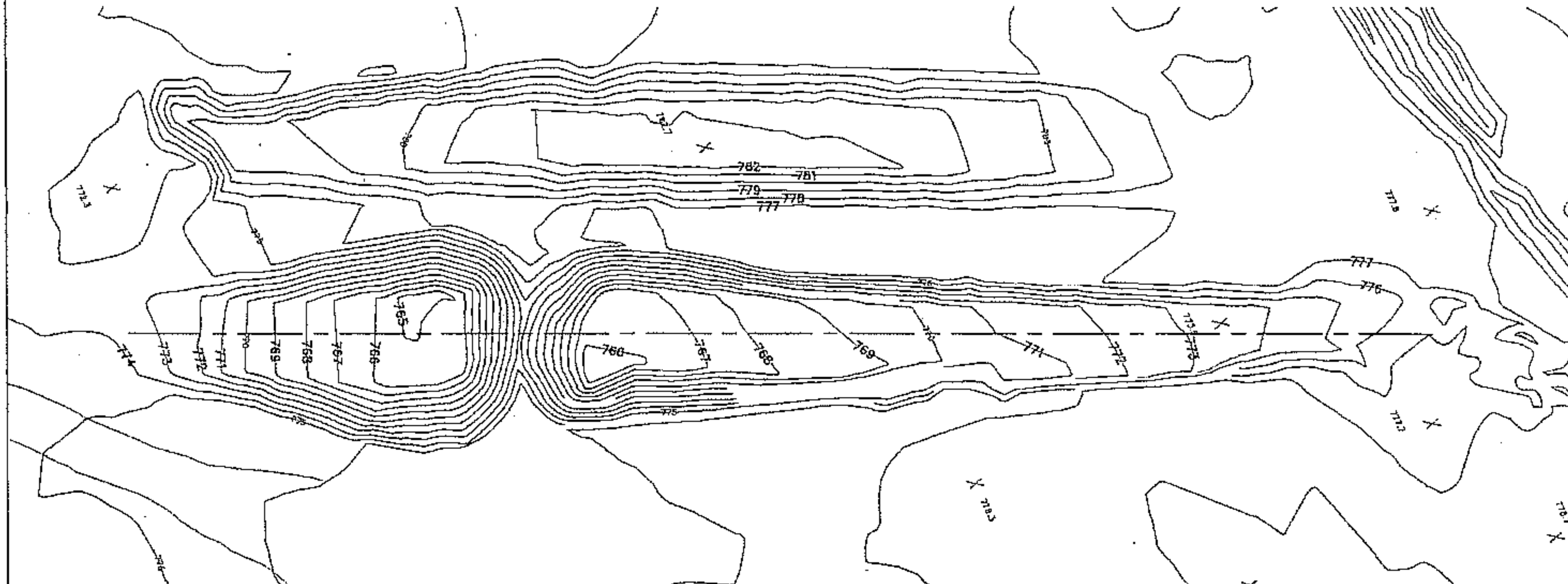
RCRA PART B
PIT 2 PLAN & PROFILE

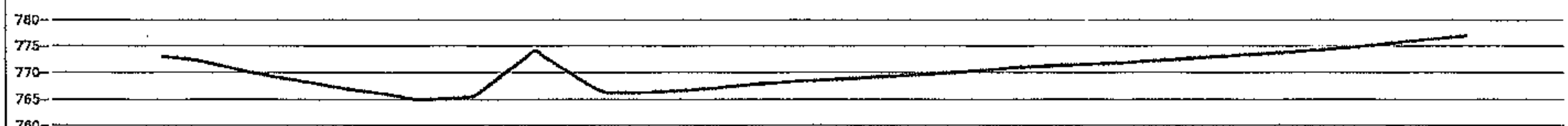
Nicklaus Engineering Inc.
1851 West 24th Street P.O. Box 4028
YUMA, ARIZONA 85364 (928)344-8374

SCALE:	AS SHOWN
DATE:	JUNE 2004
DES. BY:	SSC
DRAWN BY:	DGH
SURVEYED BY:	X.X.X.
JOB. No.:	02-076
FILE No.:	XX-XX-XX

SHEET 2 OF 3

PIT 3 - PLAN VIEW



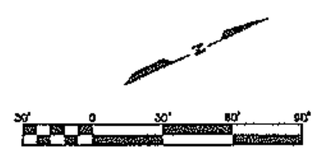


PIT 3 - PROFILE

LEGEND

765 EXISTING 5' CONTOUR

762 EXISTING 1' CONTOUR



YUMA PROVING GROUND OB/OD SITE

RCRA PART B
PIT 3 - PLAN & PROFILE

Nicklaus Engineering Inc.
1851 West 24th Street, P.O. Box 6328
YUMA, ARIZONA 85364 (928)344-8374
Email: nei@nelaw.com

SCALE:	AS SHOWN
DATE:	JUNE 2004
DES. BY:	SSC
DRAWN BY:	RCH
SURVEYED BY:	X.X.X.
JOB No.:	02-075
FILE No.:	XX-XX-XX

SHEET 3 OF 3

ATTACHMENT 2E

ESTIMATE OF OD PIT VOLUMES

21-A

ROUGH ESTIMATE OF YPG

OPEN DETONATION (OD) PIT VOLUMES

Prepared by:

Jason Associates Corporation
545 Shoup Ave., Suite 335B
Idaho Falls, Idaho 83402
(208) 522-1662

Registered Professional Engineer (Civil)
CERTIFICATE NO.
37706
KEITH D.
DAVIS
Date Signed 9/20/04
ARIZONA, U.S.A.

Yuma Proving Grounds
Open Burn/Open Detonation Facility

September 20, 2004

ROUGH ESTIMATE OF YPG
OPEN DETONATION (OD) PIT VOLUMES

OBJECTIVE:

Use survey point elevations of pit rims and toes of ramp side slopes (see drawings attached) to generate rough estimates of pit volumes for OD Pits 2 and 3 of the Open Burning/Open Detonation (OB/OD) Treatment Facility. Each of the pits has two cells and a volume will be calculated for each cell individually.

METHODOLOGY:

The main cross-section of the pit cells (i.e., the long axis, down the access ramp) is assumed to be an inverted triangle. This will present a conservatively low estimate of cell volume because there is actually a flat area at the deepest part of the cell, not a low point.

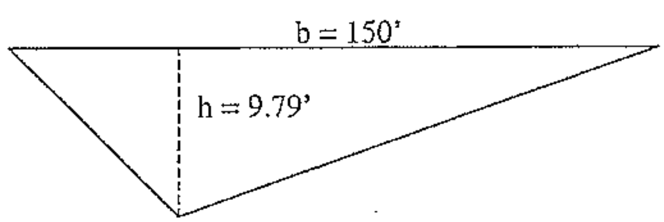
Example Calculation – Pit 2, Northwest Cell:

Main Cross-Section (X) Dimensions

Height of inverse triangle = lowest spot on cell rim minus average of two lowest spots in bottom of cell
= $771.85 - (761.75 + 762.37)/2$
= 9.79 ft

Base of inverse triangle = measured distance (using map scale included in drawings) between furthest survey points on rim
= 150 ft

Main Cross Section Area = ½ (base)(height)
= ½ (150)(9.79)
X = 734 ft^2



Volume of Ramp Section

Ramp Width (W_R) = use average of drawing measurements (measured at uniform distances along long axis) between toe of side slopes (as defined by survey points)
= 15.7 ft

Ramp Section Volume = (Ramp Width) (Main Cross Section)
= (W_R) (X)
= (15.7 ft) (734 ft^2)
= 11,524 ft^3

Volume Above Side Slopes

Use ½ of horizontal distance multiplied by the Main Cross Section (X) because the short (width) cross-section is also triangular on either side of the ramp section.

Top Cell Width (W_C) = use average of drawing measurements (measured at uniform distances along long axis) between rim of cell (as defined by survey points)
= 48.8 ft

Width of side slopes (W_{SS}) = ($W_C - W_R$) / 2
= (48.8 ft – 15.7 ft) / 2
= 16.55 ft (on each side of ramp section)

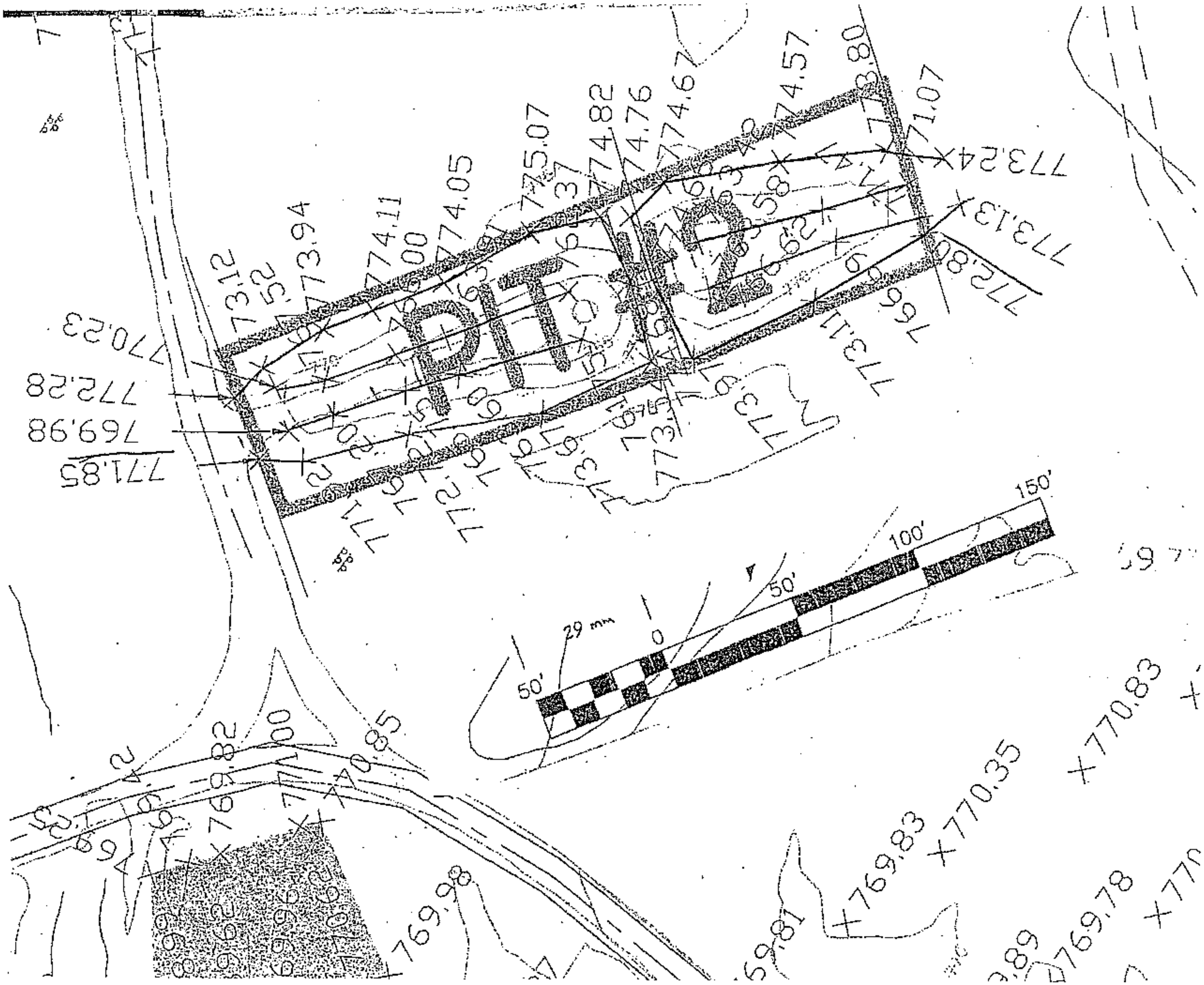
Volume above both side slopes = ½ (W_{SS}) (X) + ½ (W_{SS}) (X)
= (W_{SS}) (X)
= (16.55 ft) (734 ft2)
= 12,148 ft^3

Total Volume = Volume of Ramp Section + Volume Above Side Slopes
= 11,524 ft^3 + 12,148 ft^3
= 23,672 ft^3
Use 23,600 ft^3

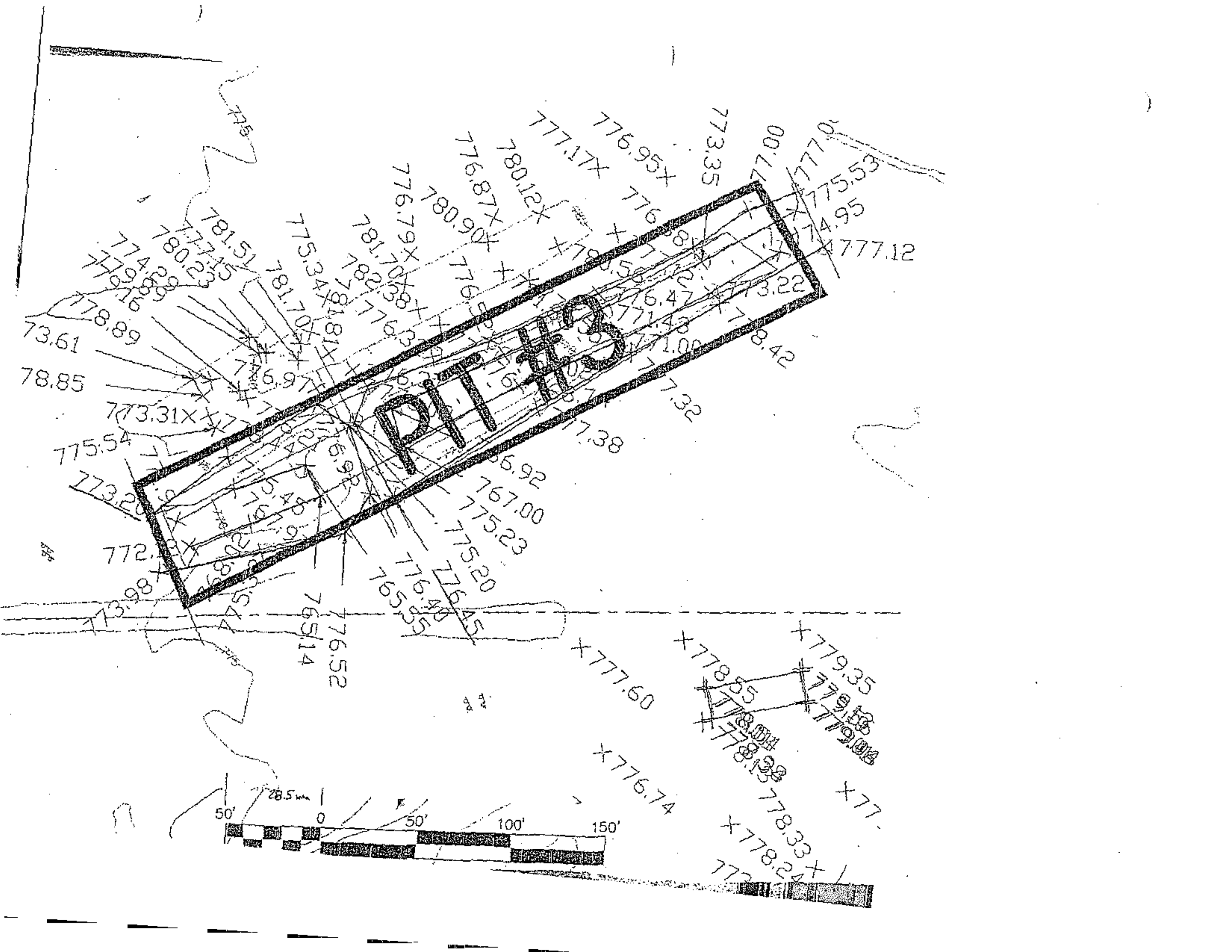
Table 1 presents key values taken or measured from the drawings of survey points and those calculated per the example above, for each of the 4 cells that make-up OD Pits 2 and 3.

Table 1. Key values used in calculation of OD Pit 2 and 3 cell volumes.

	Pit 2		Pit 3	
Cell Parameters	**Northwest Cell**	**Southeast Cell**	**North Cell**	**South Cell**
Main Cross Section Area				
Low elevation on cell rim	771.85 ft	772.80 ft	776.45 ft	773.20 ft
Average bottom point elevation	762.06 ft	763.5 ft	766.96 ft	765.35 ft
Cell height/depth (h = rim - bottom)	9.79 ft	9.30 ft	9.49 ft	7.85 ft
Cell length (b)	150 ft	100 ft	256 ft	111 ft
Main cross section area (X = ½ bh)	734 ft^2	465 ft^2	1,214.7 ft^2	435.7 ft^2
Volume of Ramp Section				
Average ramp width (W_R)	15.7 ft	14.8 ft	18.2 ft	17.7 ft
Volume of ramp section (X)(W_R)	11,524 ft^3	6,882 ft^3	22,107 ft^3	7,712 ft^3
Volume Above Side Slopes				
Average cell width (W_C)	48.8 ft	51.2 ft	40.5 ft	48.1 ft
Horizontal width of slopes (W_C - W_R)	33.1 ft	36.4 ft	22.3 ft	30.4 ft
Volume above slopes ½(W_C - W_R)(X)	12,148 ft^3	8,463 ft^3	13,544 ft^3	6,623 ft^3
Total Volume				
Ramp Section + Slope Section (rounded down to the 100 spot)	23,600 ft^3	15,300 ft^3	35,600 ft^3	14,300 ft^3
Total Volume of all 4 Cells	**88,800 ft^3**			



PIT #2
773.12
773.94
774.11
774.05
775.07
774.82
774.76
774.67
774.57
773.80
771.07
773.24
773.13
772.80
770.23
772.28
769.98
771.85
29 mm
50'
0
50'
100'
150'
770.83
770.35
769.83
769.78
769.98


PIT #3
50'
0
50'
100'
150'
28.5
777.17X
776.95X
773.35
777.00
775.53
774.95
777.12
780.12X
776.87X
780.90X
776.79X
781.70X
782.38X
781.51
780.23
775.34X
781.70X
778.89
73.61
78.85
773.31X
775.54
773.20
772.
73.98
767.00
775.23
775.20
776.45
776.40
765.55
765.14
776.52
777.38
777.32
778.42
773.22
777.60
776.74
779.35
778.33
778.24

ATTACHMENT 2F

ESTIMATE OF LOCAL RUN-OFF INFLUENCE INTO OD PITS

JASON ASSOCIATES CORPORATION

September 20, 2004

Memorandum for the Record

Subject: Local run-off influence into OD pits.

It has been historically noted that local sheet flow routinely enters the Open Detonation pits at the OB/OD Area on YPG. This evaluation will consider the 100-year storm event (4.2 inches of rainfall in 24 hour period, Premier 2004) and the area inside the proposed berms that could contribute run-off to the OD pits. The areas of influence were developed (and PE-stamped) by Guitierrez Canales Engineering, P.C., from topographic mapping data and the berm design. The Gutierrez Canales Engineering maps are included as Attachment 1. The area of influence for each pit as shown in the maps is provided in Table 1.

A rough estimate of the volume of each pit was calculated using surveyed elevation points along the pit rims and the toes of the side slopes inside the pits. The calculations for the pit volumes are included as Attachment 2.

Table 1

Pit	Area of Influence (ft^2)	Water Volume in 100-Year (4.2-inch) Storm (ft^3)	Volume Available in Pit (ft^3)
Pit 2, Northwest Cell	47,558	16,645	23,600
Pit 2, Southeast Cell	32,002	11,201	15,300
Pit 3, South Cell	22,171	7,760	14,300
Pit 3, North Cell	70,212	24,574	35,600

Conclusions:

Run-off from the 100-year storm over the local area of influence will not exceed the capacity of the existing pits after construction of the berms.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
37706
KEITH D.
DAVIS
Date Signed 9/20/04
ARIZONA, U.S.A.

Prepared by:

Keith D. Davis, P.E.
Jason Associates Corporation

Attachments:

1. Guitierrez Canales Engineering maps (2) showing areas of run-off influence
2. Rough Estimate of YPG Open Detonation (OD) Pit Volumes

545 Shoup Avenue, Suite 335B, Idaho Falls, ID 83402
Telephone: (208) 522-1662
Fax: (208) 522-2076

NOTES:

1. THESE MAPS PREPARED USING DESIGN PACKAGE TITLED U.S. ARMY PROVING GROUND 100 YEAR FLOOD PLAIN PROTECTION DESIGN OB/OD SITE, SEALED 12/11/2002.
2. NO SURFACE WATERS EXIST ON THIS HAZARDOUS WASTE MANAGEMENT SITE
3. SURROUNDING LAND USES ARE GOVERNMENT/ MILITARY
4. THERE ARE NO INJECTION OR WITHDRAWAL WELLS ON THE SITE
5. THERE ARE NO FENCES OR ACCESS GATES WITHIN 1000' OF THE ACTIVE HAZARDOUS WASTE MANAGEMENT AREA.
6. CONTOUR LINES ARE SHOWN AT 1' INTERVALS.
7. HORIZONTAL DATUM:
COORDINATES ARE IN UTM SYSTEM CONVERTED FROM METRIC TO FEET AS PROVIDED BY PREMIERE ENGINEERING ON LETTER DATED 2/20/02

VERTICAL DATUM:
ELEVATIONS ARE IN NAVD29. BACKGROUND CONTOURS FROM COOPER AERIAL SURVEY PROJECT NUMBER 6097-020502.

LEGEND:

- EXISTING CONTOUR
- EXISTING INDEX CONTOUR
- NEW STORMWATER PROTECTION BERM (BY OTHERS)
- CONCRETE PADS
- EXISTING DIRT ROAD
- EQUIPMENT STORAGE AREA
- BURN ON GROUND AREA
- LOADING/UNLOADING AREA

N

30' 0 30' 60' 90'

PREPARED BY

Gutierrez Canales Engineering P.C.
2722 E. TOPEKA PLACE
YUMA, ARIZONA 85365

GCE PROJECT NO. 04GC006

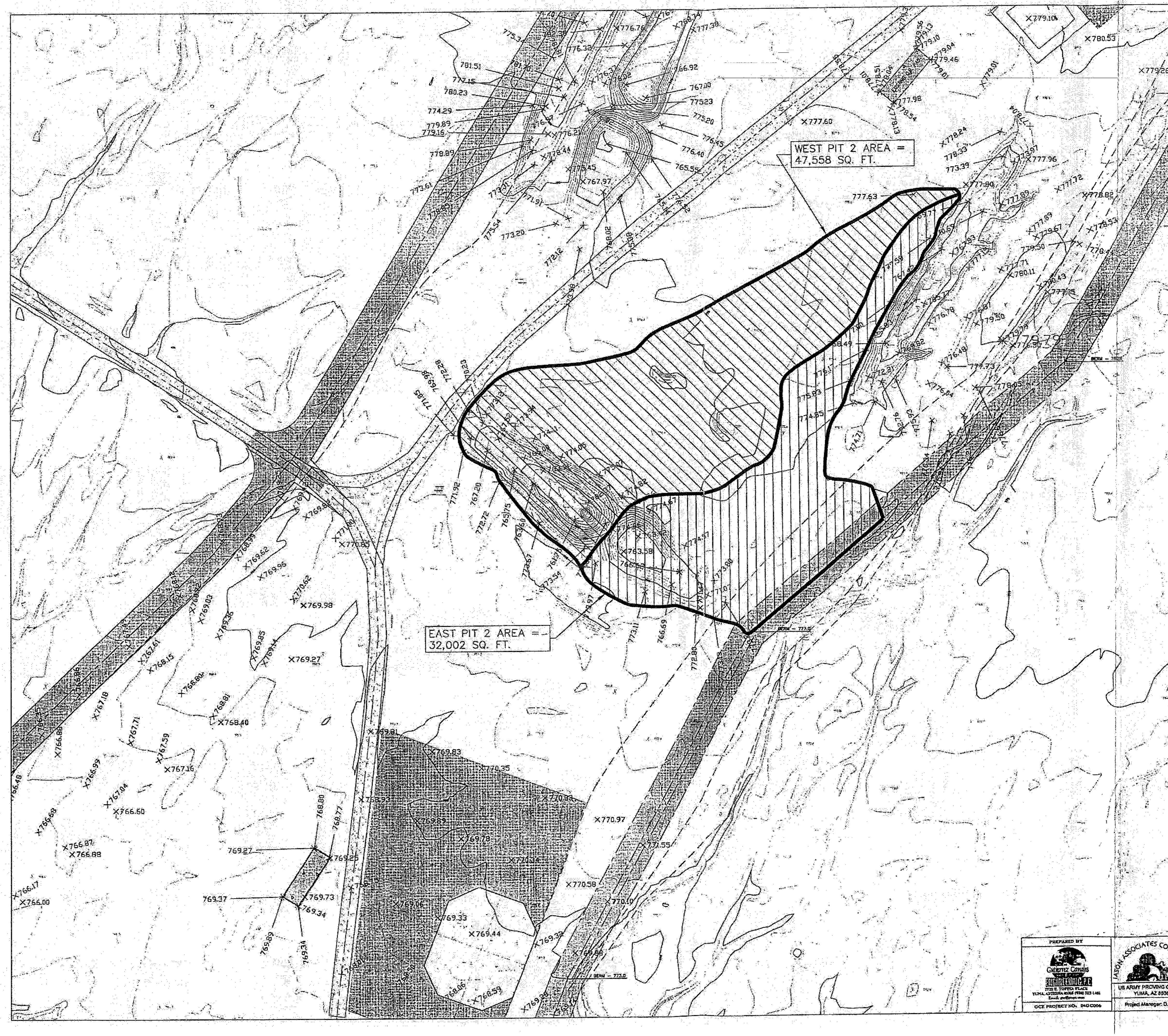
JASON ASSOCIATES CORPORATION
US ARMY PROVING GROUND
YUMA, AZ 85365
Project Manager: D. Clark

YUMA PROVING GROUND OB/OD SITE

OB/OD RCRA PART B
PIT 3 DETAIL MAP

SIZE	DWG NO	Project Number	REV
		02-034-CR	0

SCALE	1"= 30'	June 2004	SHEET	1 OF 1



NOTES:

1. THESE MAPS PREPARED USING DESIGN PACKAGE TITLED U.S. ARMY PROVING GROUND 100 YEAR FLOOD PLAIN PROTECTION DESIGN OB/OD SITE, SEALED 12/11/2002.
2. CONTOUR LINES ARE SHOWN AT 1' INTERVALS.
3. HORIZONTAL DATUM:
   COORDINATES ARE IN UTM SYSTEM CONVERTED FROM METRIC TO FEET AS PROVIDED BY PREMIERE ENGINEERING ON LETTER DATED 2/20/02.

   VERTICAL DATUM:
   ELEVATIONS ARE IN NAVD29. BACKGROUND CONTOURS FROM COOPER AERIAL SURVEY PROJECT NUMBER 6097-020602.

LEGEND:

- EXISTING CONTOUR
- EXISTING INDEX CONTOUR
- NEW STORMWATER PROTECTION BERM (BY OTHERS)
- CONCRETE PADS
- EXISTING DIRT ROAD
- DRAINAGE INFLUENCE AREA
- LOADING/UNLOADING AREA

30' 0 30' 60' 90'

PREPARED BY
Gutierrez Canales Engineering P.C.
2722 E. TOPEKA PLACE
YUMA, ARIZONA 85365
OCE PROJECT NO. 04OC006

JASON ASSOCIATES CORPORATION
US ARMY PROVING GROUND
YUMA, AZ 85365
Project Manager: D. Clark

YUMA PROVING GROUND OB/OD SITE

OB/OD RCRA PART B
PIT 2 LOCAL DRAINAGE INFLUENCE MAP

SIZE	DWG NO	Project Number	REV
	003	02-034-CR	0
SCALE	1"= 30'	June 2004	SHEET 1 OF 1

ATTACHMENT 2G

REVISED STORM WATER CALCULATIONS

Yuma Proving Grounds
Open Burn/Open Demolition Site
On-Site Drainage Report

(Supplemental Report of the 100-Year Flood Plain/Flood Protection Analysis Open Burn/Open Demolition Site, dated August 2004)

June 2014

ENGINEER:
James Davey and Associates
Consulting Engineers
1025 W. 24th Street, Suite #2
Yuma, AZ 85364
(928) 782-7926

Registered Professional Engineer (Civil)
CERTIFICATE NO.
20902
JAMES V.
DAVEY
Date Signed 6/14/2014
ARIZONA, U.S.A.

Expires 9-30-14

Yuma Proving Grounds
Open Burn/Open Demolition Site
On-Site Drainage Report

Introduction

This drainage report details the 100-year frequency storm event for the Open Burn/Open Demolition (OBOD) Site on the US Army Yuma Proving Grounds and is considered a supplemental report to the 100-Year Flood Plain/Flood Protection Analysis of the Open Burn Open Demolition Site report prepared in August 2004 by James Davey and Associates, Inc.

The evaluation of the storm drain runoff, as it applies to this project, included the following:

- Review of existing onsite runoff patterns;
- Calculation of existing onsite drainage flows;
- Quantifying the runoff volumes for the OBOD pits and concrete pad/retention basins;

These tasks, along with their results are discussed as following.

Existing Conditions

The US Army has done improvements in the OBOD site which were recommended in the August 2004 OBOD report and which are noted on this report as existing conditions.

A flood protection berm was constructed around the OBOD site preventing offsite storm water runoff from entering the site. Based on the OBOD Site/Grading Plan As-Built plans prepared by Gutierrez Canales Engineering P.C. in June 2014, the berm is approximately 2,800 feet in length around the East, West and North sides of the OBOD site. This berm has an 8-foot top width, 3:1 side slopes, and is approximately 2.66 feet above existing grade. Where the berm crosses a road, 10% slopes were constructed along the berm for vehicular traffic access to the OBOD site. Onsite improvements on the OBOD site included the construction of two retention basins downstream of the elevated open burn concrete pads, and 12-inch high native earth berms around the two OBOD pits onsite. There is an existing south concrete pad without a retention basin, however this pad is noted as to be abandoned once the new concrete pads are in use.

Hydraulic Analysis

A hydraulic analysis of the OBOD site drainage study included the following components:

- Delineation of drainage basin boundaries;
- Characterizing the drainage properties of each drainage basin;
- Quantifying the 100-year frequency stormwater runoff peak;
- Quantifying the runoff volumes for the OBOD pits and concrete pad/retention basins

The Rational Method (Q=CIA) was used for this report as the onsite drainage areas are small, have short times of concentration and uniform drainage characteristic.

PEAK DISCHARGE

Q=CIA

Where:

Q = Flow in cfs (to be calculated)

C = Rational method runoff coefficient

I = Rainfall intensity

A = Area in acres

The OBOD onsite drainage basins were delineated and flow patterns determined based on 1-foot contour mapping provided by Gutierrez Canales Engineering P.C. The flow path for each basin was determined as the longest path that storm water will travel through the delineated drainage basin. See Figure 1.0 for OBOD Drainage Basins Delineation and Flow Patterns.

For runoff coefficients, an average value of 0.30 was used, based on the Drainage Report by Premier Engineering Corporation.

Times of concentration were computed based on the delineation of the flowpaths (sheet and shallow concentrated) flow velocities. See Table 1.0 for Times of Concentration.

Table 1.0 Times of Concentration

Basin ID	Flow Type	Travel Length (ft)	Delta Elev. (ft)	Flowpath Slope (ft/ft)	Surface Description	Average Velocity (ft/s)	Time of Concentration (Min)
A1	1	300	7	0.023	native desert terrain	2.00	14
	2	617	6	0.010			
A2	1	300	7	0.023	native desert terrain	2.00	15
	2	627	6	0.010			
A3	1	300	7	0.023	native desert terrain	2.00	14
	2	560	3	0.005			
A2 +A4	1	300	2	0.023	native desert terrain	2.00	35
	2	1474	7	0.010			
A1+A5	1	300	5	0.017	native desert terrain	2.00	30
	2	1233	7	0.006			

Rainfall intensities were obtained from the Intensity-Duration-Frequency (IDF) curves found in the Drainage Report by Premier Engineering Corporation. For times of concentration less than 10 minutes, the 10-minute intensity was used.

Peak storm water runoff flows were calculated and shown for each delineated basin area. For the OBOD pits and concrete pad/retention basins, the peak storm water runoff volumes were calculated as well as the required stormwater retention volumes. See Table 2.0 for Peak Stormwater Runoff and Volumes.

Table 2.0 Peak Storm Water Runoff and Volumes

Basin ID	Area (Acres)	"C"	I (inches/hour)	Q (cfs)	Vol. Required (cf)	RB Vol. (cf)
A1	1.45	0.30	6.07	2.63		
A2	3.63	0.30	6.07	6.61		
A3	2.36	0.30	6.07	4.30		
A4	5.10	0.30	5.00	7.65		
A1+A2+A4	10.17	0.30	4.12	12.57		
A5	4.70	0.30	6.07	8.56		
A1+A5	7.06	0.30	4.00	8.47		
Pit 3	0.47				3,827	60,000
Pit 2	0.38				3,088	50,000
RB 1	0.32				2,582	4,000
RB 2	0.32				2,579	4,000

From Figure 1.0, it appears that stormwater runoff from Drainage Areas A1 thru A5 flows around the earth berms around the OBOD pits and retentions basins and drains offsite to the south. The calculated depth of flow for drainage flows around the OBOD pits and retentions basins to be inundated is shown in Table 3.0.

For Drainage Areas A1 thru A5, a 20-foot wide shallow drainage channel upstream of each pit/retention basin was assumed. A flow velocity of 2 feet per second was also assumed for all these drainage areas.

Table 3.0 Earth Berm Height

Basin ID	Drainage Channel (ft)	Flow Velocity (fps)	Q (cfs)	Depth of Flow (in)	Earth Berm Constructed (in)
A1	20	2	2.63	0 .8	12
A2	20	2	6.61	2.0	12
A3	20	2	4.30	1.3	12
A1+A2+A4	20	2	12.57	3.8	12
A3+A5	20	2	8.47	2.5	12

Conclusions

Overall, the berms constructed per the 100-Year Flood Plain/Flood Protection Analysis of the Open Burn Open Demolition Site report prepared on August 2004 by James Davey and Associates, Inc., prevent the OBOD pits and concrete pad/retention basins from being inundated by the offsite floodwaters. In addition, the 12-inch earth berms constructed around the OBOD pits and retention basins prevent these drainage areas from being inundated from from onsite storm water from Drainage Areas A1 thru A5.

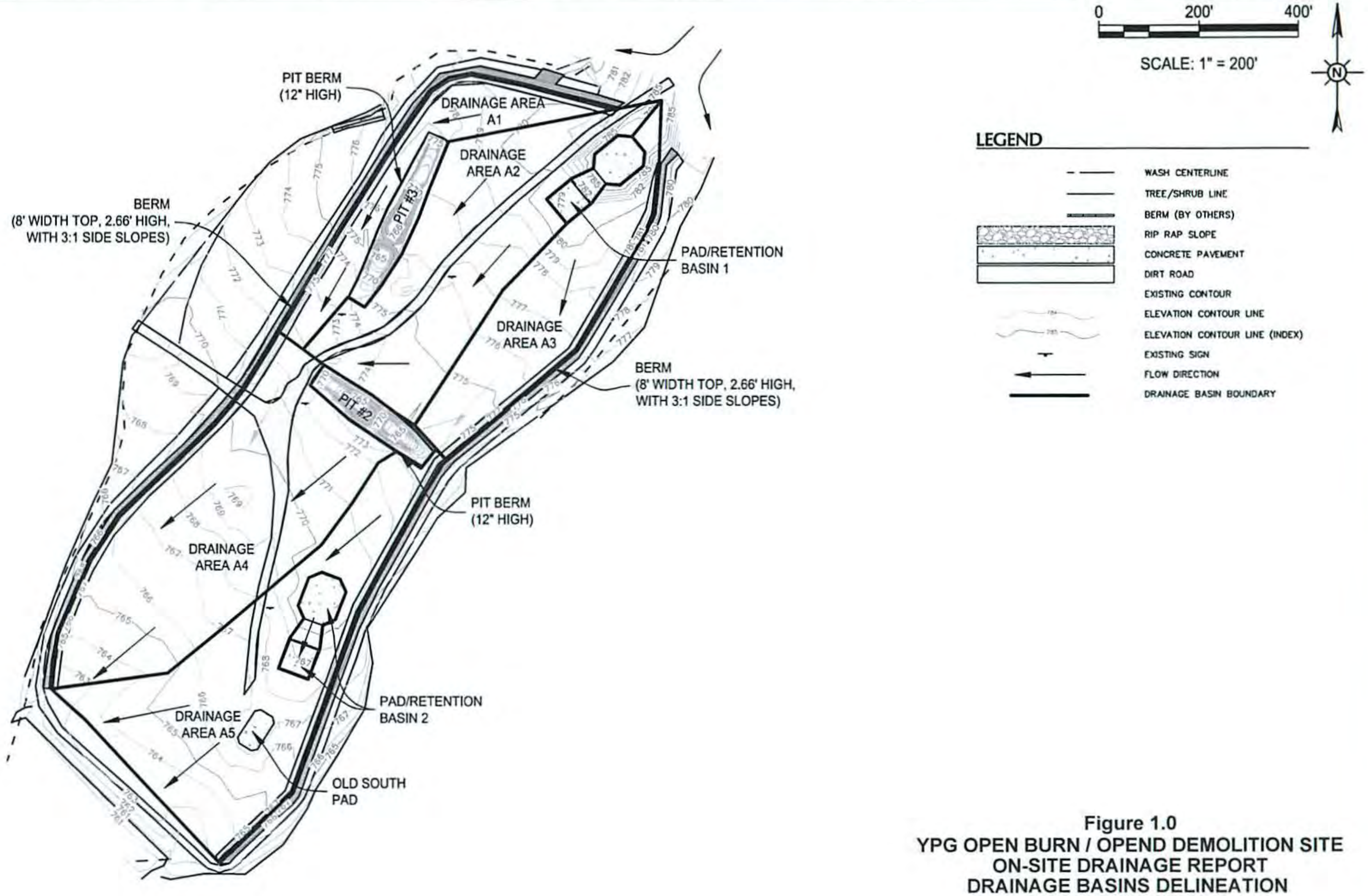


Figure 1.0
YPG OPEN BURN / OPEND DEMOLITION SITE
ON-SITE DRAINAGE REPORT
DRAINAGE BASINS DELINEATION
AND FLOW PATTERS

jda

ATTACHMENT 2H

MODIFIED EXPLOSIVE ORDNANCE TRANSPORTATION PROCEDURES

SAFETY

The USAGYPG has modified their Ammunition Recovery transportation procedures to ensure that the new berm at Kofa Munitions Treatment Facility will not pose any risk of accidental explosion. The modification includes a 5 mph speed limit sign placed at the berm entrance to ensure the driver controls vehicle speed and notification to all personnel involved in the operations of the facility.

Name REX A. ARMSTRONG

Title ACTING CHIEF, Y.T.C. AMMUNITION MANAGEMENT DIV.

5 MPH Speed Limit Sign at
Kofa Munitions Treatment Facility

ATTACHMENT 2I

ASSESSMENT OF OB/OD MTF AGAINST SUBPART X ENVIRONMENTAL PERFORMANCE STANDARDS

ARIZONA HAZARDOUS WASTE MANAGEMENT PERMIT

EPA I.D. NO. AZ5213820991

U.S. ARMY GARRISON YUMA PROVING GROUND

PERMIT ATTACHMENT 3

WASTE ANALYSIS PLAN

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WASTE ANALYSIS PLAN

This section is the Waste Analysis Plan (WAP) for the U.S. Army Garrison Yuma Proving Ground (USAGYPG) Open Burn/Open Detonation Munitions Treatment Facility (OB/OD MTF). It describes how to conduct a waste analysis both on the primary waste to be received and treated at the OB/OD MTF, and on the secondary waste generated from OB/OD MTF operations. It also describes the chemical and physical characteristics of the explosives and propellant items that will be treated in the OB/OD MTF, and describes waste characterization and disposition requirements for post-treatment waste. The information presented is based on process knowledge, military specifications, and/or chemical and physical analyses.

3.1 WASTE CHARACTERIZATION

3.1.1 Characterization of Primary Waste Stream

As part of its military mission, the U.S. Army Garrison Yuma Proving Ground (USAGYPG) may be required to thermally treat any munition in the U.S. inventory that is located at the USAGYPG, plus foreign and civilian munitions brought to the USAGYPG for testing or training and later declared a hazardous waste. The USAGYPG will not accept waste materials from off-site for OB/OD treatment. The Army considers Propellant, Explosive and Pyrotechnic (PEP) materials and munitions to be wastes when the munitions meet the definition of solid waste per 40 CFR 266.202. An unused military munition is a solid waste when any of the following occurs:

1. The munition is abandoned by being disposed of, burned, detonated, incinerated, or treated prior to disposal; or

2. The munition is removed from storage in a military magazine or other storage area for the purpose of being disposed of, burned, or incinerated, or treated prior to disposal, or

3. The munition is deteriorated or damaged (e.g., the integrity of the munition is compromised by cracks, leaks, or other damage) to the point that it cannot be put into serviceable condition, and cannot reasonably be recycled or used for other purposes; or

4. The munition has been declared a solid waste by an authorized military official.

A used or fired military munition is a solid waste:

1. When transported off range or from the site of use, where the site of use is not a range, for the purposes of storage, reclamation, treatment, disposal, or treatment prior to disposal; or

2. If recovered, collected, and then disposed of by burial, or landfilling either on or off a range.

PEP wastes must be characterized prior to transfer to the OB/OD MTF using DoD protocols and applicable forms (e.g., DA Form 4508 – Ammunition Transfer Record, YT Form 2407 – Ammunition For Demilarization, DD 1348-1 – Single Line Item Release/Receipt Document, or YT Form 24 – Bulk Propellant Burn Control Register). Blank examples of these forms are provided in Permit Attachment 3B. Forms other than the four above may be used as long as they contain the same required information. Equivalent electronic only forms and database tools may also be used.

Required forms will be completed through various offices. As described in Permit Attachment 15, all completed forms (paper or electronic) will be stored in the Operating Record. For safety reasons, waste characterization data for PEP wastes is obtained using acceptable knowledge (AK) information. The type of AK information that can be used to characterize waste munitions may be obtained from many sources including (i) historical data or user knowledge; (ii) Munitions specifications; (iii) U.S. Army Technical Manual (TM), 43 Series & 60 Series; (iv) Army Ammunition Data Sheets; and (v) Munitions Items Disposition Action System (MIDAS) database.

The USAGYPG is also required to verify compatibility of the waste stream with other wastes, materials of construction, and personnel protective equipment as described in Permit Attachment 3 Section 3.2.6.

The USAGYPG is required to specify with detail the chemical properties of the waste streams treated at the OB/OD MTF. The process used to develop the chemical description of the waste streams is described in Permit Attachment 4 and is presented in Permit Attachment 4 Table 4A-2. Permit Attachment 3A Table 3A-1 is derived from the munition characterization information developed in Attachment 4, and includes all known regulated constituents of potential concern (COPC), and excludes all compounds of interest without applicable analytical methods and compounds not of interest. Also shown in Permit Attachment 3A Table 3A-1 are the various action levels associated with the PEP materials and munitions that will be used to determine waste disposition actions.

Permit Attachment 4 Attachment 4A, Table 4A-2 contains a master list of compounds developed through a review of the 2003-2004 MIDAS sheets from munitions treated at the USAGYPG and cross-referenced with treatment data from the period 2014-2015. The USAGYPG will allow the OB/OD treatment of such munitions if the user will certify that all of the munition constituents appear on the master list. If definitive information is not known or cannot be discovered about a particular munition, or an item is truly an unknown munition, it will not be treated at the OB/OD MTF unless the treatment is considered an emergency treatment. Any emergency treatment will be conducted in accordance with the facility's Resource Conservation and Recovery Act (RCRA) Contingency Plan (Permit Attachment 10), or in accordance with an emergency permit (see Title 40 of the Code of Federal regulations (CFR) 270.61).

3.1.2 Characterization of Secondary Waste Streams

Other waste addressed by this plan consists of secondary waste streams. That is, waste streams generated as a result of the primary OB/OD treatment actions. This includes the ash and scrap metal produced directly from the treatment of PEP. The solid waste also includes, but is not limited to, soils, equipment, structures, personnel protective equipment (PPE), decontamination residuals, and accumulated precipitation that might be generated within the OB/OD MTF under normal conditions. These materials may be generated as a result of OB/OD operations, periodic maintenance, monitoring actions, contact of HW with media, and/or closure activities. The type of secondary waste streams that may be generated as a result of OB/OD actions is very broad and speculative in nature at this time; however, any solid waste generated as a result of, or in support of, OB/OD will be subject to the criteria outlined within this WAP.

All secondary waste generated at the OB/OD area must go through an evaluation by the Ordnance Response Technician (ORT) prior to leaving the area. The overall characterization process for the USAGYPG OB/OD secondary waste streams are described in subsequent paragraphs.

Secondary wastes undergo a hazardous waste determination (HWD) prior to or upon generation by trained the USAGYPG personnel. The HWD for certain secondary waste streams (see Permit Attachment 3 Section 3.2.2.2) initially involve AK evaluation. If AK is not sufficient to complete the HWD, including where applicable land disposal restrictions (LDRs) apply, the waste is then subjected to testing. Other secondary waste streams (see Permit Attachment 3 Section 3.2.2.2) will be subject to visual inspection or sampling and analyses.

If a waste has not undergone a HWD or if known or suspected changes to a previously generated waste stream have occurred, waste generators are responsible for providing the initial notification to the USAGYPG characterization personnel that a waste has been generated. Generators of waste are responsible for providing basic information pertaining to the waste stream composition and how the waste was generated to the USAGYPG characterization personnel. After the information about a waste stream has been received, the USAGYPG characterization personnel review prior HWDs within the facility's operating record to evaluate if a new HWD is required. If applicable, a new HWD is completed and placed into the facility's operating record.

Secondary waste streams that have previously been characterized and are of the same composition will be managed in accordance with past characterization determinations (e.g., PPE routinely generated). Note: Secondary wastes that are routinely generated may be managed by generators of the waste if a HWD has already been completed on the waste stream and there is no need to involve the USAGYPG characterization personnel. As previously noted, where known or suspected changes in a waste stream composition has occurred or is suspected, a new HWD is required as outlined above.

3.2 GENERAL WASTE ANALYSIS PLAN REQUIREMENTS

This WAP establishes processes for characterization and management of wastes generated by OB/OD treatment activities. The WAP will be kept with the OB/OD MTF operating record. Modifications to the WAP must be approved by the Arizona Department of Environmental Quality (ADEQ) as permit modifications. Examples of such modifications are:

1. Changes made to test methods that affect the overall quality of the analyses, as described in the Federal Register.

2. Waste streams or routine process operations are changed or modified, thus requiring a change in the parameters to be tested.

3. Regulations affecting the WAP are changed.

4. The permit is modified or reissued.

When the WAP needs to be revised, a request for permit modification with signatory certification is required to be submitted to the ADEQ pursuant to 40 CFR 270.11 and 40 CFR 270.42. Certain Class 1 modification requests can be submitted to ADEQ within seven days after the change takes effect, and do not require ADEQ approval.

3.2.1 Waste Analysis Plan Objectives

The primary purpose of obtaining waste information through sampling and analysis or other means is to ensure that wastes are properly characterized in compliance with the Arizona Hazardous Waste Management Act (AzHWMA) requirements for general waste analysis [Arizona Administrative Code (A.A.C.) R18-8-264.A which adopts 40 CFR 264.13]. A secondary objective is to meet the requirements in A.A.C. R18-8-268 (40 CFR 268.9) concerning special requirements for characteristic wastes. The objectives of the WAP are to:

1. Ensure safe handling, treatment, and disposition of all primary and secondary wastes.

2. Establish uniform primary and secondary waste characterization procedures.

3. Ensure treatment residues and process related wastes are properly characterized for final disposition off the site.

3.2.2 Parameters and Rationale

3.2.2.1 Wastes Undergoing OB/OD Treatment

The composition of military munitions is well known. Munitions destined for treatment will be characterized using AK and will have hazardous constituents verified with the list of COPCs found in Permit Attachment 4 Table 4A-2 prior to conducting OB/OD treatment activities.

Army documents and other generator knowledge documentation, such as available MIDAS information, will be maintained in the operating record for each waste treated. All wastes to be treated at the OB/OD MTF will be assigned, at a minimum, the EPA hazardous waste number for reactivity (D003) based on generator knowledge [40 CFR 261.10(a)(2)(ii)] and the requirements for reactivity [40 CFR 261.23(a)(6-8)]. All wastes will be handled, at a minimum, as reactive hazardous wastes. Other EPA hazardous waste numbers, such as D001 (oxidizer ignitability), D008 (TCLP lead), and D030 (2,4-DNT), may also apply. TCLP codes may apply to whole munitions, and the waste munitions do not need to be crushed and characterized to make this determination; rather generator knowledge can be used (see EPA HW Permits Compendium Document No. 9442.1991(16)). This approach minimizes handling of the material and reduces the possibility of unanticipated explosion or detonation of the wastes.

All potentially applicable EPA waste codes allowed to be treated at the facility and additional waste restrictions are contained in 'Permitted and Prohibited Hazardous Wastes' in Permit Part III.B (HW Open Burn Treatment Units) and Permit Part IV.B (HW Open Detonation Treatment Units).

Ejected PEP is not expected from a properly conducted open detonation. Ejected PEP is more likely from an open burning process. In either case the crew will search the area for ejected PEP after it is safe to do so, as directed by the ORT. The ejected PEP will be collected and treated again (as applicable), in accordance with the RCRA Contingency Plan (Permit Attachment 10). The ORT is trained to locate ejected PEP and treat it. This plan contains procedures for dealing with both incidental releases and releases that are deemed a threat to human health and the environment. Alternatively, any emergency treatment may be conducted pursuant to an emergency permit.

3.2.2.2 Secondary Wastes

Secondary wastes found on-site can exhibit the same EPA hazardous waste codes as allowed for the primary wastes as given above or additional waste codes. However, no secondary wastes that contain D001 or D003 waste codes may leave the site; rather, these secondary wastes will be re-treated on-site.

These secondary wastes include, but are not limited to (i) ash from OB activities involving PEP; (ii) storm water accumulated in burn pans, retention basins, OB pad or basin sumps, and/or in the OD pits (this rainwater may contain treatment residuals and is tested to determine if it is hazardous or non-hazardous waste); (iii) disposable or spent PPE; (iv) equipment and structures that have to be replaced or generated at the time of facility closure; (v) soils for proper management during actions such as equipment structure repair, contingency plan implementation, or facility closure; (vi) debris from OD actions; (vii) maintenance waste; and (ix) sampling waste.

The overall characterization approach for secondary wastes associated with OB/OD treatment activities is outlined in Permit Attachment 3 Section 3.1.2. As explained in that section, certain secondary wastes may be subject to AK determinations only, whereas other secondary wastes require visual inspection and/or sampling and analyses. Use of an AK determination as a HWD alone is acceptable only for secondary waste streams that have previously been characterized (a HWD has already been completed) and the newly generated waste streams are of the same composition. Such situations include, but are not limited to:

1. Precipitation accumulated after an earlier precipitation event that was sampled and analyzed, and no OB event occurred in the interval between the two precipitation events would not require sampling and analysis.

2. Ash that was previously analyzed from a specific propellant and shown for all possible future cases not to be hazardous does not have can be sampled and analyzed again.

3. If the secondary waste stream is known not to contain a specific constituent or parameter (e.g., nitrates or pH) because that constituent or parameter was not in any waste munition or propellant destroyed in the OB or OD unit, then AK can be used in lieu of analysis for that constituent or parameter.

However, this does not include, nor is it limited to, the following situations:

1. Precipitation with sediment in basin would require sampling and analysis prior to management of the water.

2. Ash from a different propellant that could be hazardous based on past sampling and analysis does need to be sampled for all future ash generations of that propellant.

3. Debris (scrap metal) will require a visual inspection for explosive residue and other hazardous constituents. This is the detail required in a waste analysis plan. Using the term “acceptable knowledge” without detail is not acceptable.

Regardless of type of HWD performed (AK determination, visual inspection, or analysis), each shall address certain parameters for the secondary waste stream. Permit Attachment 3A Table 3A-2 lists analytical parameters selected for the secondary waste streams. These parameters were based on the general profile of wastes acceptable for treatment at the facility. These parameters take into account the hazardous waste characteristics (waste codes) and any underlying hazardous constituents of the explosives to be treated.

Waste streams that require testing will undergo parameter selection by trained personnel. Secondary waste streams undergo a HWD upon generation and include, where applicable, selection of test parameters to complete the characterization process. The application of AK is used to select appropriate test parameters and includes evaluation of parameters associated with COPCs found in Permit Attachment 3 Table 3A-1 and 40 CFR 262.11, and 40 CFR 268 requirements. Parameters associated with HWD, LDRs and COPCs are selected from Permit

Attachment 3 Table 3A-1. All HWD and supporting assessments/records will be documented and placed in the facility's operating record.

3.2.3 Test Methods

3.2.3.1 Waste Undergoing OB/OD Treatment

Waste PEP materials (the primary waste stream) taken to the OB/OD MTF for treatment will not undergo testing. Acceptance for treatment is based on process knowledge.

It should be noted that the container (drum or bag) the waste is transported in must be declared 'RCRA Empty' (40 CFR 261.7) prior to reuse, recycle or disposal. Such containers can include propellant cans, lead-lined propellant bags, and shipping boxes or wooden crates.

3.2.3.2 Secondary Wastes

Permit Attachment 3A Table 3A-3 lists the test methods that will be used for characterizing OB/OD MTF secondary wastes. These test methods quantify the parameters of interest specified in Table 3A-2.

The analytical methods specified for waste characterization of the secondary wastes are from Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846 (EPA 1986, as amended), Annual Book of ASTM Standards, or other EPA recognized methods.

RCRA waste characterization analyses and other compliance testing (as defined by A.R.S. §36-495.1) will be performed for those parameters at an Arizona Department Of Health Services (ADHS)-certified laboratory [Arizona Revised Statues (ARS) Title 36, Chapter 4.3, Article 1, Section 36-495] unless no ADHS-certified laboratory exists for that parameter analysis. In such case, an EPA approved laboratory may be used until a laboratory becomes ADHS-certified for that parameter. However, the Permittee shall request the laboratory apply for ADHS certification for that parameter in a timely manner, if the cost for licensing for that parameter (and the resulting increase in analytical cost) is not unreasonable compared to other ADHS-certified parameter methods.

All secondary waste will undergo a HWD and be assessed for LDRs as applicable. Management of secondary waste will be based on the results of the HWD and appropriate management options. All HWDs will be documented and placed in the facility's operating record.

3.2.3.2.1 OB Ash

Upon reaching the criteria for a required analysis in Permit Attachment 3 Section 3.2.5, solid treatment residues will be sampled and analyzed for parameters (see Permit Attachment 3A Table 3A-2 and Table 3A-3) as appropriate to characterize the treatment residues for final disposition off the site at an approved hazardous waste TSDF or as solid waste.

As explained in Permit Attachment 3 Section 3.2.2.2, OB ash treatment residues will undergo a HWD using AK or testing. Where AK is insufficient to characterize the ash (including applicable LDRs associated with the treated waste) testing will be employed. Where OB ash treatment residues do not fail for TCLP and are deemed no longer hazardous, the ash will, at a minimum, be subject to applicable LDRs associated with the treated munitions (e.g., LDRs apply at the point of generation and if no switch in treatability group occurs, the LDRs associated with the original waste will be carried through to treatment residues). Prior to disposal all LDR treatment standards will be met.

3.2.3.2.2 Accumulated Precipitation

Liquids resulting from storm water accumulation will undergo a HWD and, if hazardous, will be subject to LDRs. Those liquids that have less than 10% total organic carbon (TOC) and total suspended solids (TSS) are within the non-wastewater treatability group and, if non-hazardous, will be managed as a non-hazardous waste exempt from LDRs based on legitimate switching of LDR treatability groups (i.e., legitimate switching of treatability groups under the LDR program results in a new point of generation for purposes of LDR assessment). This storm water may remain in the containment/retention basin and allowed to evaporate if sufficient capacity is available prior to the next storm event.

Significant amounts of liquids resulting from storm water accumulation in the OD or OB containment basins (see Permit Attachment 3 Section 3.2.5) will be sampled in the containment basins (Permit Attachment 3 Section 3.2.4) if pans are needed for operation and if sufficient capacity is available, the storm water will remain within the containment basin pending analytical results. The accumulated precipitation is anticipated to be non-hazardous so no special precautions are required. The samples will be processed under normal analytical turn-around time and this sampling, analyses, evaluation, and removal time is sufficient to allow removal of the accumulated rainwater between storm events. The liquid will be analyzed for parameters shown in Permit Attachment 3A Table 3A-2 using the test methods specified in Permit Attachment 3A Table 3A-3.

Following receipt of analysis, if the accumulated water exceeds RCRA-defined levels, the water will be disposed of as hazardous waste (subject to LDR requirements) through the USAGYPG HAZMART to a permitted TSDF.

If the accumulated storm water is below RCRA levels, it will be considered for use in dust suppression or other activities in accordance with other applicable rules and regulations. For example, surface water quality standards, Arizona NPDES standards, groundwater protection standards, and other Clean Water Act standards may apply. If the results are determined to be below surface water quality standards (see A.A.C. R18-11-101 et seq.), the water will be pumped from the sump beneath the grate and discharged using a portable pump approximately 20 feet to the west of the pad. If the water is greater than these other regulatory requirements but not regulated under RCRA, it will either be allowed to evaporate if sufficient capacity is available prior to the next storm event or be pumped into 55-gallon drums or other bulk containers and disposed of according to standard protocols through the USAGYPG HAZMART facility.

All removals of accumulated water from the OB pans, pads, retention basins, or OD pits will be documented in a running log located in the operating record with sample results, volume removed, and disposition recorded.

3.2.3.2.3 Equipment, Structures, and Soils

Equipment, structures, and soils that require replacement/removal and are destined for disposal will be sampled and analyzed if AK is insufficient to characterize the waste (i.e., perform a HWD). As explained in Permit Attachment 3 Section 3.2.2.2, use of AK in lieu of sampling and analyses is acceptable only for secondary waste streams that have previously been characterized (a HWD has already been completed) and the waste streams are of the same composition.

Equipment, structures, and soils will be sampled and analyzed on an "as needed" basis. For example, if military handling equipment (MHE) needs maintenance and must leave the site, appropriate samples will be taken to ensure decontamination. As another example, refractory in the OB burn pans might undergo damage and would need to be replaced.

Because equipment, structures, and soils are not recurring wastes, they will normally be sampled under a sampling and analysis plan (SAP) prepared at the time the information is needed, which will be submitted to ADEQ for approval. In the case of simple actions, particularly for soils (see definition in Permit Attachment 3C (Simple Action Report)), sampling may be performed under this WAP and analyzed only for the constituents of concern. For example, if nitrocellulose is spilled on soil, only nitrocellulose needs to be sampled for, to verify cleanup.

Following receipt of analysis data, decisions will be made on the proper management of equipment and structures to be removed from the site or on soil that might be removed from the site or left in place. For simple actions, a "simple-action" report (Permit Attachment 3C) will be completed and placed in the operating record with a copy of the report sent to ADEQ.

3.2.3.2.4 Metal Scrap from OD Actions

Metal scrap from OD actions includes, but is not limited to, metal casings, propellant charge cans, and other recyclable materials that fall into the category of scrap metal (such as the OB pans). Even though this scrap metal exceeds 60 mm in size, this material does not meet the RCRA definition of debris because it is not intended to be land disposed. [A.A.C. R18-8-268 (40 CFR 268.2(c,g,h)), and -270.A (40 CFR 270.13(n), & 270.14(b)(2))]

Scrap from OD actions undergoes a characteristic HWD (e.g., D001, D003, D008, D030, etc.) and includes a visual examination for ignitability (D001) and reactivity (D003). The ORT is trained by USAGYPG to determine if there is any hazardous waste residue associated with the scrap. If AK is not sufficient to complete the HWD and the scrap cannot be reused, recycled, or otherwise subjected to materials recovery activities, testing will be conducted (in addition to the visual examination). All visual inspection will be conducted by qualified personnel and the results of the visual inspection and the AK will be documented and placed into the facility's operating record. See Permit Attachment 6A for scrap inspection and declaration.

Scrap metal destined for recycling will meet the applicable acceptance criteria associated with the receiving facility. The USAGYPG will identify and use a solid waste scrap metal recycler prepared to accept scrap with residue constituents at non-HW concentrations (40 CFR 261.2(e)). In the event the scrap metal still contains non-reactive HW (e.g., D008, etc.), then the scrap must be sent to a HW-permitted scrap metal recycler or facility (40 CFR 261.6(a)(3)(ii)). Sham metal recycling is not allowed.

3.2.3.2.5 Other Secondary Waste Streams

Other secondary waste streams include, but are not limited to, maintenance wastes, spent brooms and rags, and non-debris wastes. These secondary waste streams will undergo a HWD using AK. As explained in Section 3.2.2.2 (Parameters and Rationale – Secondary Wastes), use of AK in lieu of sampling and analyses is acceptable only for secondary waste streams that have previously been characterized (a HWD has already been completed) and the waste streams now generated are of the same composition as those previously characterized. If AK is not sufficient to complete the characterization process, testing will be conducted. Secondary waste found to be hazardous and destined for disposal will be managed as a hazardous waste and be subject to all applicable LDRs. Secondary waste that are not hazardous will be managed as non-hazardous waste and managed accordingly (e.g., recycled if applicable, disposed in a solid waste landfill).

3.2.4 Sampling Methods

This section addresses general and specific sampling methods for primary and secondary waste streams in order to gather a representative sample for analysis by one of the analytical methods required in Section 3.2.3 (Test Methods). Proper HWD based on these sampling methods is discussed in Permit Attachment 3 Section 3.2.5.

3.2.4.1 General Sampling Methods and Sample Requirements

The PEP materials accepted at the OB/OD MTF will not be subjected to sampling. AK will be used to characterize the primary waste streams prior to treatment. Secondary waste streams will undergo sampling and analysis as appropriate at the time of generation. Permit Attachment 3A Table 3A-4 lists the type of equipment and sampling methods, where appropriate, that will be used to obtain a representative sample of each secondary waste stream. Waste streams generated during closure activities will be sampled in accordance with the sampling and analysis protocols outlined within the applicable RCRA closure plan (Permit Attachment 14).

Methods used to obtain a representative sample from each secondary waste stream will be consistent with the sampling approaches and protocols described in Chapter Nine of Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846 (EPA 1986, as amended). For each secondary waste stream sampled, a sufficient number of representative samples will be collected at each sampling event to adequately characterize the waste stream.

In the case of ash and accumulated precipitation, one representative sample per waste stream at each sampling event will be collected. For example, if bottom sediment (ash residue or wind-blown dirt) exists with the accumulated precipitation, one sample will be collected from the sediment and one sample will be collected from the water.

For equipment, structures, or soils subject to simple-action activities, the number of samples shall be as specified in Permit Attachment 3C (Simple Action Report).

For equipment, structures, or soil that could be contaminated by HW or HW residues and are to be removed, and the removal is not considered a simple action as defined in Permit Attachment 3C (Simple Action Report), then a SAP shall be submitted as a permit modification to ADEQ for pre-approval.

The Quality Assurance Project Plan (QAPP) (Permit Attachment 13) describes the waste sampling and analysis quality assurance (QA) and quality control (QC) protocols that will be followed.

The appropriate sampling technique and container is selected based on Permit Attachment 3 Table 3A-3.

Minimum sample requirements for liquid samples and for solid samples are provided in Permit Attachment 3A Table 3A-5 and Table 3A-6, respectively. Sample container selection is critical to sample quality. Considering waste compatibility, durability, volume required for analysis, and analytical sensitivities, the containers listed in Permit Attachment 3 Table 3A-5 and Table 3A-6 are recommended for sampling efforts as applicable.

3.2.4.2 Basic Sampling Protocols

Basic sampling protocols to be followed are described below:

1. Obtain samples using the equipment and methods described in Permit Attachment 3 Table 3A-4. For RCRA analyses, sample containers will be supplied by the contract laboratory and will contain preservatives as appropriate for the analyte of interest. When appropriate, collect samples using a disposable sampler.

2. Label all sample containers.

3. Properly clean and decontaminate exterior of sample containers and the sampling hardware, if necessary. Properly dispose of waste.

4. Custody-seal sample containers, place containers in a leak-tight polyethylene bag, and place samples in a durable ice-filled cooler or comparable receptacle for transport to the laboratory.

5. The sample containers may be wrapped in blister wrap or other protective material prior to placement in the cooler or comparable receptacle, if necessary.

6. Complete the chain-of-custody and request-for-analysis forms. Retain a copy for the facility operating record.

7. Review all paperwork and enclose the forms in a leak-tight polyethylene bag taped to the underside of the cooler lid or other comparable receptacle. Seal the cooler or comparable receptacle and mark in accordance with U.S. Department of Transportation (DOT) requirements as applicable. Transport samples to an Arizona-certified analytical laboratory for analysis.

As applicable, all sample containers will be labeled with at least the following information:

1. A unique alphanumeric identifier.

2. Sample location.

3. Date and time of collection.

4. Sample collector's name.

5. Preservatives used.

6. Analyses requested.

After collection, filled sample containers will be placed on ice, if necessary, in durable coolers or comparable receptacles for transport to the laboratory. Blue ice can be used in conjunction with other methods (regular ice) to maintain samples at the appropriate temperature as long as it is not the sole cooling medium. If samples are to be shipped off the site for analysis, coolers or comparable receptacles will be closed tightly, sealed with tape, and custody-sealed. Samples will then be transported to offsite laboratories via courier. All sample collection, preparation, packaging, transportation, and analysis will conform to the requirements of SW-846.

The samples will be collected and transported to the laboratory for testing in accordance with A.A.C. R18-8-261.A (40 CFR 261.4(d)).

3.2.4.3 Sample Control

Sample control procedures are designed to ensure that each sample will be accounted for at all times. The primary objectives of the sample control procedures are as follows:

1. Each sample collected for analysis will be uniquely identified.

2. Important and necessary sample constituents will be preserved (for example, refrigerated or capped).

3. Samples will be protected from loss, damage, or tampering.

4. Any alteration of samples during collection or shipping (for example, preservation or breakage) will be documented.

5. A record of sample custody and integrity will be established that will be legally defensible.

Samples will be analyzed and results will be traceable to the applicable data records (for example, chain-of-custody, field records, request for analysis, or laboratory ledgers).

Sample collectors will maintain permanent records of sampling activities. The sample record typically will include the following: purpose of sampling, date and time of collection, sample number, sampling location, sampling methodology, container description, waste description, description of process originating the waste, number and volume of samples, field observations, field measurements, destination and transporter, and signature of collector. This data will be on locally produced forms and will be submitted for inclusion in the operating record.

A chain-of-custody record will accompany samples at all times. The USAGYPG personnel collecting samples will be responsible for initiating and following chain-of-custody procedures and initiating sample custody records in the field at the time samples are collected. A chain-of-custody record form will document sample collection activities, including the sampling site, sample identification, number of samples, and date and time of collection. The form will also document the chain-of-custody, including names of responsible individuals and dates and times of custody transfers.

Transportation of samples will be performed in accordance with DOT, EPA, and Army requirements. Hazardous waste samples will be properly packaged, marked, and labeled. Shipping papers will be prepared as required by DOT regulations, EPA requirements, and Army regulations and guidelines.

Equipment used to sample waste materials will be disposable or designed for easy decontamination. Contaminated disposable equipment will be managed pursuant to Permit Attachment 3 Section 3.2.8 (Management of Process Related Wastes). Cleanable (non-disposable) equipment will be thoroughly decontaminated pursuant to Permit Attachment 3 Section 3.2.4.4.3 (Sampling Equipment Decontamination), or managed as either a solid waste or a hazardous waste based on a HWD.

3.2.4.4 Specific Sampling Procedures

Specific sampling procedures are presented here for recurring secondary waste streams, including sampling of ash and accumulated precipitation. Sampling procedures may be implemented for collection of other samples (e.g., from soils or treatment equipment) and will be consistent with the collection, preparation, packaging, transportation, and analysis requirements of SW-846 (EPA 1986, as amended). The USAGYPG will coordinate with ADEQ as required regarding additional sampling procedures that are not consistent with SW-846.

3.2.4.4.1 Ash Sampling

Samples will be collected from drums of waste ash when any of the events listed in Section 3.2.5 (Frequency of Analyses) occur.

A drum of waste treatment residue/ash will contain material from multiple OB actions, each individually bagged from the operation as follows:

1. After each treatment action, ash residues are swept up and put into bags and placed in the active satellite accumulation drum located next to the safety bunker. The bag with ash residue must be placed in a transport container and properly labeled prior to transfer from the OB/OD MTF to the satellite accumulation drum. Once at the drum, the ash will be removed from the bag and transport container and placed into the 55-gallon drum. This action also applies if a vacuum is used, instead of a broom, to collect the ash.

2. Re-usable equipment that have not been emptied or decontaminated, such as vacuums, brooms and dust pans, must be managed in a manner that is protective of human health and the environment prior to being managed as a waste. Once the ash is removed from the small container, bag, or vacuum, the container, bag, or vacuum must be declared “RCRA empty” (40 CFR 261.7) (since these are considered containers or inner liners), or be managed as containing hazardous waste.

3. Additionally, the broom and dust pan must be decontaminated pursuant to Permit Attachment 3 Section 3.2.4.4.3, or managed as containing hazardous waste until disposal pursuant to Permit Attachment 3 Section 3.2.8.

4. It is assumed that the residue within any single bag is well mixed because of the manner in which it is collected.

When the drum is ready for sampling, a composite sample of the waste will be taken. The basic process is to weigh each bag of residue in the drum and remove a mass-based portion from each bag for the composite. It is estimated this can be done by removing 50 grams per kilogram of residue mass. In this manner, a 10-kilogram bag of residue would contribute 500 grams to the sample while a 2-kilogram bag would contribute only 100 grams to the sample. After proportionate amounts of each bag have been collected, the collection is mixed well and the composite sample is taken from this mixture. Using this sampling design, the analytical results are not unduly swayed by a single bag containing a small amount of residue. The suggested value of 50 grams of sample from each kilogram of residue is an estimate. The value is not important as long as whatever value selected is used uniformly for all the residue bags in the drum to obtain the amount of residue required for the sample. Any excess collected material is returned to the drum (not to individual residue bags).

The step-by-step process for ash sampling is as follows:

1. The following equipment is required for waste ash sampling:

   - Sample containers, coolers, and ice
   - Sample collection logs, chain-of-custody forms, sample numbers, labels, custody seals, leak-tight polyethylene bags
   - Chemical-compatible gloves
   - Safety glasses
   - Plastic sheeting
   - Work surface for sample preparation and documentation
   - Scale (weight)
   - Equipment decontamination station unless equipment is disposable
   - Waterproof ink pen
   - Container for mixing composite sample
   - Hand trowel or scoop

2. Cover work surface with plastic sheeting. Arrange sample containers, custody seals, chain-of-custody forms, leak-tight polyethylene bags, and sample collection logbook on work surface. Prepare decontamination area and/or disposal container. Ready sampling equipment, including weight scale. Spread plastic sheeting next to drum. Use safety glasses and gloves.

3. Open the drum.

4. Remove the bags from the drum and place on the plastic sheeting. Working with one bag at a time, weigh the bag and record the weight. Using the trowel or scoop, remove and weigh an amount of ash from the bag equal to 50 grams for each kilogram of the bag's weight. (For example, if the bag weighs 4.5 kilograms, extract $4.5 \times 50 = 225$ grams of ash from the bag). Place the extracted ash in the sample-mixing container. Return the bag to the drum after the sample has been removed. Repeat the process until all bags have been sampled.

   NOTE: Since the waste ash from multiple OB actions is expected to be compatible, it may be mixed with no chemical reactions expected. However, care should be taken.

   NOTE: The sample removal rate (i.e., 50 grams per kilogram in bag) can be varied based on the experience of the sample collection team as long as the same rate is applied to each bag in the drum. If insufficient sample is collected for the composite, then the process must be repeated by collecting additional sample material from each *bag. Accordingly, it is to sampling team's benefit to collect sufficient sample material the first time.*

5. Gently stir the contents of the composite sample to avoid release of the material. Stir until the contents are thoroughly mixed. Close and secure drum cover.

6. Use clean gloves prior to filling sample containers. Using the trowel or scoop, carefully remove a portion of the waste material from the mixing container. Place the material into the sample container, adding sufficient material to fill the container. Secure the lid to the sample container and apply the completed custody seal. Each sample will be given a unique sample identification number. Label the container, including date and time of sample collection. Place each sample container into a leak-tight polyethylene bag and close the bag securely. Place the sample on ice in a cooler. Complete the chain-of-custody information for the sample. Record the details of sample collection in the logbook.

7. Decontaminate any non-disposable equipment and collect rinsate sample(s) pursuant to Section 3.2.4.4.3 (Sampling Equipment Decontamination), or manage the equipment as containing hazardous waste.

8. Collect and containerize any disposable sampling equipment and other waste, and manage based on an applicable HWDs.

3.2.4.4.2 Accumulated Precipitation Sampling

Samples of precipitation accumulating in the burn pad sumps will be collected in the event there are sufficient quantities to remove and sample. If precipitation accumulates beyond a set nominal amount (see Section 3.2.5, "Frequency of Analyses"), a sample will be collected to facilitate proper management of the wastewater depending on the HWD (See Section 3.2.3.2.2).

Samples will be collected individually from each sump that has accumulated sufficient water using a long-handled dipper or similar device. An alternate means of collecting the sample might be necessary if there is any apparent phase separation in the water. Any solid or sediment residues that reach the burn pad sumps will be swept up and managed with the burn residues.

Previous accumulation of precipitation in the containment area has been homogeneous and a grab sample was adequate for characterization. If the water appears to be stratified, this sampling procedure will be modified (A permit modification will be submitted to ADEQ if stratified water is consistently present).

The step-by-step process for sampling accumulated storm water is as follows:

1. The following equipment is required for storm water sampling:

   - Sample containers, coolers, tape, and ice

- Sample collection logs, chain-of-custody forms, sample numbers, labels, custody seals, leak-tight polyethylene bags, pH strips
- Disposable dipper or comparable disposable surface water sampling device
- Chemical-compatible gloves
- Safety glasses
- Disposable toweling
- Plastic sheeting
- Work surface for sample preparation and documentation
- Equipment decontamination station, if reusable equipment is utilized
- Waterproof ink pen

2. Cover work surface with plastic sheeting. Arrange sample containers, custody seals, chain-of-custody forms, leak-tight polyethylene bags, and sample collection logbook on work surface. Prepare decontamination area and/or disposal container. Determine sample locations and document on map of containment. Use safety glasses and gloves.

3. Place a sheet of plastic on the ground next to the containment and place the sample containers on the plastic sheeting. Ready the sample containers and ensure that it/they will not tip or fall during filling.

4. Use clean new gloves before collecting sample. Gently and slowly lower the sample device into the water. Dip approximately half the depth and bring the dipper back to the sample container(s). Transfer the sample into the sample container(s) with as little loss as possible. Fill the container slowly to prevent a sudden overflow of the liquid. Continue this process until the sample container(s) is/are filled. If it is necessary to break off during the sample collection procedure, remove gloves and place them in the waste container. Don clean gloves prior to continuation of sample collection.

5. For the cyanide sample container, check sample pH according to method and adjust if necessary.

6. Close the sample container, decontaminate the container exterior if necessary (see Permit Attachment 3 Section 3.2.4.4.3), and take the sample to the work surface for documentation.

7. Place the disposable sampler and any other waste material used in the sampling procedure into the waste container and close the container and manage based on an applicable HWDs.

8. Apply the completed custody seal to the sample container. Each sample will be given a unique sample identification number as specified in Permit Attachment 3 Section 3.2.4.2. Label the container, including date and time of sample collection. Place each

sample container into a leak-tight polyethylene bag and close the bag securely. Place the sample on ice within a cooler. Complete the chain-of-custody information for the sample. Record the details of sample collection in the logbook.

9. Decontaminate any non-disposable equipment and collect rinsate sample(s) pursuant to Permit Attachment 3 Section 3.2.4.4.3, or manage the equipment based on an applicable HWDs.

3.2.4.4.3 Sampling Equipment Decontamination

Decontamination of non-disposable plastic, steel, or relatively impervious items (MHE, vacuum, broom, bags) that are to be reused at the OB/OD MTF, or decontamination of non-disposable sampling equipment, is required.

The step-by-step process for decontamination is as follows:

1. The following equipment is required decontamination:

   - Clean buckets, brushes, spray bottles, laboratory grade detergent
   - Potable water
   - Deionized water
   - Flat working surface
   - PPE

2. Using appropriately sized and shaped brushes, scrub each area of each item with a laboratory-grade detergent.

   NOTE: The stainless-steel spoons/scoops, stainless-steel bowls, and dipper are to be decontaminated after each sample collection or manage either as a solid waste or a hazardous waste based on an applicable HWD.

3. Thoroughly rinse each area of each item with potable water.

4. Thoroughly rinse each area of each item with deionized water.

5. Allow each item to air dry.

6. Collect the decon water for storage, characterization, and disposal.

7. Allow equipment to air dry prior to removing from site.

8. At a minimum, a rinsate sample will be taken to verify cleanable equipment is decontaminated. One rinsate sample taken for every ten (solid or liquid) samples obtained from the cleanable equipment.

9. At completion of the decontamination activities, the spent decontamination/rinsate solution will be containerized and labeled and managed as either a solid waste or a hazardous waste based on an applicable HWDs.

NOTE: For equipment that is to be removed from the OB/OD MTF (excluding sampling equipment), the stricter decontamination and sampling procedures in Permit Attachment 3 Section 3.2.4.4 will be followed.

3.2.5 Frequency of Analysis

As described in Permit Attachment 3 Section 3.2.2.2, HWDs may include either AK, visual inspection, or sampling and analysis. The frequency with which the initial analysis HWD of the waste will be reviewed or repeated to ensure it is accurate and up to date for both primary and secondary waste streams are generally described as follows:

1. When there is a known or suspected change in the waste stream that could affect the characteristics of a particular waste stream.

2. If AK is insufficient to characterize the waste.

3. When new regulations are promulgated which result in additional RCRA characterization requirements.

In addition, specific requirements for review of the waste streams are detailed in the following sections.

3.2.5.1 Primary Waste Munitions

A HWD will be performed on each waste munition received for treatment using AK. The AK relies on up-to-date military specifications and documents for the type of munition destroyed. If any of the general criteria above are met, the OB/OD treatment personnel shall ensure accurate up-to-date documents that meet those criteria have been provided prior to treatment of the waste munition.

3.2.5.2 Secondary Waste Ash

An initial HWD shall consider ash a HW upon generation. It remains a HW unless another HWD determines otherwise. At a minimum, an initial or other HWD is performed on the OB ash when any of the following events occur.

1. Ash is collected from the burn pad prior to placing the ash in the drum; or

   NOTE: If the new waste stream and the prior containerized waste stream(s) are potentially incompatible, the waste streams must be placed in separate drums which are separated from each other.

2. The waste drum is ready to be sent to the installation's HAZMART (HW generator accumulation area) when the drum is full (The drum is considered full when it is 75% full of waste), or the waste has accumulated in the drum for a year.

4. Drums of ash are sampled at one of the following locations: the safety bunker HW satellite accumulation area or at the USAGYPG HAZMART less-than-90-day HW accumulation area. At a minimum, samples will be collected from drums of waste ash when any of the general criteria above (Section 3.2.5 (Frequency of Analysis)) are met.

3.2.5.3 Secondary Waste Accumulated Storm Water

Storm water samples will be collected when sufficient water has accumulated in the pits, pads, sumps, and/or retention basins defined in Permit Attachment 6 (Operations – Types of Waste Management Activities) and Permit Attachment 11 (Inspections) as:

1. Any amount of liquid in the retention basin that will overflow for a predicted upcoming weather event. The water removal from these locations will be timed so that such overflow will not occur.

2. Any amount of liquid in the OD Pits that will overflow for a predicted upcoming weather event or be in such quantity as to infiltrate to groundwater. The water removal from these pits will be timed so that such overflow or infiltration will not occur.

3.2.5.4 OB Structure Secondary Waste Streams

OB structures will be sampled per Permit Attachment 3 Section 3.2.4 and analyzed per Permit Attachment 3 Section 3.2.3 on an "as needed" basis as follows:

1. Burn pans, grates, and other metal parts will be visually inspected according to Permit Attachment 3 Section 3.2.5.6.

2. All other structural waste streams (e.g., refractory, pad concrete, liners, PVC pipe) require sampling since each waste is uniquely generated (a prior HWD would not be applicable).

3.2.5.5 Soil Secondary Waste Streams

Whenever soil at the OB/OD MTF is excavated (except for soil in the OD pit, soil ejected from the pits, and clean soil brought in and stockpiled to cover munitions to be detonated, fill craters, or level the pit interior), including, but not limited to, soil that is to be disposed, it is subject to a HWD. The HWD shall either include AK or sampling at a frequency as follows:

1. OD Soils - All soil within 10 lateral feet of an OD pit perimeter and less than 20 feet

below the bottom of the pit base shall undergo sampling. All soil greater than 10 lateral feet but less than 120 lateral feet of an OD pit perimeter, and from 0 to 3 feet bgs shall undergo sampling. All soil within these lateral limits but deeper than the above depths shall be sampled dependent on the analytical results of the soils above it. All soil within these lateral limits that are not sampled and all soil outside these lateral limits out to the protective area fence line shall, at a minimum, undergo visual inspection for stains, discoloration, foreign objects, and other suspect contamination.

2. OB Soils - All soil within 120 lateral feet of an OB pan perimeter, and from 0 to 3 feet bgs shall undergo sampling. All soil within these lateral limits but deeper than the above depths shall be sampled dependent on the analytical results of the soils above it. All soil within these lateral limits that are not sampled and all soil outside these lateral limits out to the protective area fence line shall, at a minimum, undergo visual inspection for stains, discolorization, foreign objects, and other suspect contamination.

3.2.5.6 Scrap Metal Secondary Waste Streams

Whenever scrap metal from the OB/OD area has been generated, all scrap metal wastes that are to be recycled are to be 100% visually inspected to be free of explosives. In addition, all scrap metal is to undergo a HWD for other hazardous wastes, HW constituents, and HW decomposition products.

3.2.5.7 Other Secondary Waste Streams

Other secondary waste streams include wastes related to:

1. The OB/OD processes (see Permit Attachment 3 Section 3.2.8). Such waste include but are not limited to, general refuse, disposable sampling equipment, disposable PPE, and spent decontamination water; and

2. Maintenance activities on the OB/OD units and nearby areas (see Permit Attachment 3 Section 3.2.9). Such wastes include but are not limited to, replaced burn pans and other metal parts, refractory, concrete, liners, and non-metallic parts.

Each of these wastes requires an initial HWD upon generation and final HWD prior to transport off the USAGYPG property. The sampling frequency for these wastes is as follows:

1. General refuse which has not contacted hazardous waste does not need to be sampled.

2. Structural related waste will be sampled according to Permit Attachment 3 Section 3.2.5.4.

3. Metal parts will be visually inspected according to Permit Attachment 3 Section 3.2.5.6.

4. All other waste streams (e.g., spent decontamination solution, disposable equipment, contaminated general refuse) require sampling each time since each waste is uniquely generated (a prior HWD would not be applicable).

3.2.5.8 Secondary Waste Contaminating Dedicated Equipment

Any equipment or structures that are deemed dedicated items (e.g., OB pad ash vacuum, brooms, MHE, OB pan refractory, fire brick, etc.) and undergo frequent reuse requires decontamination immediately after every use because the item could contain hazardous waste which is subject to RCRA regulation. However, the following are acceptable alternatives to decontamination:

1. Decontamination can occur once every 90 days if the item is managed in a container subject to 40 CFR 262.34(a) regulations until usage. When the item is required to be used it is taken out of the container and double bagged and transported to the area of work in order to perform its required function.

2. Decontamination can occur once a year if the item is managed in a container subject to 40 CFR 262.34(c) regulations until usage. When the item is required to be used it is taken out of the container and double bagged and transported to the area of work in order to perform its required function.

3. The entire MHE (including tires) potentially in contact with the hazardous waste must be swept off or vacuumed prior to moving it to the on-site parking area. This action must be done at the top of the OD pit ramp or on the OB pad. The location of the on-site MHE parking area must be documented by GPS and appropriately staked or marked to ensure continued parking at this location and for sampling the area at closure.

4. No dedicated equipment may be taken off-site without first being decontaminated and sampled to verify cleanliness.

3.2.6 Additional Requirements for Ignitable, Reactive, or Incompatible Wastes

As stated above, the waste characterization information on the explosives and propellant items that will be treated in the OB/OD MTF is well documented. However, compatibility and reactivity problems arise when compounds are mixed changing their overall properties, such as evolving toxic gases within close proximity to the mixture, or reducing the flash point of the mixture to levels near ambient (above 160 F at the desert floor). The mix could also diminish the effectiveness of treatment. The effect of any new chemicals and mixtures of chemicals must be known. Therefore, the waste characterization information must be used to verify compatibility with the waste.

Compatibility between different chemicals and compounds will be verified through testing (e.g., small-scale lab burn test, a coupon test, etc.) or by using credible published documents or literature, such as Irvin Sax's "Properties of Dangerous Materials", NIOSH Pocket Guide to

Chemical Hazards, and NFPA Standard 491M "Manual of Hazardous Chemical Reactions", and the NOAA Chemical Reactivity Worksheet.

The explosives and propellant items will be treated in ways documented to be compatible with other propellants, explosives, and pyrotechnics, as governed by Army doctrine and regulations. For example, DNT is a known incompatible with nitrates and other strong oxidizers and appropriate precautions must be taken (see Permit Attachment 3 Section 3.2.4.4.1).

Compatibility evaluations have been completed on secondary waste streams and have been determined not to be a concern.

Compatibility between equipment and waste streams is also not a problem. The OB/OD process equipment and waste containers are specifically designed to handle these items as described in this permit. No compatibility issues exist with the equipment or any of the proposed waste streams. Also, fuels (petroleum and hydrocarbons) are incompatible with oxidizers (e.g., nitrates, perchlorates, etc.).

The containers of recurring secondary wastes are segregated for different waste streams and are sampled for constituents of concern prior to release from the OB/OD MTF. This action will prevent the improper handling of reactive or incompatible waste streams.

Any secondary wastes with visually observed propellant or black powder will be included in the next scheduled burning operation or if applicable, will be treated in place in accordance with the procedures in the RCRA contingency plan (Permit Attachment 10). These wastes do not need to be sampled, and can be containerized (in a satellite accumulation drum next to the OB pan) until the next treatment.

Any secondary wastes with visually observed explosives will be included in the next scheduled detonation operation. These wastes do not need to be sampled, and can be containerized (in a satellite accumulation drum in the OD pit) until the next treatment.

Any secondary wastes with no visually observed PEP, but with analytical results indicating an ignitable oxidizer (D001) or reactivity (D003) hazard, will be treated in the next scheduled OB/OD operation (see Permit Attachment 6 (OB/OD Operations) for applicable waste holding time limits).

Any secondary wastes with no visually observed PEP, and no analytical results indicating ignitable oxidizers (D001) or reactivity (D003) hazards, will be disposed of off-site as a hazardous waste and will be categorized in accordance with Permit Attachment 3 Section 3.2.3.2.

Permit Attachment 6 shall be followed for the prevention of reaction of ignitable, reactive, and incompatible waste.

3.2.7 Sampling and Analysis QA/QC Procedures

Permit Attachment 13 (QAPP) presents the quality assurance/quality control (QA/QC) requirements for sampling and analysis that will be followed to ensure waste sampling and analysis objectives are met and that all data obtained are technically sound, statistically valid, and properly documented.

Samples for RCRA and explosives analysis will be shipped off the site to an Arizona-certified laboratory.

3.2.8 Management of Process Related Wastes

The following paragraphs discuss management of process-related wastes.

OB/OD sampling activities will generate a variety of process related wastes, including general refuse (i.e., ordinary trash), contaminated disposable sampling equipment, disposable clothing and other PPE, cleanup materials (paper towels, plastic sheets, etc.), and decontamination water. These wastes, with the exception of general refuse, may potentially contain contaminants above regulatory levels. These materials will be drummed, and disposed of as hazardous waste if analytical results determine the waste to be hazardous as described below.

Until analytical results are received, the drummed waste will be labeled "Hazardous Waste – Analysis Pending" (or equivalent), and will be kept either near the sampling site, transported to the safety bunker, or transported to the HAZMART.

General refuse, which includes all general facility trash that is non-hazardous at the point of generation and not subject to LDRs can be managed in on-site dumpsters in accordance with normal USAGYPG procedures.

Spent decontamination and rinsate water will be placed in U.S. Department of Transportation (DOT)-approved drums. The DOT-approved drums will be properly sealed and labeled accordingly. In order to prevent leakage of the containerized liquids, the drums will never be filled to more than 95 percent of their capacity, allowing for at least a 5 percent air space at the top of the drum. A HWD will be performed and the spent decontamination solution/rinsate water will managed accordingly.

3.2.9 Management of OB/OD Maintenance Wastes

Refractory, the burn pans, concrete, etc. are expected to require periodic disposition due to routine maintenance, repair, or replacement.

The burn pans and other metal parts will be sampled for hazardous waste content. If non-hazardous the items will be inspected and certified for disposition as metal scrap according to Permit Attachment 3 Section 3.2.3. If hazardous, the a HWD will be developed for the items.

The refractory, concrete, and other non-metallic materials will be characterized using the sampling and analytical methods specified for ash (see Permit Attachment 3 Section 3.2.3 and Section 3.2.4).

3.3 WASTE ANALYSIS REQUIREMENTS PERTAINING TO LAND DISPOSAL RESTRICTIONS

The regulations that enforce the Hazardous and Solid Waste Amendments of RCRA (adopted by the Arizona Hazardous Waste Management Act) prohibit land disposal of certain types of wastes subject to AzHWMA/RCRA and establish concentration limits and treatment standards for restricted wastes prior to land disposal. Where applicable, all OB/OD wastes will be managed in accordance with land disposal restriction (LDR) requirements. Information presented in this section describes how the wastes that are subject to LDRs will be characterized and managed. All LDR determinations will be placed into the facility's operating log (see Permit Attachment 15).

OB/OD operations treat the ignitable and reactive nature of the PEP associated with the EPA Hazardous Waste Numbers D001 and D003. The ash, water, and other secondary waste streams might require treatment to achieve the treatment standards for toxicity characteristic (TC) metals (primarily lead, D008), TC organics, and any identified underlying hazardous constituents (UHCs) associated with the PEP prior to land disposal. These waste streams can be sent off the site for treatment at an approved hazardous waste TSDF in order to achieve LDR requirements prior to land disposal.

The USAGYPG will provide written notification and/or certification as applicable with each shipment of waste to the receiving TSDF according to the requirements of A.A.C. R18-8-268 (40 CFR 268.7). Wastes accompanied by a LDR certification that all LDR treatment standards associated with the waste have been met may be disposed of as nonregulated waste under the requirements found in A.A.C. R18-8-268 (40 CFR 268.9), subsequent to the required documentation and notification.

Copies of all notices, certifications, demonstrations, and other documentation produced to support the determination for restricted wastes treated on the site, or treated, stored, or disposed of off the site at an approved hazardous waste TSDF will be retained in the OB/OD operating record by the USAGYPG until closure pursuant to A.A.C. R18-8-264.A (40 CFR 264.73(b)(3,12)).

3.3.1 Waste Characterization

The waste characterization requirements that will be followed for the wastes subject to LDRs are the same as those described in Permit Attachment 3 Section 3.2. The information provided by this characterization will allow for determination of LDR applicability and compliance with LDR treatment standards, concentration limits, and/or notification and certification requirements.

Wastes ejecting or deposited onto the ground surface as a result of OB/OD does not constitute land disposal and is not subject to LDR until it is removed from the ground surface (or at closure). Once removed from the ground surface (time of generation) or at closure, the following requirements apply:

1. Excluding scrap metal generated from the treatment of waste munitions, treatment residuals including soil removed from pits/trenches that are within the same treatability group (e.g, ash) that is generated from munitions destruction are subject to applicable LDR requirements. Treatment residuals (e.g., ash) will undergo a HWD and be assessed for applicable UHCs and associated universal treatment standards (UTS) at the time of generation. Applicable UHC will include at a minimum, those reasonably expected UHCs originally associated with the treated munitions regardless of whether the ash fails TCLP.

2. Scrap metal generated from munitions treatment will undergo a visual examination for explosive residues and undergo a HWD prior to recycling as scrap metal (see Permit Attachment 3 Section 3.2.4.1.4.

3. Waste designated as a new point of generation for purposes of LDR (i.e., switch in treatability group) and waste not generated from the treatment of munitions (e.g., soil not within pit areas, rainwater, sludge generated from the management of rainwater, equipment, structures, PPE, etc.), will undergo a HWD and if hazardous will be subject to applicable LDR treatment standards.

Treatability groups will be determined according to Permit Attachment 3 Section 3.3.2.

Testing to comply with the LDRs including the identification of reasonably expected UHCs will be based on the applicable treatability group and treatment standard associated with the applicable COPC. Totals analysis will be used unless otherwise specified in 40 CFR 268.40, 40 CFR 268.48, or 40 CFR 268.49 (as applicable).

Debris waste destined for disposal (e.g., equipment, structures, PPE) will meet the applicable definition of debris waste as noted in 40 CFR 268.2. Debris waste managed under the alternative treatment standards outlined in 40 CFR 268.45 will meet the applicable performance standards associated with the applicable debris type per this regulatory section. Hazardous debris waste not managed under the alternative treatment standards expressed in 40 CFR 268.45 will be characterized to determine LDR applicability according to Section 3.3.2 (LDR – Sampling and Analytical Parameters).

Generator storage (accumulation) of OB/OD restricted wastes will be in accordance with the prohibitions of storage of restricted wastes, A.A.C. R18-8-268.A (40 CFR 268.50). All wastes associated with the OB/OD MTF will be accumulated in accordance with the requirements of A.A.C. R18-8-262.A (40 CFR 262.34) until characterization is completed.

3.3.2 Sampling and Analytical Procedures

The characterization (visual inspection, sampling, and analytical test) methods that will be followed for wastes subject to LDRs are the same as those described in Permit Attachment 3 Section 3.2.3 and Section 3.2.4. Parameters for characterization determinations are selected from Permit Attachment 3A Table 3A-2.

3.3.3 Frequency of Analysis

The frequency of analysis requirements that will be followed for wastes subject to LDRs are the same as those described in Permit Attachment 3 Section 3.2.5.

3.4 ADDITIONAL REQUIREMENTS FOR TREATMENT FACILITIES

The following paragraphs describe the additional sampling, analysis, and documentation requirements for wastes treated in the OB/OD MTF. Once waste has undergone treatment, the treatment residuals will be containerized, labeled, and stored in waste accumulation areas (either a satellite accumulation point area [40 CFR 261.34(c)] or a less-than-90-day area as appropriate) pending shipment off the site to a permitted TSDF. The residuals will be characterized as described in Permit Attachment 3 Section 3.4.1, and all required LDR notifications and certifications will be prepared by USAGYPG personnel and forwarded with the waste shipment to the offsite TSDF or other facility as allowed by the regulations. All records and results of waste analyses and waste determinations will be recorded as they become available and will be maintained in the operating record until closure of the facility.

3.4.1 Analysis of Treatment Residues

Analyses of treatment residues are used to characterize the residual wastes for waste determination and LDR requirements. Characterization of treatment residuals is described in Permit Attachment 3 Section 3.2.2.

3.4.2 Sampling and Analytical Procedures

Sampling and analysis will be conducted on the treatment residuals as described in Permit Attachment 3 Section 3.2.3 and Section 3.2.4.

3.4.3 Frequency of Analysis

Permit Attachment 3 Section 3.2.5 lists the frequency of characterizing treatment residuals.

ATTACHMENT 3A

Table 3A-1. Constituents of Potential Concern for the OB/OD Munitions Treatment Facility.

Element / Compound Information								
CAS Name	CAS #	Chemical Symbol / Formula	TCLP Levels mg/L	TCLP Levels Code	UTS[a] (mg/kg)	Appendix VIII[b] List	Appendix IX[c] List	Analytical Method[f]
Metals								
Aluminum	7429-90-5	Al						6010/ 6020
Antimony	7440-36-0	Sb			1.15 mg/L	x	x	6010/ 6020
Arsenic	7440-38-2	As	5.0	D004	5.0 mg/L	x	x	6010/ 6020
Barium	7440-39-3	Ba	100.0	D005	21 mg/L	x	x	6010/ 6020
Beryllium	7440-41-7	Be			1.22 mg/L	x	x	6010/ 6020
Boron	7440-42-8	B						6010/ 6020
Cadmium	7440-43-9	Cd	1.0	D006	0.11 mg/L	x	x	6010/ 6020
Chromium (total)	7440-47-3	Cr	5.0	D007	0.60 mg/L	x	x	6010/ 6020
Cobalt	7440-48-4	Co					x	6010/ 6020
Copper	7440-50-8	Cu					x	6010/ 6020
Lead	7439-92-1	Pb	5.0	D008	0.75 mg/L	x	x	6010/ 6020
Manganese	7439-96-5	Mn						6010/ 6020
Mercury	7439-97-6	Hg	0.2	D009	0.025 mg/L	x	x	7470, 7471
Molybdenum	7439-98-7	Mo						6010/ 6020
Nickel	7440-02-0	Ni			11 mg/L	x	x	6010/ 6020
Selenium	7782-49-2	Se	1.0	D010	5.7 mg/L	x		6010/ 6020
Silver	7440-22-4	Ag	5.0	D011	0.14 mg/L	x	x	6010/ 6020
Strontium	7440-24-6	Sr						6010/ 6020
Sulfur (indicator)	7704-34-9	S						6010/ 6020
Tin	7440-31-5	Sn					x	6010/ 6020
Vanadium	7440-62-2	V			1.6 mg/L		x	6010/ 6020
Zinc	7440-66-6	Zn			4.3 mg/L		x	6010, 6020

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Element / Compound Information								
CAS Name	CAS #	Chemical Symbol / Formula	TCLP Levels mg/L	TCLP Levels Code	UTS[a] (mg/kg)	Appendix VIII[b] List	Appendix IX[c] List	Analytical Method[f]
Explosives								
1,3,5-Trinitrobenzene (1,3,5-TNB)	99-35-4	C_9H_{12}				x	x	8330
1,3-Dinitrobenzene (1,3-DNB)	99-65-0	$C_6H_4N_2O_4$				x	x	8330
2,4,6-Trinitrotoluene (2,4,6-TNT)	118-96-7	$C_7H_5N_3O_6$					x	8330
2,4-Dinitrotoluene (2,4-DNT)	121-14-2	$C_7H_6N_2O_4$	0.13	D030	140	x	x	8330
2,6-Dinitrotoluene (2,6-DNT)	606-20-2	$C_7H_6N_2O_4$			28	x	x	8330
2-Amino-4,6-dinitrotoluene (2-AM-4,6-DNT)	35572-78-2	$C_7H_7N_3O_4$						8330
2-Nitrotoluene (2-NT) (MNT)	88-72-2	$C_7H_7NO_2$						8330
3-Nitrotoluene, m-nitrotoluene (3-NT)	99-08-1	$C_7H_7NO_2$						8330
4-Amino-2,6-dinitrotoluene (4A-DNT)	19406-51-0	$C_7H_7N_3O_4$						8330
4-Nitrotoluene, p-nitrotoluene (4-NT)	99-99-0	$C_7H_7NO_2$						8330
Dinitrotoluene (all isomers)	25321-14-6	$C_7H_6N_2O_4$						8330
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) (trimethylene trinitramine) (cyclotrimethylene trinitramine)	121-82-4	$C_3H_6N_6O_6$						8330
Nitrobenzene	98-95-3	$C_6H_5NO_2$	2.0	D036	14	x	x	8330
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	$C_4H_8N_8O_8$						8330
Pentaerythritol tetranitrate (PETN) (Nitropenaerythrite)	78-11-5	$C_5H_8N_4O_{12}$						8330
Tetryl (Methyl-2,4,6-trinitrophenylnitramine)	479-45-8	$C_7H_5N_5O_8$						8330
Perchlorate	14797-73-0	ClO_4^--						6850 or 6860

Table 3A-1. Constituents of Potential Concern for the OB/OD Munitions Treatment Facility.

Element / Compound Information								
CAS Name	CAS #	Chemical Symbol / Formula	TCLP Levels mg/L	TCLP Levels Code	UTS[a] (mg/kg)	Appendix VIII[b] List	Appendix IX[c] List	Analytical Method[f]
Nitrocellulose (NC) (nitrostarch)	9004-70-0	$C_{12}H_{16}(ONO_2)_4O_6$						lab specific
Nitroglycerin (NG) (1-nitroglycerol)	55-63-0	$C_3H_5N_3O_9$				x		lab specific
Nitroguanidine (NQ)	556-88-7	$CH_4N_4O_2$						lab specific
Picric Acid	88-89-1	$C_6H_3N_3O_7$						lab specific
Volatile Organic Compounds								
1,1,1-Trichloroethane	71-55-6	$C_2H_3Cl_3$			6.0	x	x	8260
2- Nitropropane	79-46-9	$C_3H_7NO_2$				x		8260
Acetone	67-64-1	C_3H_6O			160		x	8260
Acrolein	107-02-8	C_3H_4O			NA	x	x	8260
Carbon disulfide	75-15-0	CS_2			4.8 mg/L	x	x	8260
Carbon tetrachloride	56-23-5	CCl_4	0.5	D019	6.0	x	x	8260
Chloroform	67-66-3	$CHCl_3$	6.0	D022	6.0	x	x	8260
Chloromethylbenzene (Benzl chloride)	100-44-7	C_7H_7Cl				x		8260
Dichloromethane (Methylene chloride)	75-09-2	CH_2CL_2			30.0	x	x	8260
Ethyl acetate	141-78-6	$C_4H_8O_2$			33			8260
Ethyl Benzene	100-41-4	C_8H_{10}			10		x	8260
Ethyl ether	60-29-7	$C_4H_{10}O$			160			8260
Ethylene dichloride (1,2-dichloroethane)	107-06-2	$C_2H_4Cl_2$			6.0	x	x	8260
Ethylene oxide	75-21-8	C_2H_4O			NA	x		8260
Isobutyl Alcohol (Isobutanol)	78-83-1	$C_4H_{10}O$			170	x	x	8260
Iso-propylbenzene (Cumene)	98-82-8	C_9H_{12}						8260
Methanol	67-56-1	CH_4O			0.75 mg/L			8260
Methyl Ethyl Ketone	78-93-3	C_4H_8O			36	x	x	8260

Table 3A-1. Constituents of Potential Concern for the OB/OD Munitions Treatment Facility.

Element / Compound Information								
CAS Name	CAS #	Chemical Symbol / Formula	TCLP Levels		UTS[a] (mg/kg)	Appendix VIII[b] List	Appendix IX[c] List	Analytical Method[f]
			mg/L	Code				
Methyl Isobutyl Ketone	108-10-1	$C_6H_{12}O$			33	x	x	8260
n-Butyl Alcohol	71-36-3	$C_4H_{10}O$			2.6	x		8260
Pyridine	110-86-1	C_5H_5N	5.0	D038	16	x	x	8260/ 8270
Styrene Monomer	100-42-5	C_8H_8					x	8260
Toluene	108-88-3	C_7H_8			10	x	x	8260
Trichloroethylene	79-01-6	C_2HCl_3	0.5	D040	6.0	x	x	8260
Trichlorofluoromethane	75-69-4	CCl_3F			30	x	x	8260
Vinyl Acetate	108-05-4	$C_4H_6O_2$					x	8260
Vinyl chloride	75-01-4	C_2H_3Cl	0.2	D043	6.0	x	x	8260
Xylenes	1330-20-7	C_8H_{10}			30	x	x	8260
Volatile Organic TICs								
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	$C_2Cl_3F_3$			30			8260 TIC
Azobenzene	103-33-3	$C_{12}H_{10}N_2$						8260 TIC
Cyclohexane	110-82-7	C_6H_{12}						8260 TIC
Cyclohexanone	108-94-1	$C_6H_{10}O$			0.75 mg/L			8260 TIC
Methylcyclohexane	108-87-2	C_7H_{14}						8260 TIC
n-hexane	110-54-3	C_6H_{14}						8260 TIC
Semi-Volatile Organic Compounds								
1,2,4-Trichlorobenzene	120-82-1	$C_6H_3Cl_3$			19	x	x	8270
1,2-Dichlorobenzene	95-50-1	$C_6H_4Cl_2$			6.0	x	x	8270
1,3-Dichlorobenzene	541-73-1	$C_6H_4Cl_2$			6.0	x	x	8270
1,4-Dichlorobenzene	106-46-7	$C_6H_4Cl_2$	7.5	D027	6.0	x	x	8270
1-Methylnaphthalene	90-12-0	$C_{11}H_{10}$					x	8270

Table 3A-1. Constituents of Potential Concern for the OB/OD Munitions Treatment Facility.

Element / Compound Information								
CAS Name	CAS #	Chemical Symbol / Formula	TCLP Levels mg/L	TCLP Levels Code	UTS[a] (mg/kg)	Appendix VIII[b] List	Appendix IX[c] List	Analytical Method[f]
2,2-Oxybis (1-chloropropane) [Bis(2-chloro-1-methyethyl) ether]	108-60-1	$C_6H_{12}Cl_2O$				x	x	8270
2,4,5-Trichlorophenol	95-95-4	$C_6H_3Cl_3O$	400.0	D041	7.4	x	x	8270
2,4,6-Trichlorophenol	88-06-2	$C_6H_3Cl_3O$	2.0	D042	7.4	x	x	8270
2,4-Dichlorophenol	120-83-2	$C_6H_4Cl_2O$			14	x	x	8270
2,4-Dimethylphenol	105-67-9	$C_8H_{10}O$			14	x	x	8270
2,4-Dinitrophenol	51-28-5	$C_6H_4N_2O_5$			160	x	x	8270
2-Amino-4-nitrotoluene (5-nitro-o-toluidine)	99-55-8	$C_7H_8N_2O_2$			28	x	x	8270
2-Aminoanthraquinone	117-79-3	$C_{14}H_9NO_2$						8270
2-Chloronaphthalene	91-58-7	$C_{10}H_7Cl$			5.6	x	x	8270
2-Chlorophenol	95-57-8	C_6H_5ClO			5.7	x	x	8270
2-Methyl-4,6-dinitrophenol (4,6-dintro-o-cresol)	534-52-1	$C_7H_6N_2O_5$			160	x	x	8270
2-Methylnapthalene	91-57-6	$C_{11}H_{10}$					x	8270
2-Methylphenol (o-cresol)	95-48-7	C_7H_8O	200.0	D023	5.6		x	8270
2-Nitroaniline	88-74-4	$C_6H_6N_2O_2$			14		x	8270
2-Nitrophenol	88-75-5	$C_6H_5NO_3$			13		x	8270
3,3-Dichlorobenzidine	91-94-1	$C_{12}H_{10}Cl_2N_2$				x	x	8270
3-Methylphenol (m-cresol)	108-39-4	C_7H_8O	200.0	D024	5.6		x	8270
3-Nitroaniline	99-09-2	$C_6H_6N_2O_2$					x	8270
4-Chloro-3-methylphenol (p-chloro-m-cresol)	59-50-7	C_7H_7ClO			14	x	x	8270
4-Bromophenyl-phenylether	101-55-3	$C_{12}H_9BrO$			15	x	x	8270

Table 3A-1. Constituents of Potential Concern for the OB/OD Munitions Treatment Facility.

Element / Compound Information			TCLP Levels		UTS[a] (mg/kg)	Appendix VIII[b] List	Appendix IX[c] List	Analytical Method[f]
CAS Name	CAS #	Chemical Symbol / Formula	mg/L	Code				
4-Chloroaniline	106-47-8	C_6H_6ClN			16	x	x	8270
4-Chlorophenyl-phenyl ether	7005-72-3	$C_{12}H_9ClO$					x	8270
4-Methylphenol (p-cresol)	106-44-5	C_7H_8O	200.0	D025	5.6		x	8270
4-Nitroaniline	100-01-6	$C_6H_6N_2O_2$			28	x	x	8270
4-Nitrophenol	100-02-7	$C_6H_5NO_3$			29	x	x	8270
Acenaphthene	83-32-9	$C_{12}H_{10}$			3.4		x	8270
Acenaphthylene	208-96-8	$C_{12}H_8$			3.4	x	x	8270
Acetophenone	98-86-2	C_8H_8O			9.7	x	x	8270
Aniline (Arylamine)	62-53-3	C_6H_7N			14	x	x	8270
Anthracene	120-12-7	$C_{14}H_{10}$			3.4		x	8270
Benz[a]anthracene	56-55-3	$C_{18}H_{12}$			3.4	x	x	8270
Benzene	71-43-2	C_6H_6	0.5	D018	10	x	x	8270
Benzidine	92-87-5	$C_{12}H_{12}N_2$				x		8270
Benzo(a)pyrene	50-32-8	$C_{20}H_{12}$			3.4	x	x	8270
Benzo(b) fluoranthene	205-99-2	$C_{20}H_{12}$			6.8	x	x	8270
Benzo(g,h,i) perylene	191-24-2	$C_{22}H_{12}$			1.8		x	8270
Benzo(k)fluoranthene	207-08-9	$C_{20}H_{12}$			6.8	x	x	8270
Benzoic acid	65-85-0	$C_7H_6O_2$						8270
Benzyl Alcohol	100-51-6	C_7H_8O					x	8270
Bis(2-chloroethoxy)methane (Dichloromethoxyethane)	111-91-1	$C_5H_{10}Cl_2O_2$			7.2	x	x	8270
Bis(2-chloroethyl)ether (Dichoroethyl ether)	111-44-4	$C_4H_8Cl_2O$			6.0	x	x	8270

Table 3A-1. Constituents of Potential Concern for the OB/OD Munitions Treatment Facility.

Element / Compound Information								
CAS Name	CAS #	Chemical Symbol / Formula	TCLP Levels		UTS[a] (mg/kg)	Appendix VIII[b] List	Appendix IX[c] List	Analytical Method[f]
			mg/L	Code				
Bis(2-chloroisopropyl)ether	39638-32-9	$C_6H_{12}Cl_2O$			7.2			8270
Bis(2-ethylhexyl)phthalate (DEHP) (Diethylhexylphthalate)	117-81-7	$C_{24}H_{38}O_4$				x	x	8270
Butyl benzyl phthalate	85-68-7	$C_{19}H_{20}O_4$			28	x	x	8270
Chrysene	218-01-9	$C_{18}H_{12}$			3.4	x	x	8270
Dibenz[ah]anthracene	53-70-3	$C_{22}H_{14}$			8.2	x	x	8270
Dibenzofuran	132-64-9	$C_{12}H_8O$					x	8270
Dibutyl phthalate (Di-n-butyl phthalate)	84-74-2	$C_{16}H_{22}O_4$			28	x	x	8270
Diethyl phthalate	84-66-2	$C_{12}H_{14}O_4$			28	x	x	8270
Dimethyl phthalate	131-11-3	$C_{10}H_{10}O_4$			28	x	x	8270
Di-n-octyl phthalate	117-84-0	$C_{24}H_{38}O_4$			28	x	x	8270
Diphenylamine	122-39-4	$C_{12}H_{11}N$			13	x	x	8270
Fluoranthene	206-44-0	$C_{16}H_{10}$			3.4	x	x	8270
Fluorene	86-73-7	$C_{13}H_{10}$			3.4		x	8270
Gamma-BHC (Lindane)	58-89-9	$C_6H_6Cl_6$	0.4	D013	0.066	x	x	8270
Hexachlorobenzene	118-74-1	C_6Cl_6	0.13	D032	10	x	x	8270
Hexachlorobutadiene	87-68-3	C_4Cl_6	0.5	D033	5.6	x	x	8270
Hexachlorocyclopentadiene	77-47-4	C_5Cl_6			2.4	x	x	8270
Hexachloroethane	67-72-1	C_2Cl_6	3.0	D034	30	x	x	8270
Indeno(1,2,3-cd)pyrene	193-39-5	$C_{22}H_{12}$			3.4	x	x	8270
Isophorone	78-59-1	$C_9H_{14}O$					x	8270
Maleic anhydride	108-31-6	$C_4H_2O_3$				x		8270
Methylphenol (cresol)	1319-77-3	C_7H_8O	200.0	D026		x		8270

Table 3A-1. Constituents of Potential Concern for the OB/OD Munitions Treatment Facility.

Element / Compound Information								
CAS Name	CAS #	Chemical Symbol / Formula	TCLP Levels		UTS[a] (mg/kg)	Appendix VIII[b] List	Appendix IX[c] List	Analytical Method[f]
			mg/L	Code				
Naphthalene	91-20-3	$C_{10}H_8$			5.6	x	x	8270
n-Nitroso di-n-propylamine	621-64-7	$C_6H_{14}N_2O$			14	x	x	8270
n-Nitrosodiethylamine	55-18-5	$C_4H_{10}N_2O$			28	x	x	8270
n-Nitrosodimethylamine	62-75-9	$C_2H_6N_2O$			2.3	x	x	8270
n-Nitrosodiphenylamine	86-30-6	$C_{12}H_{10}N_2O$			13		x	8270
Pentachlorophenol	87-86-5	C_6HCl_5O	100.0	D037	7.4	x	x	8270
Perchloropentacyclodecane (mirex)	2385-85-5	$C_{10}Cl_{12}$						8270
Phenanthrene	85-01-8	$C_{14}H_{10}$			5.6		x	8270
Phenol	108-95-2	C_6H_6O			6.2	x	x	8270
Pyrene	129-00-0	$C_{16}H_{10}$			8.2		x	8270
Semi-Volatile Organic TICs								
2-Furaldehyde (furfural)	98-01-1	$C_5H_4O_2$						8270 TIC
Nitrate / Nitrite / Ammonia								
Ammonia	7664-41-7	H_3N						350.1 or 350.3
Nitrate[i] (total nitrate/nitrite will be compared to SRL for nitrite)	14797-55-8	NO_3						353.2
Nitrite (see Nitrate)	14797-65-0	NO_2						353.2
Other Parameters								
Cyanides (Total)	74-90-8	CN			590	x		9012
Cyanides (Amenable)	57-12-5	CN			30		x	9012
Oxidizing Compounds								ASTM D4981
pH – Soil								9045

Table 3A-1. Constituents of Potential Concern for the OB/OD Munitions Treatment Facility.

a. Universal Treatment Standards (UTS) values shown are for non-wastewater and are in mg/kg unless shown as mg/L, which indicates the UTS is a TCLP value. These values are from **40 CFR 268.48** and apply to land disposal (not OB/OD treatment).

b. Appendix VIII List is from **40 CFR 261, Appendix VIII**, Basis for Listing Hazardous Waste.

c. Appendix IX is from **40 CFR 264, Appendix IX**, Ground-Water Monitoring List

f. Analytical methods to be verified/specified by the analytical laboratory are intended to be the most recent, accepted version available at the time of analysis.

g. By agreement with ADEQ, the sum of nitro aromatic explosives without other SRLs/GPLs will be considered to have a non-residential SRL of 340 mg/kg.

h. Tentatively identified compounds (TICs) are those to be pursued if offered by the analytical laboratory. They are shown in the table with a likely analytical method, but the method actually performed by the laboratory may be different (e.g., those shown as measured with method 8260 may actually be measured by method 8270).

i. Nitrate/nitrite analysis will be for total nitrate + nitrite. Nitrite will not be analyzed separately due to the tight holding time associated with its measurement. However, for purposes of soil evaluation, the total nitrate + nitrite values will be compared to the lower SRL value for nitrite.

Table 3A-2. Summary of Selected Parameters for Secondary Wastes and Rationale for Selection [h]

SECONDARY WASTE STREAM:		OB Ash	Storm Water in OB Pads, Basins, or OD Pits	OB Equipment or Structures	Soils	OD Scrap Metal	Other OB/OD Secondary Waste Streams
MEDIA [(a)] :		S	L	S	S	S	S, L
TREATMENT OPTIONS:		OSD	OSD, On-ground, Evaporate	OSD, Reuse, Recycle	OSD, On-ground	OSD Recycle	OSD
RATIONALE:		(B)	(B)(C)(F)	(B)	(D)	(E)	(B)(E)
ANALYTICAL PARAMETER/TYPE							
TC metals	TCLP	Y		Y			Y
TC metals	Visual					Y	
Total metals	LAM		Y				
Total metals	LAM/SCRN				Y		
TC organics (including SVOCs)	TCLP	Y	Y	Y			Y
TC organics (including SVOCs)	Visual					Y	
SVOCs	LAM	Y	Y	Y			
SVOC TICs	LAM	Y	Y	Y	Y		
VOCs & VOC TIC's	LAM						
Cyanides (total and amenable)	LAM	Y	Y	Y	Y		Y
HW cyanides	Visual					Y	
8330 [(G)] Residual explosives	LAM	Y	Y	Y			Y
8330 [(G)] Residual explosives	LAM/SCRN				Y		
8330 [(G)] Residual explosives	Visual					Y	
Non-8330 [(G)] Residual explosives	LAM	Y	Y	Y	Y		Y
Non-8330 [(G)] residual explosives	Visual					Y	
Oxidizers	SCRN	Y		Y	Y		Y
HW oxidizers	Visual					Y	
Nitrates/Nitrites/Ammonia	LAM	Y	Y	Y	Y		Y
Nitrates/Nitrites/ Ammonia	Visual					Y	
Perchlorates	LAM	Y	Y	Y	Y		Y
Perchlorates	Visual					Y	
HW pH	LAM	Y					
HW pH	Visual					Y	
Total Organic Carbon (TOC)	LAM	Y	Y	Y	Y	Y	Y
Total Suspended Solids	LAM	Y	Y	Y	Y	Y	Y
Paint Filter Liquids	LAM	Y	Y	Y	Y	Y	Y

a. Abbreviations: L = Liquid; S = Solid; TC = Toxicity characteristic; TCLP = Toxicity characteristic leaching procedure; OSD = Off-site disposal (to either a permitted hazardous waste, solid waste, or POTW facility, as appropriate); TIC = Tentatively identified compound; LAM = Laboratory analytical method; SCRN = Field screen method; and Visual = 100% visual inspection to ensure waste is free of explosives and other hazardous constituents (**Permit Attachment 6C**).

b. Ensure safe handling and proper characterization for shipment off site to a permitted hazardous waste Treatment, Storage, or Disposal Facility (TSDF). Determine land disposal restrictions (LDR's) and treatment standards applicable to the waste including identification of underlying hazardous constituents [**A.A.C. R18-8-268.A (40 CFR 268.9)**].

c. Ensure water is within acceptable limits for consideration as a dust suppressant or other comparable uses.

d. Ensure safe handling and proper management including footnote "B" above if soil is to be disposed, or that contaminants of concern are below action levels identified in this document if soil is to remain in place. In the case of soils, screening methods may be used to augment data from full method analyses. The use of such soil screening methods (metals and/or explosives) shall first be approved by ADEQ as a class 1 modification.

e. Ensure safe handling and proper management of all metal scrap resulting from OD operations by a 100% visual inspection (per *SOP YP-0000-K-028*) that it is free and clear of explosive prior to its removal from the site for recycling or disposal (**Permit Attachment 6C**). Prior to transport off YPG property for solid waste recycling (metal) or solid waste disposal, the metal scrap must also be documented free of other hazardous waste, HW constituents, or HW decomposition products.

f. For disposal to the ground surface, comply with RCRA, the *Arizona Surface Water Standards* (including the *Arizona NPDES Program)*, and the *Arizona Aquifer Water* Quality Standards (AWQS) (A.A.C., Title 18, Chapter 11). Comply with the *Clean Water Act* (CWA) for disposal to a permitted POTW or pretreatment facility.

g. 8330 explosives = chemicals normally detected by EPA SW-846 Method 8330 (not limited to TNT and RDX); Non-8330 explosives = nitrocellulose, nitroglycerine, nitroguanidine, and picric acid.

h. AK (process knowledge) can be used on some secondary waste streams (see text) in lieu of visual inspection, screening methods, or laboratory analytical methods.

i. Optional for determining waste water and non-waste water treatability groups under land disposal restrictions.

Table 3A-3. Secondary Waste Characterization Methods.[a]

Parameter/Analyte	Test Method[b]
METALS	
Total metals [d]	Method 6010 (or 6020) and 7470 (mercury in liquid)/7471 (mercury in solids)
TC[c] metals (antimony*, arsenic, barium, beryllium*, cadmium, chromium [total], lead, mercury, nickel*, selenium, silver, thallium*, zinc*)	Method 1311 (solids only) extraction followed by 6010 and 7470 (mercury in liquid)/7471 (mercury in solids)
VOC/SVOC	
TC organics (all TC VOCs and SVOCs listed in **Table 3-1**, including 2,4-dinitrotoluene, nitrobenzene, vinyl chloride)	Method 1311 (solids only) extraction followed by 8260, 8270
VOC's (all VOC's listed in **Table 3-1**)	Method 8260
VOC TIC's (all VOC TIC's listed in **Table 3-1**)	Method 8260 TIC's
SVOC's (all SVOC's listed in **Table 3-1** including diethyl phthalate, dibutyl phthlate; 2,4-dinitrotoluene, 2,6-dinitrotoluene, diphenylamine; nitrobenzene)	Method 8270
SVOC TIC's (all SVOC TIC's listed in **Table 3-1**)	Method 8270 TIC's
EXPLOSIVES	
8330 Residual explosives (RDX, TNT, PETN, HMX, Tetryl, etc.) [d]	Method 8330
Non-8330 Residual explosives (NC, nitroguanidine, nitroglycerine, and Picric acid)	Lab Specific
IGNITABLE OXIDIZERS/OTHER COMPOUNDS	
Cyanides (total and amenable)	Method 9010 or 9012
Oxidizer Screen	ASTM D4981
Nitrates/Nitrites	SAC-WC-0049 Rev 2 or equiv./MCA Method 353.2
Ammonia	SAC-WC-0049 Rev 2 or equiv./MCA Method 350.3
Perchlorate	SAC-WC-0049 Rev 2 or equiv./Method 6850 or 6860/
pH	Method 9045
Total Organic Carbon (TOC)	MCA Method 160.2
Total Suspended Solids (TSS)	MCA Method 160.2
Paint Filter Liquid Test (PFLT)	Method 9095

a. Samples will be analyzed by a State-certified laboratory. For samples analyzed by an Arizona- certified laboratory, methods used will have a current certification where applicable.

b. Methods are from *Test Methods for Evaluating Solid Waste Physical/Chemical Methods*, SW-846, current edition, or *Methods for Chemical Analysis of Water and Wastes (MCA)*, unless otherwise indicated.

c. Abbreviations: TC = toxicity characteristic (40 CFR 261.24); UHC = underlying hazardous constituent; * = Non-TC metals or organics (including SVOCs).

d. Screening techniques may be used to supplement full method analyses in the case of soil samples, but such methods are expected to be based in the methods shown for metals and residual explosives. The screening methods chosen will be approved by ADEQ in a class 1 modification prior to its use.

Table 3A-4. Equipment and Sampling Methods for Waste Characterization.

Media and Waste Stream	Sample Type	Method and Equipment	Type of Sampling
Liquids			
Potentially contaminated precipitation collected in sumps	Grab	If water accumulates beyond a set nominal volume (see description of operations), collect grab samples from burn pad sump using a long handled dipper or similar device.	Waste: Sample each location where precipitation accumulates beyond the set nominal volume.
Solids			
Waste ash	Composite grab	Disposable sample equipment will be used. Collect samples from each bag in the container proportionate to the quantity in the bag (e.g., 50 g of sample per kg in the bag) using scoop, shovel, tongs, or trier. Mix the samples to form one large composite sample in a clean stainless steel bowl. Draw samples for analysis from the mixed composite sample after complete mixing. Any material that is not used for samples will be returned to the drum.	Waste: Sample each container in a proportional, composite manner.
Equipment/Structures	Grab	Collect samples using simple random strategy using a mechanical device to cut or break off a piece of the item or to scrape off a portion of the item's surface. As an alternative, the equipment or structures may be decontaminated and a liquid rinsate sample taken.	Waste: Sample in sufficient quantity (number of samples) per item to adequately characterize.
Soil	Grab [a]	Collect samples using simple random (or random systematic) strategy, as appropriate, using a scoop or shovel or, for subsurface soils, a drill, auger, or coring device if necessary.	Waste/Environmental: Sample in sufficient quantity (number of samples) per area to adequately characterize.

a. For analysis of explosive residues, soils may be collected via a modified composite method, which includes collection of several soil samples at set locations from within a randomly (or random-systematically) selected location. This is the composite wheel sampling method in which a 122-centimeter (4 foot) diameter template is centered at the location, and the template has holes at the center and along the periphery from which sub-samples are taken to form the composite.

Table 3A-5. Minimum Sample Requirements for Liquid Samples.[a]

Analytical Parameter	Size[b]	Container Type[b]	Preservative	Holding Time[c]
TC metals				
Total metals	100 mL	P, G	4° C	180 days, 28 days for Hg in glass (extraction and analysis)
Cyanide	500 mL	G or P	4°C, NaOH (pH >12)	14 days to analysis
TC organics (VOCs & SVOCs)	1 L	Amber G Teflon®-lined cap	4°C	7 days to extraction, 40 days to analysis
SVOCs	1 L	Amber G Teflon®-lined cap	4°C	7 days to extraction, 40 days to analysis
VOCs	N/N [e]	N/N	N/N	N/N
Residual explosives detected by Method 8330	1 L	Amber G Teflon®-lined cap	4°C[d]	7 days to extraction, 40 days to analysis
Residual explosives not detected by Method 8330 (NC, NGuan, NGlyc, and Picric Acid)				
Perchlorate, Nitrate+Nitrite, Ammonia Oxidizer Screen pH	250 mL	G or P	4°C	28 days
Total Organic Carbon (TOC)				
Total Suspended Solids (TSS)				
Paint Filter Liquid Test (PFLT)				

a. References: *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* **SW-846**, current edition.

b. Abbreviations: G = glass; L = liter; mL = milliliter; P = polyethylene; TC = toxicity characteristic.

c. Holding times are from the date of collection as referred to in ***Federal Register,*** **Vol. 49, No. 209, October 26, 1984**, as applicable.

d. Store samples and extracts in the dark and protect from light.

e. Not needed (N/N) since not being analyzed for; therefore, no sample or analytical information is given.

Table 3-6. Minimum Sample Requirements for Solid Samples.[A]

Analytical Parameter	Size	Container Type	Preservative	Holding Time[b]
Total metals	8 oz.	Clear glass jar (WM)	4°C	NA
TC metals	120 mL	Amber glass jar (WM), Teflon®-lined cap	4°C	Analyze extract within 180 days, 28 days for Hg
Cyanide	120 mL[c]	Glass	4°C	14 days to analysis
TC organics (VOCs & SVOCs)	8 oz.	Clear glass jar (WM), Teflon®-lined cap	4°C	14 days to extraction, 40 days to analysis
SVOCs	8 oz.	Clear glass jar (WM), Teflon®-lined cap	4°C	14 days to extraction, 40 days to analysis
VOCs	N/N [e]	N/N	N/N	N/N
Residual explosives detected by Method 8330	8 oz.	Glass (WM)	4°C[d]	14 days to extraction, analyze within 40 days
Residual explosives not detected by Method 8330 (NC, NGuan, NGlyc, and Picric Acid)				
Perchlorate, Nitrate+Nitrite, Ammonia, pH, Oxidizers Screen	8 oz.	Amber glass jar (WM), Teflon®-lined cap	4°C	14 days to analysis
Total Organic Carbon (TOC)				
Total Suspended Solids (TSS)				
Paint Filter Liquid Test (PFLT)				

a. References: *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, **SW-846**, current edition.

b. Holding times are from the date of collection as referred to **in Federal Register, Vol. 49, No. 209, October 26, 1984**, as applicable.

c. Abbreviations: mL = milliliter; NA = not applicable; TC = toxicity characteristic; WM = wide mouth.

d. Store samples and extracts in the dark and protect from light.

e. Not needed (N/N) since not being analyzed for; therefore, no sample or analytical information is given.

ATTACHMENT 3B

OPERATIONAL FORMS

Ammunition Transfer Record

Ammunition For Demilarization

Single Line Item Release/Receipt Document

Bulk Propellant Burn Control Register

AMMUNITION TRANSFER RECORD
(AMCR 740-25)

DATE PREPARED	CONTROL NUMBER

FROM	STOCK NUMBER	NOMENCLATURE	TO	STOCK NUMBER	NOMENCLATURE

SERIAL OR LOT NUMBER	COND	SITE LOCATION	GRID LOCATION	RES SITE	T/S	L/C	METH	MGR	QUANTITY	NO. PKG.	NO. QTY.	SERIAL OR LOT NUMBER	COND	SITE LOCATION	GRID LOCATION	RES SITE	T/S	L/C	METH	MGR	QUANTITY	NO. PKG.	NO. QTY.

REMARKS:

TYPE OF ACTION

- ☐ LOCATION CHANGE
- ☐ LOT NUMBER CHANGE
- ☐ STOCK NUMBER CHANGE
- ☐ RECLASSIFICATION
- ☐ OTHER
- ☐ ITEM DATA CHANGE

SIGNATURE OF FORMAN/CHECKER/INSPECTOR	DATE OF ACTION
APPROVED/DATE	
APPROVED/DATE	

DA FORM 4508
1 MAY 76

TRUCKS AND EQUIPMENT ARE IN PROPER WORKING ORDER.
SOP'S HAVE BEEN READ AND ADHERED TO.

AMMUNITION RECOVERY BRANCH DATE

I CERTIFY THAT THE ABOVE ITEM(S) WERE DEMILITARIZED IAW DOD 4160.2i-M-1, DA PAM 385-64, ATEC 385-1, DMVVR, SOP, AND SECURITY REGULATIONS WHERE APPLICABLE.

PRINT NAME/SIGNATURE DATE
AMMUNITION RECOVERY BRANCH

DEMILITARIZATION AND INSPECTIONS OF MATERIEL AND/OR RESIDUE WILL BE WITNESSED AND COUNTERSIGNED BY QUALITY ASSURANCE (AMMUNITION) IAW DOD 4160.21-M-1; CHAPTER 11.

QUALITY ASSURANCE (AMMUNITION) DATE

AMMUNITION FOR DEMILARIZATION
AMMUNITION MANAGEMENT DIVISION

DATE:_______________________________ RANGE CONTROL #: _____________________

SUBMITTED BY:______________________ JONO/WO #:_____________________________

NSN/MCN	DODIC	NOMEN	LOT	NEW	QTY	REMARKS

DATE PICKED UP : __________________

RECEIVED BY: ______________________

I CERTIFY THAT THE ABOVE ITEMS WERE DEMILITARIZED IAW: DOD 4160.21-M-1; DA PAM 385-64; ATEC 385-1; DMWR; SOP'S AND SECURITY REGULATIONS WHERE APPLICABLE.

NAME: _________________________________

SIGNATURE: ____________________________

DATE OF DESTRUCTION: ________________

ISSUED BY : ________________________

WITNESSED AND COUNTERSIGNED
QUALITY ASSURANCE (AMMUNITION) IAW DOD 4160.21-M-1

NAME : ______________________________

SIGNATURE: __________________________

DATE: _______________________________

YT 2407 REPLACEMENT FOR DA FORM 2407

Revised 11/17/2011

DD FORM 1348-1A, JUL 91 (EG) ISSUE RELEASE/RECEIPT DOCUMENT

1	2	3	4	5	6	7	23	24	25	26	27	28	29	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

DOC IDENT | RI FROM | M&S | UNIT | UI S | QUANTITY | SER | SUPPLEMENTARY ADDRESS | SIG | FUND | DISTRIBUTION | PROJECT | PRI | REQD | DEL DATE | ADV | RI | O/P | COND | MGT | UNIT PRICE DOLLARS CTS

1. TOTAL PRICE DOLLARS CTS

2. SHIP FROM

3. SHIP TO

4. MARK FOR

5. DOC DATE

6. NMFC

7. FRT RATE

8. TYPE CARGO

9. PS

10. QTY. REC'D

11. UP

12. UNIT WEIGHT

13. UNIT CUBE

14. UFC

15. SL

16. FREIGHT CLASSIFICATION NOMENCLATURE

17. ITEM NOMENCLATURE

18. TY CONT

19. NO CONT

20. TOTAL WEIGHT

21. TOTAL CUBE

22. RECEIVED BY

23. DATE RECEIVED

24. DOCUMENT NUMBER & SUFFIX (30-44)

25. NATIONAL STOCK NO. & ADD (8-22)

26. RIC (4-6) UI (23-24) QTY (25-29) CON CODE (71) DIST (55-56) UP (74-80)

27. ADDITIONAL DATA

TRUCKS & EQUIPMENT ARE IN PROPER WORKING ORDER. SOP's HAVE BEEN READ & ADHERED TO.

______________________ ________
AMMUNITION RECOVERY BRANCH DATE

I certify that the above item(s) were demilitarizied IAW DOD 4160.21-M-1, DA PAM 385.64, ATEC 385-1, DMWR, SOP Security Regulations, SOPs and Security Regulations where applicable.

______________________ ________
AMMUNITION RECOVERY BRANCH DATE

Demilitarization and inspections of materiel and/or residue will be witnessed and countersigned by Quality Assurance (Ammunition) IAW DOD 4160.21-M-1; Chapter 11.

______________________ ________
QUALITY ASSURANCE (AMMUNITION) DATE

TOTAL N.E.W. __________

PREVIOUS EDITION MAY BE USED

Adobe Designer 7.0

Ammunition Management Division
Bulk Propellant Burn Control Register
HANDLING CODE T18 OB, EPA ID D003, TREATMENT BURN FOR ALL ITEMS LISTED

Building Number.__________ Date__________

	BULK PROPELLANT RECEIVED/GENERATED FROM FOLLOWING AMMUNITION LOTS			"ZERO DEFECTS OUT THE GATE" AND SAFETY IS PARAMOUNT!		
CONTROL NUMBER	NSN/MCN/DODIC	NOMENCLATURE	LOT NO.	NEW (LBS)	PAD	NOTES / TEST DIRECTOR / JONO'S
					N S	
					N S	
					N S	
					N S	
					N S	
					N S	
					N S	
					N S	
					N S	
					N S	
					N S	

Additional Notes:

TOTAL NEW__________

Issued By__________ Date__________

Received By__________ Date__________

NOTE: Quantity not to exceed 2000 lbs per form.

I Certify that the above items have been destroyed/demilitarized IAW DOD Reg. 4160.21-M, AMC R 385-100, TM9-1300-206, Security Regulations, SOP's and Existing Safety Regulations.

AMMUNITION RECOVERY BRANCH DATE

Destruction of ammunition will be witnessed and countersigned by Quality Assurance (Ammunition) IAW YPGR 710-2

QUALITY ASSURANCE DATE
(AMMUNITION)

YT Form 24

ATTACHMENT 3C

WAP SIMPLE-ACTION REPORT

SIMPLE ACTION REPORT

'Simple actions' are defined as all sampling and analysis events concerning OB/OD equipment, structures, and soil that do not require a sampling and analyses plan (SAP) to be submitted to ADEQ for pre-approval and do not necessitate ADEQ oversight. Actions that do not fit into this category include, but are not limited to:

- Work constituting a class 2 or class 3 permit modification;
- RCRA closure; or
- Emergency action clean-up/remediation.

Section I defines the sampling required for these simple-action events. Section II defines the reporting for these events in addition to those requirements in Permit Attachment 15 (Recordkeeping and Reporting).

I. Simple Action Sampling Requirements

'Simple-actions' fit into one of the following events: (1) Replacement or repair of certain structures which meet specific criteria and the structure is intended for off-site disposal or recycling, off-site reuse, or off-site repair; (2) Replacement or repair of all equipment where the equipment is intended for off-site disposal or recycling, off-site reuse, or off-site repair; and (3) Excavation of soil not associated with emergency action or closure. Criteria and requirements for these simple-actions are described as follows:

A. Structures:

- 'Simple-Action' Structures -- The only structures at the facility that could be contaminated include the OB pans, OB pad (including sump grate and liner), and OB retention basin (including PVC pipe). Therefore, simple actions for the OB pad and OB retention basin is defined as replacement or repair of less than 100 square feet of surface concrete (or refractory for the new pad) per calendar year, or replacement of the grating. Replacement of the liner below the pad or basin or the PVC double-pipe is not considered a simple-action.

- Simple-action structures that have been in direct contact with the HW or HW residues, that are to be replaced, and are intended for off-site disposal (including recycling), offsite reuse, or offsite repair – Such items must be decontaminated and then sampled to verify cleanliness at a minimum rate of one sample per 100 s.f. of surface area of the item. If there were two items of 40 s.f. each, a minimum of two samples would be needed (one sample for each item). As an alternative, no verification samples would be required if the item were decontaminated and inspected per 40 CFR 268.45 (HW debris rule).

  NOTE: Items intended for reuse that are sampled for cleanliness will be considered clean when sample solid levels are below non-residential SRLs, or when rinsate *samples are non-detect. Items intended for disposal that are sampled for cleanliness will be considered "RCRA clean" when the item does not exhibit hazardous waste characteristics (e.g., D001, D003, D008, D030, etc.). The disposal facility may have other criteria.*

- Simple-action structures that might have been contaminated by HW or HW residues, that are to be replaced, and are intended for off-site disposal (including recycling), offsite reuse, or offsite repair – Such items do not need to be decontaminated, but need to be sampled to verify cleanliness, at a minimum rate of one sample per 500 s.f. of surface area of the item. As an alternative, no verification samples would be required if the item were decontaminated and inspected per 40 CFR 268.45 (HW debris rule). The same criteria for cleanliness described above apply.

B. Equipment:

- All equipment is subject to 'simple-action' procedures.

- Equipment that has been in direct contact with the HW or HW residues, that are to be replaced, and are intended for off-site disposal (including recycling), offsite reuse, or offsite repair – The same procedures as described above for simple action structures in direct contact with HW shall apply.

- Equipment that might have been contaminated by HW or HW residues, that are to be replaced, and are intended for off-site disposal (including recycling), offsite reuse, or offsite repair – The same procedures as described above for simple action structures that might have been contaminated by HW shall apply.

C. Soil:

- A minor spill to soil not requiring implementation of the contingency plan is considered a simple action.

- At a minimum, the soil remaining in place after the excavation will be sampled to verify cleanup at a rate of:

- one sample at 0-3 inches bgs for every 100 square feet of excavation base;

- one sample at 0-3 inches bgs for every 10 horizontal linear feet of excavation sidewall if the sidewall is greater than 1 foot high;

- one sample located at 0-3 inches bgs and 3 horizontal feet outside the excavation perimeter for every 10 linear feet of the excavation perimeter; and

- Separate samples are required for different soil types (e.g., clay and sand).

NOTE: Cleanliness will be determined by comparison to the Arizona soil remediation standards in A.A.C . R18-7-201 et seq.

- At a minimum, the soil excavated must be sampled at a rate of one sample for every 10 cubic yards of soil. Separate samples are required for different soil types (e.g., clay and sand in the soil). The disposal facility may have other criteria.

- Soil where no spill occurred but is in the proximity of the HWMU's such that it could be contaminated, and the soil is intended to be disposed of offsite.

- The excavated soil must be sampled at a rate of one sample for every 10 cubic yards of soil. Separate samples are required for different soil types (e.g., clay and sand in the soil).

II. Simple-Action Report

At a minimum, the 'simple action' report documenting the sampling, analysis, and disposal of equipment, structures, and soil shall include:

- Name of the Equipment or Structure (including unique identifier such as model number, if applicable), or whether it is soil.

- Applicable HW management unit(s) the equipment, structure, or soil pertains to (e.g., OD Area 3, South Pit; Southernmost OB Pan on Current North OB Pad; Entire OB/OD Site).

- The location of the area sampled shown on a sketch (If concrete or soil, the sample locations may either be measured or determined using a GPS device.).

- The intended purpose of characterization of the equipment, structure, or soil (e.g., off-site recycling, off-site reuse, disposal, maintenance, etc.).

- Type of pre-decontamination or pre-remediation samples taken, if applicable (soil, liquid rinsate, solid wipe samples, etc.).

- Method of decontamination or remediation, if applicable (e.g., steam cleaning; 40 CFR 268.45 abrasive blasting; hand excavation; bulldozer excavation, etc.).

- Type of post-decontamination or post-remediation samples taken, if applicable.

- If decontaminated pursuant to 40 CFR 268.45, certification that the equipment or structure meets the standards (including any inspection requirements) and restrictions designated in Table 1 of that regulation.
- If composite samples are taken (e.g., composite wheel methodology to analyze soils for explosives), specify the number of subsamples taken to form the composite.

- The sample record (see Section 3.2.4.3 (Sample Control)).

- The analytical methods performed for characterization.

- Laboratory analytical report including analytical results, QA/QC results, and chain of custody identifying the qualified sampler.

- A statement indicating final disposition (offsite solid waste landfill, offsite HW TSDF, offsite repair, offsite reuse, offsite solid waste recycling, offsite HW recycling, etc.).

- Name(s) and signature(s) of qualified person(s) approving sampling, analyses, decontamination and remediation (if applicable), and final disposition.

- Volume of waste generated.

- Purpose of removal/replacement.

- Date of Activities.

- The results of all HWD’s and visual inspections.

ARIZONA HAZARDOUS WASTE MANAGEMENT PERMIT

EPA I.D. NO. AZ5213820991

U.S. ARMY GARRISON YUMA PROVING GROUND

PERMIT ATTACHMENT 4

CONSTITUENTS OF POTENTIAL CONCERN

TABLE OF CONTENTS

CONTENTS PAGE

ATTACHMENTS

CONSTITUENTS OF POTENTIAL CONCERN

4.1 BACKGROUND

The U.S. Army Garrison Yuma Proving Ground (USAGYPG) is required to specify the chemical properties of the waste streams treated at the Open Burn/Open Detonation Munitions Treatment Facility (OB/OD MTF). This is necessary to identify the proper analytes or Constituents of Potential Concern (COPCs) for routine monitoring and closure of the treatment units. To arrive at the list of COPCs, the USAGYPG compiled a master list of compounds in 2004 from which a list of COPCs was derived. In 2016, the USAGYPG revalidated both the master list of compounds and the list of COPCs by comparing the 2000-2003 treatment data against 2014-2015 treatment data. This process is summarized in the following sections. The revalidated list of COPCs is provided in Permit Attachment 3A Table 3A-1. The 2014-2016 OB/OD MTF treatment data is provided in Permit Attachment 4A Table 4A-1. The revalidated master list of compounds is provided in Permit Attachment 4A Table 4A-2.

4.2 FUNCTION OF THE MASTER LIST

FOR A MUNITION ITEM TO BE TREATED AT THE USAGYPG OB/OD MTF, ALL OF THE COMPOUNDS/ELEMENTS IN THE ITEM MUST BE REPRESENTED ON THE MASTER LIST.

Further, the military munition (propellant, explosive, or pyrotechnic) must be assigned one or more of the following EPA hazardous waste codes: D001 (ignitability): D002 (corrosive); D003 (reactivity); D004 (arsenic); D005 (barium); D006 (cadmium); D007 (chromium); D008 (lead); D009 (mercury); D010 (selenium); D011 (silver); D030 (2,4-dinitrotoluene); D032 (hexachlorobenzene); D033 (hexachlorobutadiene); D035 (Methyl ethyl ketone); and D036 (nitrobenzene). Military munitions include foreign and civilian munitions brought to the USAGYPG for research and testing, and later declared hazardous waste at the USAGYPG for any of the reasons stated in the Waste Analysis Plan (Permit Attachment 3).

The master list will serve an additional purpose at the USAGYPG. Some organizations that use the range do not wish to reveal the exact composition of the munitions they plan to test. The USAGYPG will allow the testing of such munitions if the user will certify that all of the munition constituents appear on the master list.

4.3 DEVELOPMENT OF 2004 CONSTITUENT MASTER LIST

4.3.1 Literature Review

To develop a comprehensive master list of constituents and their properties, without regard to level of hazard presented by the compounds, the USAGYPG conducted a literature review. The review yielded several applicable references for materials related to explosives detonation or burning. The references provided an initial listing of approximately 344 compounds or elements.

These compounds/elements appeared in at least one of the references (YPG 2004c, Permit Attachment 4).

4.3.2 Review of the U.S. Army Garrison Yuma Proving Ground Data Summaries & Operating Records

The USAGYPG reviewed internal data summaries and OB/OD operating records over the period 2000-2003 and identified the munitions items treated. This data was condensed to a list of 126 unique munitions items for which detailed constituent data could be found. The detailed data from the MIDAS database was then input into the master list of compounds.

4.3.3 Oxidizers & Further Review

The USAGYPG critically evaluated the list and added a few additional compounds, as well as recognizing a class of compounds as oxidizers, that is, compounds that may respond to ASTM Method D 4981-95, "Standard Test Method for Screening of Oxidizers in Waste".

4.3.4 Master List Final Evaluation

The compounds in the master list were compared to five sets of regulations: ADEQ non-residential SRLs; ADEQ GPLs; Underlying Hazardous Constituents/Universal Treatment Standards; 40 CFR 261 Appendix VIII list; and 40 CFR 264 Appendix IX list.

The compounds that appeared in one or more of the five regulatory lists were grouped and noted as "regulated". Compounds or mixtures that contain or may contain regulated compounds also were included as regulated. Other compounds were categorized as being "of interest" (are known munition constituents), or as being "not regulated and not of interest". The end result was a comprehensive master list of chemical compounds and elements that may be present in items treated in the OB/OD MTF, including 247 "regulated", 42 "of interest" and 287 "not regulated and not of interest" chemicals.

4.4 DEVELOPMENT OF THE 2004 COPC TABLE

4.4.1 Procedure

The step-by-step procedure that was (and will be taken in any future evaluations) to determine the COPCs from the Master List of Constituents are:

1. The compounds classified as regulated were included in the COPC table with the following exceptions:

    a. Compounds for which there are no standard analytical methods

    b. Tetrazene (see discussion of rationale in the next section)

2. The compounds of interest for which there are standard analytical methods were included in the COPC table.

3. The remaining compounds (not regulated and not of interest) were not included in the COPC table.

Using the above criteria, 165 chemicals were identified for inclusion in the 2004 COPC table.

4.4.2 Regulated Compounds Excluded

4.4.2.1 Ether-alcohols

There is no standard analytical method for the ether-alcohols. They are present in small amounts in a few of the munitions tested at the USAGYPG during 2000-2003. As a class, these compounds have comparatively high non-residential screening reference levels (SRL) – 6,200 to 430,000 milligrams per kilogram (mg/kg). They will burn or evaporate during detonation, leaving very low concentrations dispersed on the soil surface. In view of the high non-residential SRLs and low concentrations anticipated in the environment, the USAGYPG recommends not pursuing a method for the ether-alcohols.

4.4.2.2 Hydrazine

The SRL for hydrazine is 5.7 mg/kg. Hydrazine is reactive and degrades rapidly in air and water. It degrades more slowly in soil. There are standard analytical methods for hydrazine in air, but there is no standard analytical method for hydrazine in soil. The USAGYPG is not aware of a reliable analytical method for hydrazine in soil.

4.4.2.3 Tetrazene

Tetrazene is a primary explosive, used in small amounts as an initiator. SW-846 Method 8331 (Explosives), with an estimated quantitation limit of 1 mg/kg, is available for the determination of tetrazene. It is an expensive analysis, and only a few laboratories offer it. The USAGYPG recommends analyzing for tetrazene only if there is specific reason to suspect sufficiently high concentrations of tetrazene to justify the expense.

4.4.2.4 40 CFR 261 Appendix VIII Compounds

Aziridine (CAS No. 151-56-4), diethylene glycol dicarbamate (CAS No. 5952-26-1), and thiourea (CAS No 62-56-6) are 40 CFR 261 Appendix VIII compounds for which regulatory levels have not been set. The USAGYPG plans not to pursue sampling and analysis for these compounds.

4.4.2.5 Regulated Compounds which are TICs

Several of the regulated compounds for which there are no analytical methods may be amenable to analysis by the SW-846 GC/MS methods, 8260 (volatile organic compounds (VOC)) and 8270 (semi-volatile organic compounds (SVOC)), as tentatively identified compounds (TICs). TIC analysis is accomplished by comparing the mass spectrum from the sample to the current GC/MS spectral library. If the compound is tentatively identified by spectral matching, its concentration may be *estimated* using an internal standard of similar structure. USAGYPG recommends against analysis of TICs that do not have approved and validated analytical methods.

4.5 REVALIDATED 2016 TABLES

The underlying chemical constituents of military munitions have changed little over the last 10-plus years. While munitions configurations may change, the chemical make-up of the energetic portions of munitions are much the same today as since the end of the Cold War in the early 1990s. Within these constraints, the USAGYPG decided to revalidate the list against recent data, instead of building a new master list.

For this revalidation, the 2014-2015 OB/OD MTF disposal data was collected and compared to the 2000-2003 data-set. Permit Attachment 4A Table 4A-1 summarizes by National Stock Number (NSN)/part number/stock number – nomenclature combinations all of the munitions treated at the USAGYPG OB/OD MTF during the period 2014-2015. In all, 313 distinct NSN/part number/stock numbers – nomenclature combinations items were identified. While some NSN/part number/stock numbers matched between the two data-sets, many did not as these identifiers change over time due to item updates. Instead, items between the two data-sets were matched based on item nomenclature, and user knowledge regarding the items. Using this process, it was determined that 90% of the items in the 2014-2016 data-set can be correlated with the items in the 2000-2003 data-set. Based on user knowledge, the remaining 10% were determined to have analogues in the 2000-2003 data-set that are comparable and representative.

With the match-up between the 2000-2003 and 2014-2016 data-sets completed, the Master List of the USAGYPG OB/OD compounds has been revalidated and is presented in the Permit Attachment 4A Table 4A-2.

Following the same process as in section 4.4 (Development Of The 2004 COPC Table), the 2004 COPC Table was reassessed and revalidated as still being current, and is provided in Permit Attachment 3A Table 3A-1 (WAP) as well.

4.6 REFERENCES

The following documents from the 2007 RCRA Permit issued by ADEQ are incorporated by reference into this 2016 renewal permit:

YPG 2004c — RCRA Operating Permit Application, Open Burn/Open Detonation Facility, U.S. Army Yuma Proving Grounds, prepared by Jason Associates Corporation, September 2004 Update.

- YPG 2004c, Permit Attachment 4: "Constituents Of Potential Concern"

ATTACHMENT 4A

TABLES

Table 4A-1. Munition Items Treated at the OB/OD MTF in 2014-2015

NSN / PART / STOCK NUMBER	NOMENCLATURE
41001426	CHG, PROP 155MM GB M3 SERIES
1305-00-892-2150	CTG 7.62MM M80
1305-01-094-1035	CTG 25MM M792
1305-01-299-1674	CTG 25MM M793 TRT
1305-01-426-4351	CTG 25MM M910
1305-01-492-1609	CHG PROP M234
1310-00-826-5395	60MM INCREMENT
1310-00-D01-1810	PROJ 60MM INERT
1310-01-050-8896	M204 PRO CHG F/60MM
1310-01-064-2839	CNTR & CLOSURE ASSY F/CHG PROP 60MM
1310-01-157-0689	CTG 40MM M385A1
1310-01-342-6874	CTG IGN M702 F/60MM
1310-01-342-6874	IGNITION CART M702
1310-01-482-1257	CTG 60MM M769 FRP
1310-01-482-1257	M235 CHG PROP F/60MM M769
1310-01-487-1944	M235 PROP CHG F/60MM
1310-01-487-1944	M783
1310-01-487-1944	M783 FUZE
1310-01-568-3208	CHG, PROP, M235 F/ MORTAR BA15
1310-01-568-3208	M235 CHG
1310-01-568-3208	M235 PROP CHG
1310-01-568-3208	MIS PROP C405 AWD M47 POWDER
1310-11-D01-2531	CTG 50MM MAPAM HE W/FUZE PD M783
1310-11-D01-2532	CTG 60MM MAPAM INERT W/FUZE PD M783
1313-01-492-1609	PROPELLANT F/ PROP CHARGE M234
1315-00-028-4361	CHG PROP M67 F/105MM M1
1315-00-028-4857	105 M/M M1 HE
1315-00-028-4857	105 M1 COMP B
1315-00-028-4857	105MM M1
1315-00-028-4857	105MM M1 HE
1315-00-028-4857	CTG 105MM HE M1
1315-00-028-4857	CTG 105MM M1
1315-00-028-4857	CTG 105MM M1 HE
1315-00-028-4857	WARHEAD M1, FOR PROJ, 105MM M1
1315-00-028-4857	WHD, F/ CART, 105MM M1 W/O FUZE, W/O PROP
1315-00-028-4861	CTG, 105MM M1 W/O FUZE, W/O PROP CHRG
1315-00-028-4861	PROJ 105MM M1
1315-00-028-4861	PROP F/ CHG, PROP 105MM M67
1315-00-077-2028	CASE CTG 105MM M1
1315-00-077-2128	CASE & PRIMER
1315-00-077-2128	CASE CTG 105MM M14B4
1315-00-077-2128	CHG, PROP F/105MM M67
1315-00-077-2128	KASE & PRIMER
1315-00-824-4503	CASE CART 105MM M14 W/PRIMER
1315-00-824-4503	CASE CART 105MM M14 W/PRIMER BRASS
1315-00-825-1384	CHG PROP M67

Table 4A-1. Munition Items Treated at the OB/OD MTF in 2014-2015

NSN / PART / STOCK NUMBER	NOMENCLATURE
1315-00-825-1384	PROPELLANT F/ CHG, PROP 105MM M67
1315-00-D00-8438	PROPELLANT F/ CHG, PROP, F/155MM
1315-00-D00-8693	CHG PROP M280
1315-00-D00-8693	F/ CHG, PROP 155MM WB M4 SERIES
1315-00-D00-8693	M230 PROP CHG F/120MM
1315-00-D00-8693	M233 PROP CHG F/120MM
1315-00-D02-2083	CTG 105MM PGU-44/B-E1 IM
1315-00-D02-2230	PROPELLANT F/ CHG, PROP M3 SERIES
1315-00-D02-2629	PROPELLANT FOR PROP CHG, F/155MM
1315-00-D02-3546	CHG PROP 105MM XM350 PN 13041276
1315-00-D02-3546	CHG PROP XM350
1315-00-D02-3546	CHG XM350
1315-00-D02-3546	PROP F/ CHG, PROP 105MM
1315-00-D02-3546	PROP R/PROP CHRG
1315-01-189-7764	PRO CHG M67
1315-01-219-3936	CTG 81MM REPAIR KIT 10 GA
1315-01-219-3936	CTG 81MM REPAIR KIT 20GA
1315-01-219-3936	REPAIR KIT
1315-01-219-3936	REPAIR KIT CTG 81MM
1315-01-219-3936	REPAIR KIT M880
1315-01-219-3936	REPAIR KIT SHOT GUN SHELLS RED
1315-01-219-3936	REPAIR KIT SHOT GUN SHELLS YELLOW
1315-01-219-3936	SHOTGUN SHELL 12GA
1315-01-219-3936	SHOTGUN SHELL 20GA
1315-01-219-3936	SHOTGUN SHELLS
1315-01-219-3936	SHOTGUN SHELLS (REPAIR KIT)
1315-01-219-3936	SHOTGUN SHELLS F/REPAIR KIT
1315-01-219-3936	SHOTGUN SHELLS F/REPAIR KIT RED
1315-01-219-3936	SHOTGUN SHELLS F/REPAIR KIT YELLOW
1315-01-233-2316	CHG M200
1315-01-233-2316	F/ CHG, PROP 155MM RG M203 SERIES
1315-01-237-4775	PROP F/105MM M67
1315-01-237-9725	M67 CHGS
1315-01-237-9775	105MM HE M1
1315-01-237-9775	CHG M67
1315-01-237-9775	CHG PROP 105MM M67
1315-01-237-9775	CHG PROP M67 105MM F1 M2A1
1315-01-237-9775	CTG CASE 105MM W/M67
1315-01-237-9775	M67 CHG
1315-01-237-9775	M67 PROP CHG F/105MM
1315-01-237-9775	PROP CHG M67
1315-01-239-9775	M67 CHG PROP
1315-01-288-5545	PROP F/120MM 1002
1315-01-288-5545	PROP F/120MM M1002 CTG 120MM TPCSDS-T M865
1315-01-289-9789	CTG 81MM M853 ILLUM
1315-01-289-9789	IGN CART M752

Table 4A-1. Munition Items Treated at the OB/OD MTF in 2014-2015

NSN / PART / STOCK NUMBER	NOMENCLATURE
1315-01-290-1597	M219 PROP CHG F/81MM
1315-01-290-1597	PROPELLANT F/ PROP CHARGE M219
1315-01-290-1598	M218 PROP C46 F/ 81MM
1315-01-290-4748	CTG IGN 81MM M752A1
1315-01-290-4748	M742A1 16N CART
1315-01-290-4748	M752A1 IGNITION CART
1315-01-319-3936	SHOTGUN SHELL
1315-01-319-3936	SHOTGUN SHELLS F REFURBISH KIT F 81MM PRAC
1315-01-326-2575	M220 CHG
1315-01-327-9775	PROP CHG 105MM M67
1315-01-329-2515	CHG PROP M220
1315-01-329-2575	CHG M220
1315-01-329-2575	CHG, PROP M220 F/CTG, 81MM
1315-01-329-2575	M220 PROP CHG F/81MM
1315-01-329-2575	PROPELLANT F/ PROP CHARGE M220
1315-01-337-8940	M67 PROP CHG
1315-01-353-7619	CTG 81MM HE M889A1
1315-01-353-7619	CTG 81MM M889A1
1315-01-353-7619	CTG 81MM M889A1 HE
1315-01-353-7619	M935
1315-01-354-4916	81MM M879 PRAC
1315-01-418-4363	M230 CHG PROP F/120MM M934A1
1315-01-465-5969	CTG IGN M1020
1315-01-465-5969	M1020 IGN CART, FOR CART 120MM M933
1315-01-465-5969	M102016W CART
1315-01-472-1854	CTG 105MM PGU 43/B
1315-01-492-1598	CHG PROP M233
1315-01-492-1609	120MM PROP CHG 60MM 81MM PROP CHG PROP
1315-01-492-1609	CHG M234
1315-01-492-1609	CHP PROP M234
1315-01-492-1609	M234 CHG
1315-01-492-1609	M234 PROP C46 F/120MM
1315-01-492-1609	M234 PROP CHG
1315-01-492-1609	M234 PROP CHG F/120MM
1315-01-492-1609	M234A1 F/120MM PROP CHG
1315-01-492-1609	M234A1 PROP C46 F/120MM
1315-01-492-1609	M546 F/SANG M553 120MM
1315-01-492-1609	MISC 120MM PROP CHG
1315-01-492-1609	MISC PROP 0403 60, 81, & 120MM
1315-01-492-1609	MISC PROP CHGS FOREIGN AND USA
1315-01-492-1609	PROP, F/ CHG F/CTG 81MM
1315-01-492-1609	PROPELLANT F/ CHG, PROP M220 F/CTG 81MM
1315-01-492-1609	PROPELLANT F/ PROP CHARGE
1315-01-492-1609	PROPELLANT F/ PROP CHARGE M235
1315-01-539-6966	81MM M879 CTG
1315-01-560-9914	PROJ 105MM M1130

Table 4A-1. Munition Items Treated at the OB/OD MTF in 2014-2015

NSN / PART / STOCK NUMBER	NOMENCLATURE
1315-01-576-8539	CTG 120MM M931
1315-01-578-7965	CTG 81MM M819 SMOKE RED PHOSPHORUS
1315-01-578-7965	M218 PROP CHG F/81MM
1315-01-593-8353	CTG 105MM M724A1E1
1315-01-614-6902	CTG 105MM PRAC
1315-01-618-5867	CTG 120MM HE M933A1
1315-13-D02-2861	120 MM M528A2 HE
1315-13-D02-2861	CTG 120MM M528A2 HE
1315-18-D02-3701	PROJ, 105MM
1320-00-028-4374	CHG PROP M18IN
1320-00-028-4374	PROPELLANT / CHG, PROP GB M1
1320-00-028-4378	CHG 8IN M2
1320-00-082-0811	CHG SUPP (T-2)
1320-00-082-0811	CHG SUPPL (T-2)
1320-00-082-0811	CHG SUPPL T2
1320-00-308-5555	M2 PROP CHG
1320-00-308-5555	PROPELLANT F/ PROP CHG WB SERIES M2
1320-00-312-9059	PROPELLANT F/ CHG, PROP, F/155MM M3 SERIES
1320-00-824-0811	CHG ASSY T2
1320-00-824-0811	CHG SUPP T2
1320-00-824-0811	CHG SUPP T-2 TNT
1320-00-824-0811	CHG, SUPPLEMENTARY
1320-00-925-1922	M3A1 CHG
1320-00-935-1922	CHG M3A1
1320-00-935-1922	CHG M3A1 155MM
1320-00-935-1922	CHG PROP 155MM M3A1
1320-00-935-1922	CHG PROP M3A1 155MM
1320-00-935-1923	CHG M4A2 155MM
1320-00-935-1923	CHG PROP 155MM M4A2
1320-00-935-1923	CHG PROP M4A2
1320-00-935-1923	M4A2 CHG
1320-00-935-1923	PROP CHG M4A2
1320-00-935-1923	PROPELLANT F/CHG, PROP 155MM WB M4 SERIES
1320-00-935-2091	CHG PROP F/EXCESS
1320-00-935-2091	CHG PROP M119A2
1320-00-D01-0303	PROJ 155MM M864 SLUGGER SPECIAL TEST W/LIVE BASE BURNER
1320-00D-01-0377	PROP M795 INERT
1320-00-D01-1109	PROK, 155MM HERA M549A1, INERT W/LIVE RKT MTR
1320-00-D01-3002	IGN BAG ASSM.
1320-00-D01-8265	BASE TACTICAL MK2 BB
1320-00-D02-0239	PROJ, 155MM M864 INERT, W/ LIVE BASEBURNER, W/O EXPULSION CHG
1320-00-D02-0989	CANDLE ASSY F/155MM XM1066 IR
1320-01-033-9394	CHG PROP 155MM RB M203
1320-01-053-6687	F/CHG PROP M203 SERIES
1320-01-093-6856	CHG M119A2

Table 4A-1. Munition Items Treated at the OB/OD MTF in 2014-2015

NSN / PART / STOCK NUMBER	NOMENCLATURE
1320-01-202-8938	CHG, PROP 155MM RB N203 SERIES
1320-01-202-8938	PROP 155MM M203A1
1320-01-202-8983	CHG PROP M203
1320-01-307-3952	CHG PROP M3A1
1320-01-307-3953	CHG M4A2
1320-01-307-3953	CHG PROP 155MM WB M4 SERIES
1320-01-310-4857	F/ CHG, PROP 155MM WB M119 SERIES W/O PRIMER
1320-01-312-9059	CHG, PROP 155MM BG M3 SERIES
1320-01-457-4063	CHG PROP 155MM XM232
1320-01-457-4063	CHG PROP 155MM XM232 W/PROPELLANT M30A1
1320-01-457-4603	PROPELLANT F/CHG, PROP M231
1320-01-526-6523	M232 PROP CHG GDE14D-0131072 (FROM)
1320-12-316-5792	CHG PROP 155MM DM72
1320-18-D02-0102	PROJ 155MM M549A1 INERT WAX FILLED W/ LIVE B/B
1320-99-725-7973	FUZES F/L15A4
1320-99-725-7973	PROJ 155MM L15A4 HE
1340-01-226-0717	WHD M274
1340-01-267-4223	RKT MTR 2.75" MK66 MOD 3
1340-01-446-4094	RKT 2.75" M274 W MK66
1340-01-446-4094	WHD M274 2.75"
1340-01-446-4096	RCKT MTR, 2.75 IN MK66-4
1340-01-446-4096	RKT MOTOR 2.75 MKD66 MOD4
1340-01-448-7506	WHD 2.75" M267
1376-00-009-0041	PROP POWDER F/M67
1376-00-009-0041	PROP POWDER M150 M67
1376-00-009-0042	CHG PROP M67 (23-37)
1376-00-481-6104	BOOSTER PELLET PBXN-5, FOR FUZE MULTI-OPTION M734
1376-00-689-4063	POWDER, BLK CLASS I, GLAZED
1376-00-689-4063	PROP CHG
1376-00-D00-0536	PROP POWDER HYBRID EXPERIMENTAL F/120MM
1376-00-D01-3497	PROPELLANT BALL POWDER (SHP)921
1376-00-D01-9743	PROPELLANT PAP-8419 SINGLE PERF
1376-00-D02-0078	PROP 1-PERF GRAIN IMR 5010
1376-00-D02-1360	PROPELLANT BALL POWDER OBP460 F/SMALL ARMS
1376-00-D02-2385	PROP SURFACE MODERATED M31A2
1376-00-D02-2387	PROPELLANT SOLID PAP-10-002 F/CHG PROP 105MM
1376-00-D02-2483	PROPELLANT XPR11R9 F/105MM
1376-00-D02-2485	PROPELLANT EPR53C5 F/105MM
1376-00-D02-2548	PROP L1/MM1807 L 15190-912
1376-00-D02-2549	PROP L1/MM1907 F CTG 120MM
1376-00-D02-3259	PROP PAP 12-049 MOD 3
1376-01-489-1519	PROPELLANT PAP 7993 MP M1 MOD
1376-01-526-6467	PROPELLANT M31A1E1 W/DECOPPERING AGENT M32A2
1376-11-D02-0346	PROPELLANT ECL DONKEY PC 8454
1376-11-D02-2670	PROP ECL-DONKEY PC 8338
1376-12-D02-1248	PROP DEGN I/SL 2100 STICK

Table 4A-1. Munition Items Treated at the OB/OD MTF in 2014-2015

NSN / PART / STOCK NUMBER	NOMENCLATURE
1390-00-187-5392	FUZE PD M557
1390-00-187-5392	FZ PD M557 W/BOOST
1390-00-825-1370	PRIMER 828B2
1390-00-825-1370	PRIMER M28B2
1390-00-825-1370	PRIMER PERC M28B2
1390-00-825-1370	PRIMER PERC M28E2
1390-00-889-2014	FUZE, PD M557
1390-00-D00-1502	FMTSQ M772 FUZE
1390-00-D006672	PRIMER, PERC M28A2/B2
1390-00-D02-0139	PRIMER F/50MM EAPS
1390-00-D02-0139	PRIMER, PERC M82 F/AEPS RND
1390-00-D02-3516	FUZE MO PGK XM1156 W/BOOSTER
1390-01-008-4605	PRIMER, PERC MK2A4
1390-01-050-8898	FUZE, MO M734 W/ COMP A-5 BOOSTER
1390-01-050-8898	M734 MO
1390-01-050-8898	M734 MO FUZE
1390-01-132-7481	FUZE PD M739A1
1390-01-268-7286	M734 FUZE M.O
1390-01-268-9155	FUZE PD M935
1390-01-268-9155	FZ PD M935
1390-01-282-6038	FUZE M762A1
1390-01-329-0777	M82 PERC PRIMER
1390-01-329-0777	PRIMER PERC M82
1390-01-329-0777	PRIMER, PERC M82
1390-01-384-0604	FUZE M751 PP
1390-01-384-0604	FUZE PD M751
1390-01-399-6878	FUZE M775 PRAC PD
1390-01-399-6878	FUZE PD M775 PRAC
1390-01-399-6878	FUZE PP M775 PRAC
1390-01-462-0699	FUZE MOFA M782
1390-01-464-1535	FUZE PD PRAC M787
1390-01-464-1535	M781 FUZE
1390-01-464-1535	M781 FUZE PD
1390-01-464-1535	SHOT GUN SHELL YELLOW
1390-01-464-1535	SPOTTING CHARGE SHOTGUN SHELL
1390-01-474-2262	BOOSTER F M767A1
1390-01-474-2262	FUZE ETM767A1
1390-01-474-2268	FUZE, ET M762A1
1390-01-483-4698	FUZE M783 PD/DCY
1390-01-483-4698	FUZE PD M783 W/ PBXN
1390-01-483-4698	FZ M783 / M734
1390-01-483-4698	FZ PD M783 PBXN-5
1390-01-483-4698	FZ PD/DLY M783
1390-01-483-4698	M734 FUZE
1390-01-483-4698	M783 FUZE, MD, DLY
1390-01-483-4698	M783 PD FUZE

Table 4A-1. Munition Items Treated at the OB/OD MTF in 2014-2015

NSN / PART / STOCK NUMBER	NOMENCLATURE
1390-01-483-4698	M783 PD/DLY FUZE
1390-01-548-0337	FUZE, M772 MTSQ F/ MOTAR
1390-44-D02-1012	FUZE MRV-U (URKAINE) F/RKT 122MM M21
1440-01-223-1494	GRIPSTOCK CONTROL F/GUIDED MISSILE STINGER
19203-8838201	IMX SUPPL CHG T2
BX06	PROP CHG 60MM
BX06	PROPELLANT F/ PROP CHARGE M236
C044	M220 PROP CHG F/60MM
MIXED	60MM INCREMENTS
N/A	CASE CTG 105MM W PERM W PROP
N/A	CHG 120MM C10
N/A	CHG M230
N/A	CTG .50 CAL
N/A	DUMMY FUZES
N/A	FUZE PD L166A1
N/A	M-10 EXP CHG
N/A	M234A1 PROP CHG F/120MM
N/A	M546 F/SANG
N/A	M546, M553
N/A	M553, M546
N/A	N/A
N/A	PELLET BOOSTER
N/A	PROJ 155MM PXR6325
N/A	STICK PROP 19 PER F
NCAU08M290	CHG PROOF 155MM UK
X12577522	CHG PROP M230
X12577522	M230 CHG
YPG2013267002	PROPELLANT F/CHG PROOF F/ 155MM
YPG201411026	INERT 81MM 879
	50MM PROP CHG
	60MM PROP CHGS
	CHG 155MM
	CHG 3-7 L8A2
	CHRG, PROP FOR PROJECTILE M546
	CTG 50MM EAPS W/INERT WHD
	M14B4 105MM CARTRIDGE CASES
	M231 CASE ASSM.
	PROJ, 155MM HE M107 (TNT)

Table 4A-2. Master List of U.S. Army Garrison Yuma OB/OD MTF Compounds and Elements

Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
REGULATED COMPOUNDS														
1,1,1-Trichloroethane	71-55-6	$C_2H_3Cl_3$			x	6	x	x	8260	113.4047	1.50E-01	1.34E+00	7.41E+01	
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	$C_2Cl_3F_3$			x	30			8260 TIC	187.3762	2.00E-02	1.58E+00	4.76E+01	
1,2,4-Trichlorobenzene	120-82-1	$C_6H_3Cl_3$			x	19.0	x	x	8270	181.4487	4.90E-03	1.46E+00	2.14E+02	
1,2-Dichlorobenzene	95-50-1	$C_6H_4Cl_2$			x	6.0	x	x	8270	147.0036	8.40E-03	1.31E+00	1.81E+02	
1,3,5-Trinitrobenzene (1,3,5-Tnb)	99-35-4	C_9H_{12}	D003				x	x	8330B	213.1062	NP	NP	NP	
1,3-Dichlorobenzene	541-73-1	$C_6H_4Cl_2$			x	6.0	x	x	8270	147.0036	1.25E-02	1.29E+00	1.73E+02	
1,3-Dinitrobenzene (1,3-Dnb)	99-65-0	$C_6H_4N_2O_4$	D003				x	x	8330B	168.1086	4.69E-02	1.37E+00	2.97E+02	1.50E+02
1,4-Dichlorobenzene	106-46-7	$C_6H_4Cl_2$	D027	7.5	x	6.0	x	x	8270	147.0036	8.13E-03	1.24E+00	1.73E+02	6.70E+01
1-Methylnaphthalene	90-12-0	$C_{11}H_{10}$						x	8270	142.2	<0.1	1.03E+00	2.40E+02	8.20E+01
2- Nitropropane	79-46-9	$C_3H_7NO_2$					x		8260	89.0938	1.7	9.92E-01	1.20E+02	2.80E+01
2,2-Oxybis (1-Chloropropane) [Bis (2-Chloro-1-Methyethyl) Ether]	108-60-1	$C_6H_{12}Cl_2O$					x	x	8270	171.0662	1.70E-01	1.11E+00	1.87E+02	ND
2,4,5-Trichlorophenol	95-95-4	$C_6H_3Cl_3O$	D041	400	x	7.4	x	x	8270	197.4481	1.20E-01	1.50E+00	2.53E+02	ND
2,4,6-Trichlorophenol	88-06-2	$C_6H_3Cl_3O$	D042	2	x	7.4	x	x	8270	197.4481	8.00E-02	1.49E+00	2.45E+02	9.90E+01
2,4,6-Trinitrotoluene (2,4,6-TNT)	118-96-7	$C_7H_5N_3O_6$	D003					x	8330B	227.133	1.00E-02	1.65E+00	240 (explodes)	
2,4-Dichlorophenol	120-83-2	$C_6H_4Cl_2O$			x	14.0	x	x	8270	163.003	4.50E-01	1.38E+00	2.10E+02	1.13E+02
2,4-Dimethylphenol	105-67-9	$C_8H_{10}O$			x	14.0	x	x	8270	122.1664	7.87E-01	9.65E-01	2.11E+02	1.10E+02
2,4-Dinitrophenol	51-28-5	$C_6H_4N_2O_5$			x	160.0	x	x	8270	184.108	2.79E-01	1.68E+00	1.13E+02	
2,4-Dinitrotoluene (2,4-DNT)	121-14-2	$C_7H_6N_2O_4$	D030	0.13	x	140.0	x	x	8330B	182.1354	2.70E-02	1.52E+00	3.00E+02	2.07E+02
2,6-Dinitrotoluene (2,6-DNT)	606-20-2	$C_7H_6N_2O_4$			x	28.0	x	x	8330B	182.1354	1.82E-02	1.28E+00	3.00E+02	
2-Amino-4,6-Dinitrotoluene (2-AM-4,6-DNT)	35572-78-2	$C_7H_7N_3O_4$							8330B	197.15	ND	ND	ND	ND
2-Amino-4-Nitrotoluene (2-Methyl-5-Nitroaniline)	99-55-8	$C_7H_8N_2O_2$			x	28.0			8270	152.1524	<0.1	ND	ND	ND
2-Chloronaphthalene	91-58-7	$C_{10}H_7Cl$			x	5.6	x	x	8270	162.6183	ND	ND	2.56E+02	ND
2-Chlorophenol	95-57-8	C_6H_5ClO			x	5.7	x	x	8270	128.5579	2.85	1.24E+00	1.76E+02	6.30E+01
2-Ethoxyethanol	110-80-5	$C_4H_{10}O_2$					x			90.1218	miscible	9.31E-01	1.36E+02	4.00E+01
2-Furaldehyde (Furfural)	98-01-1	$C_5H_4O_2$								96.0854	8.3	1.16E+00	1.67E+02	6.00E+01
2-Methyl-4,6-Dinitrophenol (4,6-Dintro-O-Cresol)	534-52-1	$C_7H_6N_2O_5$			x	160.0	x	x	8270	198.1348	1.00E-02	ND	ND	ND
2-Methylnapthalene	91-57-6	$C_{11}H_{10}$						x	8270	142.2	2.46E-03	1.00E+00	2.41E+02	9.70E+01

Table 4A-2. Master List of U.S. Army Garrison Yuma OB/OD MTF Compounds and Elements

Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
2-Methylphenol (O-Cresol)	95-48-7	C_7H_8O	D023	200	x	5.6		x	8270	108.1396	<0.1	1.05E+00	1.91E+02	8.10E+01
2-Nitroaniline	88-74-4	$C_6H_6N_2O_2$				14.0			8270	138.1256	1.26E-01	1.44E+00	2.84E+02	1.68E+02
2-Nitrophenol	88-75-5	$C_6H_5NO_3$			x	13.0		x	8270	139.1104	2.10E-01	1.50E+00	2.15E+02	1.02E+02
2-Nitrotoluene (2-NT) (MNT)	88-72-2	$C_7H_7NO_2$	D003						8330B	137.1378	6.00E-02	1.16E+00	2.22E+02	1.06E+02
3,3-Dichlorobenzidine	91-94-1	$C_{12}H_{10}Cl_2N_2$					x	x	8270	253.1304	1.23E-03	ND	3.68E+02	ND
3-Methylphenol (M-Cresol)	108-39-4	C_7H_8O	D024	200	x	5.6		x	8270	108.1396	1-5	1.03E+00	2.02E+02	8.60E+01
3-Nitrotoluene, M-Nitrotoluene (3-NT)	99-08-1	$C_7H_7NO_2$							8330B	137.1378	<0.1	1.16E+00	230 - 231	1.01E+02
4 -Chloro-3-Methylphenol (P-Chloro-M-Cresol)	59-50-7	C_7H_7ClO			x	14.0	x	x	8270	142.5847	3.85E-01	ND	2.35E+02	1.18E+02
4-Amino-2,6-Dinitrotoluene (4A-DNT)	19406-51-0	$C_7H_7N_3O_4$							8330B	197.15	ND	ND	ND	ND
4-Bromophenyl-Phenylether	101-55-3	$C_{12}H_9BrO$			x	15.0	x	x	8270	249.1065	ND	1.42E+00	3.10E+02	ND
4-Chloroaniline	106-47-8	C_6H_6ClN				16.0			8270	127.5731	3.90E-04	1.17E+00	2.32E+02	ND
4-Chlorophenyl-Phenyl Ether	7005-72-3	$C_{12}H_9ClO$						x	8270	204.6555	ND	ND	2.84E+02	ND
4-Methylphenol (P-Cresol)	106-44-5	C_7H_8O	D025	200	x	5.6		x	8270	108.1396	<0.1	1.03E+00	2.02E+02	8.90E+01
4-Nitroaniline	100-01-6	$C_6H_6N_2O_2$			x	28.0	x	x	8270	138.1256	8.00E-02	ND	3.32E+02	1.99E+02
4-Nitrophenol	100-02-7	$C_6H_5NO_3$			x	29.0	x	x	8270	139.1104	1.6	1.48E+00	2.79E+02	1.69E+02
4-Nitrotoluene, P-Nitrotoluene (4-NT)	99-99-0	$C_7H_7NO_2$							8330B	137.1378	<0.1	1.39E+00	2.38E+02	1.03E+02
Acenaphthene	83-32-9	$C_{12}H_{10}$			x	3.4		x	8270	154.211	3.47E-04	1.07E+00	2.79E+02	1.25E+02
Acenaphthylene	208-96-8	$C_{12}H_8$			x	3.4	x	x	8270	152.1952	3.93E-04	8.99E-01	2.65E+02	ND
Acetone	67-64-1	C_3H_6O			x	160.0		x	8260	58.0798	miscible	7.86E-01	5.62E+01	-2.00E+01
Acetophenone	98-86-2	C_8H_8O					x	x	8270	120.1506	5.50E-01	1.03E+00	2.02E+02	7.70E+01
Acrolein	107-02-8	C_3H_4O					x	x	8260	56.064	2.13E+01	8.39E-01	5.27E+01	-2.60E+01
AL Tape (See Aluminum)														
AL-NI-CO-Z Alloy (See Aluminum & Nickel)														
Aluminum	7429-90-5	Al							6010/ 6020	26.98154	insoluble	2.70E+00	2.33E+03	6.45E+02
Aluminum Nitrate (See Aluminum & Nitrate)	13473-90-0	AlN_3O_9								212.99624	ND	ND	ND	ND
Ammonia	7664-41-7	H_3N							350.3	17.0304	8.99E+01	6.82E-01	-3.33E+01	1.10E+01
Ammonium Dichromate (See Ammonia And See Chromium)	7789-09-5	$Cr_2H_8N_2O_7$								252.0644	3.10E+01	2.15E+00	ND	ND
Ammonium Nitrate	6484-52-2	$H_4N_2O_3$								80.0432	1.18E+02	1.73E+00	2.10E+02	ND

Table 4A-2. Master List of U.S. Army Garrison Yuma OB/OD MTF Compounds and Elements

Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
(See Ammonia & Nitrate)														
Ammonium Perchlorate (See Ammonia & Perchlorate)	7790-98-9	ClH_4NO_4								117.4889	soluble	ND	ND	ND
Ammonium Picrate (See Picric Acid)	131-74-8	$C_6H_6N_4O_7$								246.136	1.00E+00	ND	ND	ND
Aniline (Arylamine)	62-53-3	C_6H_7N			x	14.0	x	x	8270	93.128	3.50E+00	1.02E+00	1.84E+02	7.00E+01
Anthracene	120-12-7	$C_{14}H_{10}$			x	3.4		x	8270	178.233	4.34E-06	1.28E+00	3.40E+02	1.21E+02
Antimony	7440-36-0	Sb			x	1.15 mg/L	x	x	6010/ 6020	121.76	Insoluble	6.68E+00	1.64E+03	ND
Antimony Sulfide (See Antimony)	1315-04-4	$S_{10}Sb_4$					x			807.64	ND	ND	ND	ND
Aromatic 150	64742-94-5									ND	ND	ND	ND	ND
Arsenic	7440-38-2	As	D004	5	x	5 mg/L	x	x	6010/ 6020	74.9216	insoluble	ND	ND	ND
Aziridine (Ethyleneimine)	151-56-4	C_2H_5N					x			43.0682	miscible	ND	5.60E+01	-1.11E+01
Azobenzene	103-33-3	$C_{12}H_{10}N_2$								182.2244	<0.01	1.09E+00	2.93E+02	4.76E+02
Barium	7440-39-3	Ba	D005	100	x	21 mg/L	x	x	6010/ 6020	137.33	insoluble	ND	1.64E+03	ND
Barium Chloride (See Barium)	10361-37-2	$BaCl_2$					x			208.236	ND	3.86E+00	1.56E+03	ND
Barium Chromate (See Barium)	10294-40-3	$BaCrO_4$					x			253.3236	ND	ND	ND	ND
Barium Dinonylnapthenate (See Barium)	25619-56-1									ND	ND	ND	ND	ND
Barium Nitrate (See Barium, Nitrate, & Oxidizing Compounds)	10022-31-8	BaN_2O_6					x			261.3398	8.70E+00	3.23E+00	ND	ND
Barium Peroxide (See Barium & Oxidizing Compounds)	1304-29-6	BaO_2					x			169.3288	Slightly soluble	ND	ND	ND
Barium Stearate (See Barium)	6865-35-6	$C_{36}H_{70}BaO_4$					x			704.2766	ND	ND	ND	ND
Barium Sulfate (See Barium)	7727-43-7	O_4SBa								233.3876	Insoluble	4.25E+00	ND	ND
Benz[A]Anthracene	56-55-3	$C_{18}H_{12}$			x	3.4	x	x	8270	228.2928	1.40E-06	ND	4.38E+02	ND
Benzene	71-43-2	C_6H_6	D018, D001,	0.5	x	10.0	x	x	8270	78.1134	1.80E-01	8.79E-01	8.01E+01	-1.10E+01
Benzidine	92-87-5	$C_{12}H_{12}N_2$					x		8270	184.2402	<0.1	1.25E+00	4.02E+02	ND
Benzin, Naptha	8030-30-6									ND	ND	7.60E-01	110 - 190	ND
Benzo(A)Pyrene	50-32-8	$C_{20}H_{12}$			x	3.4	x	x	8270	252.3148	3.80E-07	1.35E+00	4.95E+02	ND
Benzo(B) Fluoranthene	205-99-2	$C_{20}H_{12}$			x	6.8	x	x	8270	252.3148	1.20E-07	ND	3.57E+02	ND
Benzo(G,H,I) Perylene	191-24-2	$C_{22}H_{12}$			x	1.8		x	8270	276.3368	2.6E-08	ND	5.00E+02	ND
Benzo(K)Fluoranthene	207-08-9	$C_{20}H_{12}$			x	6.8	x	x	8270	252.3148	5.5E-08	ND	4.80E+02	ND

Table 4A-2. Master List of U.S. Army Garrison Yuma OB/OD MTF Compounds and Elements

Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
Benzoic Acid	65-85-0	$C_7H_6O_2$							8270	122.1232	3.40E-01	1.08E+00	2.49E+02	1.21E+02
Benzyl Alcohol	100-51-6	C_7H_8O							8270	108.1396	4.29	1.05E+00	2.05E+02	9.40E+01
Beryllium	7440-41-7	Be			x	1.22 mg/L	x	x	6010/ 6020	9.01218	insoluble	ND	2.97E+03	ND
Bis(2-Chloroethoxy)Methane (Dichloromethoxyethane)	111-91-1	$C_5H_{10}Cl_2O_2$			x	7.2	x	x	8270	173.0388	ND	ND	2.18E+02	ND
Bis(2-Chloroethyl)Ether (Dichoroethyl Ether)	111-44-4	$C_4H_8Cl_2O$			x	6.0	x	x	8270	143.0126	1.72	1.22E+00	1.79E+02	5.50E+01
Bis(2-Chloroisopropyl)Ether	39638-32-9	$C_6H_{12}Cl_2O$				7.2			8270	171.0662	ND	ND	1.87E+02	ND
Bis(2-Ethylhexyl)Phthalate (DEHP) (Diethylhexylphthalate)	117-81-7	$C_{24}H_{38}O_4$			x	28.0	x	x	8270	390.5618	3.40E-05	9.73E-01	3.87E+02	1.99E+02
Boron	7440-42-8	B							6010/ 6020	10.81	ND	ND	3.65E+03	ND
Butyl Benzyl Phthalate	85-68-7	$C_{19}H_{20}O_4$			x	28.0	x	x	8270	312.3646	2.69E-04	1.10E+00	3.70E+02	ND
Cadmium	7440-43-9	Cd	D006	1	x	0.11 mg/L	x	x	6010/ 6020	112.41	insoluble	ND	7.65E+02	ND
Cadmium Chromate (See Cadmium & Chromium)							x	x						
Cadmium Phosphate (See Cadmium)	13847-17-1	$Cd_3O_8P_2$					x	x		527.17272	ND	ND	ND	ND
Carbon Disulfide	75-15-0	CS_2			x	4.8 mg/L	x	x	8260	76.131	1.19E-01	1.26E+00	4.62E+01	-3.00E+01
Carbon Tetrachloride	56-23-5	CCl_4	D019	0.5	x	6.0	x	x	8260	153.823	8.05E-02	1.59E+00	7.67E+01	ND
Chloroform	67-66-3	$CHCl_3$	D022	6	x	6.0	x	x	8260	119.3779	7.95E-01	1.50E+00	6.17E+01	ND
Chloromethylbenzene (Benzl Chloride)	100-44-7	C_7H_7Cl					x		8260	126.5853	5.25E-02	1.10E+00	1.79E+02	6.70E+01
Chromic Acid (See Chromium & Oxidizing Compounds)	1333-82-0	CrO_3								99.9942	6.20E+01	2.70E+00	2.50E+02	ND
Chromium (Total)	7440-47-3	Cr	D007	5	x	0.6 mg/L	x	x	6010/ 6020	51.996	insoluble	ND	2.64E+03	ND
Chrysene	218-01-9	$C_{18}H_{12}$			x	3.4	x	x	8270	228.2928	1.80E-07	1.27E+00	4.48E+02	ND
Copper	7440-50-8	Cu						x	6010/ 6020	63.546	1.00E-02	8.92E+00	2.60E+03	ND
Cyclohexane	110-82-7	C_6H_{12}								84.1608	<0.1	7.79E-01	8.07E+01	-1.80E+01
Cyclohexanone	108-94-1	$C_6H_{10}O$			x	0.75 mg/L	x			98.1444	5-10	9.47E-01	1.56E+02	4.60E+01
Dibenz[Ah]Anthracene	53-70-3	$C_{22}H_{14}$			x	8.2	x	x	8270	278.3526	5.00E-08	ND	5.24E+02	ND
Dibenzofuran	132-64-9	$C_{12}H_8O$						x	8270	168.1946	<0.1	ND	2.85E+02	1.30E+02
Dibutyl Phthalate (Di-N-Butyl Phthalate)	84-74-2	$C_{16}H_{22}O_4$			x	28.0	x	x	8270	278.3474	1.30E-03	1.04E+00	3.40E+02	1.71E+02
Dichloromethane (Methylene Chloride)	75-09-2	CH_2CL_2			x	30.0	x	x	8260	84.9328	1.32E+00	1.33E+00	3.98E+01	ND
Diethyl Phthalate	84-66-2	$C_{12}H_{14}O_4$			x	28.0	x	x	8270	222.2402	8.96E-02	1.12E+00	2.98E+02	1.60E+02

Table 4A-2. Master List of U.S. Army Garrison Yuma OB/OD MTF Compounds and Elements

Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
Diethylene Glycol Dicarbamate	5952-26-1	$C_6H_{12}N_2O_5$					x			192.1712	ND	ND	ND	ND
Diethylene Glycol Mono-N-Butyl Ether	112-34-5	$C_8H_{18}O_3$								162.2284	>=10	9.67E-01	2.30E+02	1.00E+02
Dimethyl Phthalate	131-11-3	$C_{10}H_{10}O_4$			x	28.0	x	x	8270	194.1866	<0.1	1.19E+00	2.84E+02	1.46E+02
Dinitrotoluene (All Isomers)	25321-14-6	$C_7H_6N_2O_4$							8330B	182.1354	3.00E-02	1.32E+00	2.50E+02	ND
Di-N-Octyl Phthalate	117-84-0	$C_{24}H_{38}O_4$			x	28.0	x	x	8270	390.5618	3.00E-04	9.78E-01	2.20E+02	1.04E+02
Diphenylamine	122-39-4	$C_{12}H_{11}N$				13.0	x	x	8270	169.2256	3.00E-02	1.16E+00	3.02E+02	1.52E+02
Ethyl Acetate	141-78-6	$C_4H_8O_2$			x	33.0			8260	88.106	8.00E-01	8.95E-01	7.71E+01	-4.00E+00
Ethyl Benzene	100-41-4	C_8H_{10}			x	10		x	8260	106.167	2.06E-02	8.67E-01	1.36E+02	1.50E+01
Ethyl Ether	60-29-7	$C_4H_{10}O$			x	160.0			8260	74.1224	6.90E+00	7.13E-01	3.46E+01	-4.00E+01
Ethylene Dichloride (1,2-Dichloroethane)	107-06-2	$C_2H_4Cl_2$			x	6.0	x	x	8260	98.9596	8.61E-01	1.25E+00	8.35E+01	1.30E+01
Ethylene Glycol Mono-N-Butyl Ether	111-76-2	$C_6H_{14}O_2$								118.1754	miscible	9.03E-01	1.71E+02	6.10E+01
Ethylene Oxide	75-21-8	C_2H_4O					x		8260	44.053	miscible	8.82E-01	1.07E+01	-2.00E+01
Fluoranthene	206-44-0	$C_{16}H_{10}$			x	3.4	x	x	8270	202.255	2.65E-05	ND	3.75E+02	ND
Fluorene	86-73-7	$C_{13}H_{10}$			x	3.4		x	8270	166.222	1.90E-05	1.203	2.95E+02	1.51E+02
Fuel Oil #6	68553-00-4									ND	ND	ND	ND	ND
Gasoline	8006-61-9								8260	ND	Insoluble	7.20E-01	32-225	-4.56E+01
Gamma-Bhc (Lindane)	58-89-9	$C_6H_6Cl_6$	D013	0.4	x	0.066	x		8270	290.8314	7.30E-04	1.87E+00	3.23E+02	ND
Hexachlorobenzene	118-74-1	C_6Cl_6	D032	0.13	x	10.0	x	x	8270	284.784	6.20E-07	2.04E+00	3.32E+02	2.42E+02
Hexachlorobutadiene	87-68-3	C_4Cl_6	D033	0.5	x	5.6	x	x	8270	260.762	3.20E-04	1.68E+00	2.10E+02	ND
Hexachlorocyclopentadiene	77-47-4	C_5Cl_6			x	2.4	x	x	8270	272.773	3.40E-04	1.70E+00	2.39E+02	ND
Hexachloroethane	67-72-1	C_2Cl_6	D034	3	x	30.0	x	x	8270	236.74	5.00E-03	2.09E+00	1.89E+02	ND
Hexahydro-1,3,5-Trinitro-1,3,5-Triazine (RDX) (Trimethylene Trinitramine)(Cyclotrimethylene Trinitramine)	121-82-4	$C_3H_6N_6O_6$							8330B	222.117	Insoluble	1.82E+00	ND	ND
Hydrazine	302-01-2	H_4N_2								32.045	miscible	ND	1.14E+02	3.78E+01
Hydrocarbon Lubricant	68649-12-7													
Hydrogen Chloride (See ph)	7647-01-0	ClH							pH	36.4609	6.20E+01	9.09E-01	-8.51E+01	1.10E+01
Hydrogen Cyanide	74-90-8	HCN							9012	27.0256	miscible	ND	2.56E+01	-1.80E+01
Hydrotreated Light Naphthenic Petroleum Distillates	64742-53-6									ND	ND	ND	ND	ND
Indeno(1,2,3-Cd)Pyrene	193-39-5	$C_{22}H_{12}$			x	3.4	x	x	8270	276.3368	6.20E-06	ND	5.36E+02	ND

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Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
Isobutyl Alcohol (Isobutanol)	78-83-1	$C_4H_{10}O$			x	170	X	X	8260	74.1224	9.50E+00	8.02E-01	1.08E+02	2.80E+01
Isophorone	78-59-1	$C_9H_{14}O$						x	8270	138.209	1.20E+00	9.23E-01	2.15E+02	8.40E+01
Iso-Propylbenzene (Cumene)	98-82-8	C_9H_{12}							8260	120.1938	4.99E-03	8.62E-01	1.51E+02	3.10E+01
Lead	7439-92-1	Pb	D008	5	x	0.75 mg/L	x	x	6010/ 6020	207.2	Insoluble	ND	1.74E+03	ND
Lead Beta Recorcyloate (See Lead)														
Lead Azide (See Lead)	13424-46-9	N_6Pb								291.2402	ND	ND	ND	ND
Lead Carbonate (See Lead)	598-63-0	CO_3Pb								267.2092	ND	ND	ND	ND
Lead Chromate Oxide (See Lead & Chromium)	18454-12-1	CrO_4 O Pb								ND	ND	ND	ND	ND
Lead Chromate (See Lead & Chromium)	7758-97-6	CrO_4Pb								323.1936	<0.1	ND	(dec)	ND
Lead Dioxide (See Lead)	1309-60-0	O_2Pb								239.1988	insoluble	9.38E+00	ND	ND
Lead Hydroxide (See Lead)	19783-14-3	$Pb(OH)_2$								ND	ND	ND	ND	ND
Lead Mononitroresorcinate (See Lead)	51317-24-9	$C_6H_5NO_4$ xPb												
Lead Naphthenate (See Lead)	61790-14-5	$C_7H_{12}O_2$ xPb								ND	ND	ND	ND	ND
Lead Salicylate (Propellant Burn Stabilizer) (See Lead)		$Pb(OOCC_6H_4OH)_2$												
Lead Styphnate (See Lead)	15245-44-0	$C_6HN_3O_8Pb$								450.2892	ND	ND	ND	ND
Lead Sulfocyananate (Lead Thiocyanate) (See Lead)	592-87-0	$Pb(SCN)_2$								323.3554	ND	ND	ND	ND
Liquified Petroleum	68476-85-7									ND	ND	ND	-40 - -1	ND
Maleic Anhydride	108-31-6	$C_4H_2O_3$					x		8270	98.058	SOLUBLE; DECOMPOSES IN HOT SOLVENT	1.31E+00	2.00E+02	1.03E+02
Manganese	7439-96-5	Mn							6010/ 6020	54.938	Decomposes	7.40E+00	2.10E+03	ND
Mercury	7439-97-6	Hg	D009	0.2	x	0.025 mg/L	x	x	7470, 7471	200.59	2.00E-03	1.35E+01	3.57E+02	ND
Mercury Fulminate (See Mercury)	628-86-4	$C_2HgN_2O_2$								284.6242	ND	ND	ND	ND
Methanol	67-56-1	CH_4O			x	0.75 mg/L			8260	32.042	miscible	7.91E-01	6.46E+01	1.20E+01
Methyl Ethyl Ketone	78-93-3	C_4H_8O			x	36	x	x	8260	72.1066	2.56E+01	8.05E-01	7.96E+01	-7.00E+00
Methyl Isobutyl Ketone	108-10-1	$C_6H_{12}O$			x	33	x	x	8260	100.1602	1.90E+00	7.98E-01	1.17E+02	1.40E+01
Methylcyclohexane	108-87-2	C_7H_{14}							8270 TIC	98.1876	insoluble	7.69E-01	1.01E+02	-3.00E+00
Methylphenol (Cresol)	1319-77-3	C_7H_8O	D026	200			x		8270	324.4188	1.93E+00	1.04E+00	88-94	8.20E+01

Table 4A-2. Master List of U.S. Army Garrison Yuma OB/OD MTF Compounds and Elements

Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
Mineral Spirits	64475-85-0									ND	ND	ND	ND	ND
Molybdenum	7439-98-7	Mo							6010/ 6020	95.94	Insoluble	ND	4.83E+03	ND
Molybdenum Disulfide (See Molybdenum)	1317-33-5	MoS_2								ND	ND	ND	ND	ND
Molybdenum Trioxide (See Molydenum)	1313-27-5	MoO_3								143.9382	<0.1	4.69E+00	1.16E+03	ND
Naphthalene	91-20-3	$C_{10}H_8$			x	5.6	x	x	8270	128.1732	3.10E-03	9.97E-01	2.18E+02	7.80E+01
Naptha (Petroleum)	64741-41-9									ND	ND	ND	6.50E+01	ND
N-Butyl Alcohol	71-36-3	$C_4H_{10}O$			x	2.6	x		8260	74.1224	6.32E+00	8.10E-01	1.18E+02	3.50E+01
N-Hexane	110-54-3	C_6H_{14}								86.1766	9.47E-04	6.55E-01	6.90E+01	-2.20E+01
Nickel	7440-02-0	Ni			x	11 mg/L	x	x	6010/ 6020	58.6934	insoluble	8.90E+00	2.73E+03	ND
Nitrate (Total Nitrate/Nitrite Will Be Compared To SRL For Nitrite)	14797-55-8	NO_3							353.2	62.0049	ND	ND	ND	ND
Nitric Acid (See Nitrate, Oxidizing Compounds, & ph)	7697-37-2	HNO_3								63.0128	miscible	1.38E+00	1.21E+02	ND
Nitrite (See Nitrate)	14797-65-0	NO_2							353.2	46.0055	ND	ND	ND	ND
Nitrobenzene	98-95-3	$C_6H_5NO_2$	D036	2	x	14.0	x	x	8330B	123.111	1.90E-01	1.20E+00	2.11E+02	8.70E+01
Nitrocellulose (NC) (Nitrostarch)	9004-70-0	$C_{12}H_{16}(ONO_2)_4O_6$	D003						lab specific	ND	Insoluble	ND	ND	-4.50E+01
Nitroglycerin (NG) (1-Nitroglycerol)	55-63-0	$C_3H_5N_3O_9$					x		lab specific	227.0872	Slightly soluble	ND	ND	ND
Nitroguanidine (NQ)	556-88-7	$CH_4N_4O_2$							lab specific	104.0682	ND	ND	ND	ND
N-Nitroso Di-N-Propylamine	621-64-7	$C_6H_{14}N_2O$				14.0			8270	130.1894	9.89E-01	ND	2.06E+02	9.90E+01
N-Nitrosodiethylamine	55-18-5	$C_4H_{10}N_2O$			x	28.0	x	x	8270	102.1358	9.30E+00	ND	1.77E+02	6.10E+01
N-Nitrosodimethylamine	62-75-9	$C_2H_6N_2O$			x	2.3			8270	74.0822	>=10	1.01E+00	1.49E+02	6.10E+01
N-Nitrosodiphenylamine	86-30-6	$C_{12}H_{10}N_2O$			x	13.0		x	8270	198.2238	3.50E-03	1.23E+00	2.68E+02	ND
Octahydro-1,3,5,7-Tetranitro-1,3,5,7-Tetrazocine (HMX)	2691-41-0	$C_4H_8N_8O_8$	D003						8330B	296.156	ND	ND	ND	ND
Pentachlorophenol	87-86-5	C_6HCl_5O	D037	100	x	7.4	x	x	8270	266.3383	1.40E-03	1.98E+00	3.10E+02	ND
Pentaerythritol Tetranitrate (PETN) (Nitropenaerythrite)	78-11-5	$C_5H_8N_4O_{12}$	D003						8330B	316.1378	<0.1	ND	ND	ND
Perchlorate	14797-73-0	ClO_4^-							314.0	99.4506	ND	ND	ND	ND
Perchloropentacyclodecane (Mirex)	2385-85-5	$C_{10}Cl_{12}$							8270	545.546	<0.1	ND	(dec)	ND
Petroleum Distillate	8002-05-9									ND	ND	ND	-8.00E+01	ND
Petroleum Hydrocarbon	n/a													
Phenanthrene	85-01-8	$C_{14}H_{10}$			x	5.6		x	8270	178.233	1.18E-04	1.06E+00	3.40E+02	ND

Table 4A-2. Master List of U.S. Army Garrison Yuma OB/OD MTF Compounds and Elements

Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
Phenol	108-95-2	C_6H_6O			x	6.2	x	x	8270	94.1128	8.28E+00	1.07E+00	1.82E+02	7.90E+01
Phosphorus, White	7723-14-0	P							6010/ 6020	30.97376	3.00E-04	2.34E+00	ND	3.00E+01
Picric Acid	88-89-1	$C_6H_3N_3O_7$							lab specific	229.1056	1.40E+00	1.76E+00	>300	1.50E+02
Potassium Ferricyanide (See Cyanide)	13746-66-2	C_6FeN_6 3K								329.2212	ND	1.85E+00	ND	ND
Potassium Nitrate (See Nitrate)	7757-79-1	KNO_3								101.0949	ND	2.11E+00	ND	ND
Potassium Perchlorate (See Perchlorate)	7778-74-7	$ClKO_4$								138.5406	7.50E-01	2.52E+00	ND	ND
Potassium Permanganate (See Manganese & Oxidizing Compounds)	7722-64-7	$KMnO_4$								158.0256	6.40E+00	2.70E+00	ND	ND
Proplene Glycol Monomethyl Ether	107-98-2	$C_4H_{10}O_2$								90.1218	>=10	9.24E-01	1.20E+02	3.30E+01
Prussian Blue Dye (See Cyanide)	14038-43-8	$Fe[Fe(CN)_6]_3$								859.2336	ND	ND	ND	ND
Pyrene	129-00-0	$C_{16}H_{10}$			x	8.2		x	8270	202.255	1.30E-06	1.27E+00	4.04E+02	2.10E+02
Pyridine	110-86-1	C_5H_5N	D038	5	x	16.0			8260/ 8270	79.1012	Miscible	9.82E-01	1.15E+02	1.70E+01
Red PB Oxide (See Lead)	1314-41-6	O_4Pb_3							6010/ 6020	685.5976	ND	ND	ND	ND
SB Sulfide (See Antimony)	1345-04-6	S_3Sb_2							6010/ 6020	679.4	insoluble	ND	ND	ND
Selenium	7782-49-2	Se	D010	1	x	5.7 mg/L			6010/ 6020	78.96	insoluble	4.79E+00	6.85E+02	ND
Silver	7440-22-4	Ag	D011	5	x	0.14 mg/L	x	x	6010/ 6020	107.868	insoluble	ND	2.21E+03	ND
Smokeless Powder (See Nitrocellulose)														
SN Coating (See Tin)														
Sodium Dichromate (See Chromium)	10588-01-9	$CrO_7$2Na								261.96734	ND	ND	4.00E+02	ND
Sodium Nitrate (See Nitrate & Oxidizing Compounds)	7631-99-4	$NNaO_3$								84.99467	soluble	2.26E+00	3.80E+02	ND
Strontium	7440-24-6	Sr							6010/ 6020	87.62	ND	ND	ND	ND
Strontium Chromate (See Strontium & Chromium)	7789-06-2	CrO_4Sr								203.6136	slightly	ND	ND	ND
Strontium Nitrate (See Nitrate & Oxidizing Compounds)	10042-76-9	N_2O_6Sr								211.6298	soluble	2.99E+00	6.45E+02	ND
Strontium Oxalate (See Strontium)	814-95-9	C_2O_4Sr								175.6396	ND	ND	ND	ND
Strontium Peroxide (See Strontium & Oxidizing Compounds)	1314-18-7	O_2Sr								119.6188	decomposes	ND	ND	ND
Styrene Monomer	100-42-5	C_8H_8						x	8260	104.1512	3.20E-02	9.05E-01	1.45E+02	3.20E+01
Synthetic Hydrocarbon	n/a													

Table 4A-2. Master List of U.S. Army Garrison Yuma OB/OD MTF Compounds and Elements

Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
Tetryl (Methyl-2,4,6-Trinitrophenylnitramine)	479-45-8	$C_7H_5N_5O_8$							8330B	287.1452	2.00E-02	ND	1.87E+02	ND
Thiourea	62-56-6	CH_4N_2S					x			76.116	1-5	1.41E+00	ND	ND
Tin	7440-31-5	Sn						x	6010/ 6020	118.69	ND	7.30E+00	2.27E+03	ND
Tin Chromate (See Tin & Chromium)	38455-77-5	Cr-H2-O4.1/2Sn												
Tin Dioxide (See Tin)	18282-10-5	O_2Sn								150.6888	ND	6.95E+00	ND	ND
Toluene	108-88-3	C_7H_8			x	10	x	x	8260	92.1402	5.26E-02	8.67E-01	1.11E+02	4.00E+00
Trichloroethylene	79-01-6	C_2HCl_3	D040	0.5	x	6.0			8260	131.3889	1.10E-01	1.46E+00	8.67E+01	ND
Trichlorofluoromethane	75-69-4	CCl_3F			x	30.0	x	x	8260	137.3684	1.24E-01	1.49E+00	2.38E+01	ND
Vanadium	7440-62-2	V			x	1.6 mg/L		x	6010/ 6020	50.941	Insoluble	ND	ND	ND
Vinyl Acetate	108-05-4	$C_4H_6O_2$								86.0902	2.00E+00	9.34E-01	7.23E+01	-8.00E+00
Vinyl Chloride	75-01-4	C_2H_3Cl	D043	0.2	x	6.0	x	x	8260	62.4987	1.10E-01	9.11E-01	-1.39E+01	4.20E+01
Vm&P Naphtha	8032-32-4									ND	ND	6.56E-01	30-60	-3.00E+01
Xylenes	1330-20-7	C_8H_{10}			x	30	x	x	8260	318.501	1.75E-02	8.62E-01	1.40E+02	2.50E+01
Zinc	7440-66-6	Zn			x	4.3 mg/L		x	6010, 6020	65.39	Insoluble	7.14E+00	9.08E+02	ND
Zinc Chromate (See Zinc & Chromium)	13530-65-9	CrH_2O_4Zn								181.3836	ND	ND	ND	ND
Zinc Phosphate (See Zinc)	7779-90-0	$O_8P_2Zn_3$								386.11272	ND	ND	ND	ND
ZN Oxide (See Zinc)	1314-13-2	OZn								81.3894	insoluble	5.61E+00	ND	ND
ZN Stearate (See Zinc)	557-05-1	$Zn(C_{18}H_{35}O_2)_2$								632.3366	ND	ND	ND	2.76E+02
General Indicators														
Oxidizing Compounds									ASTM D4981-95					
ph - Soil									9045					
COMPOUNDS OF INTEREST														
1,1,1-trimethylolethane trinitrate (TMETN)	3032-55-1	$C_5H_9N_3O_9$								255.1408	ND	1.47E+00	ND	ND
1,2,4-butanetriol trinitrate (BTN)	6659-60-5	$C_4H_7N_3O_9$								241.114	ND	ND	ND	ND
1,3,5,7-tetranitrocubane														
1,3-dinitroglycerol	623-87-0	$C_3H_6N_2O_7$								182.0896	ND	ND	ND	ND
1-nitropyrene	5522-43-0	$C_{16}H_9NO_2$								247.2526	<0.1	ND	ND	ND
2,4,6-trinitrobenzaldehyde	606-34-8	$C_7H_3N_3O_7$								241.1166	ND	ND	ND	ND
2,4,6-Trinitroresorcinol (Styphnic	82-71-3	$C_6H_3N_3O_8$								245.105	ND	ND	ND	ND

Table 4A-2. Master List of U.S. Army Garrison Yuma OB/OD MTF Compounds and Elements

Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
acid)														
2,4-diamino-6-nitrotoluene (2,4-DANT)	6629-29-4	$C_7H_9N_3O_2$								167.167	ND	ND	ND	ND
2,6-diamino-4-nitrotoluene (2,6-DANT)	59229-75-3	$C_7H_9N_3O_2$								167.167	ND	ND	ND	ND
2-amino-6-nitrotoluene	603-83-8	$C_7H_8N_2O_2$								152.1524	<0.1	ND	3.05E+02	ND
2-nitrodiphenylamine	119-75-5	$C_{12}H_{10}N_2O_2$								214.2232	<0.1	1.36E+00	ND	ND
2-nitronaphthalene	581-89-5	$C_{10}H_7NO_2$								173.1708	insoluble	ND	165	ND
3,5-dinitroaniline	618-87-1	$C_6H_5N_3O_4$								183.1232	insoluble	ND	ND	ND
3-nitroaniline	99-09-2	$C_6H_6N_2O_2$							8270	138.1256	8.90E-02	1.43E+00	3.06E+02	ND
4-acetamide-2-nitrotoluene		$C_7H_7NO_2$												
4-nitrocentralite														
Cobalt	7440-48-4	Co							6010	58.9332	<0.1	8.92E+00	2.87E+03	ND
Diamino-Trinitrobenze (DATB)	1630-08-6	$C_6H_5N_5O_6$								243.1354	ND	ND	ND	ND
Diazodinitrophenol (DDNP)	87-31-0	$C_6H_2N_4O_5$								ND	ND	ND	ND	ND
Dietheleneglycol Dinitrate (DEGDN)	693-21-0	$C_4H_8N_2O_7$								196.1164	ND	ND	ND	ND
Dinitrocellulose (see Nitrocellulose - Table1)									NC Method					
Dinitroso-hexahydro-1,3,5-triazine (DNX)		$C_3H_6O_4N_6$							oxidizer screen ?					
Ethyl centralite (diethyldiphenyl urea, centralite I)	85-98-3	$C_{17}H_{20}N_2O$							oxidizer screen ?	268.3578	<0.1	1.12E+00	325-330	1.50E+02
Ethylene dinitramine (Haleite, EDNA)	505-71-5	CH_2NHNO_2								150.0938	ND	ND	ND	ND
Ethylene glycol dinitrate (EDGN, Nitroglycol) (see Nitrocellulose - Table1)	628-96-6	$C_2H_4N_2O_6$								152.0634	5.20E-01	ND	114 (explodes)	ND
Ethylenediamine dinitrate (EDAD, EDDN) (see Nitrocellulose - Table 1)	20829-66-7	$C_2H_{10}N_4O_6$												
Hexanitrostilbene (HNS)	20062-22-0	$C_{14}H_6N_6O_{12}$								450.2344	ND	ND	ND	ND
Methylcentralite (dimethyldiphenylurea, centralite II)	611-92-7	$C_{15}H_{16}N_2O$								240.3042	ND	ND	ND	ND
Methylnitrate	598-58-3	CH_3NO_3								77.0396	ND	ND	ND	ND
Nitrodiphenylamine	836-30-6	$C_{12}H_{10}N_2O_2$							8270 TIC??	214.2232	ND	ND	ND	ND
Nitromethane	75-52-5	CH_3NO_2								61.0402	9.50E+00	1.14E+00	1.01E+02	3.50E+01

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Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
Nitroso-dinitro-hexahydro-1,3,5-traizine (MNX)			D003											
Potassium chlorate (see Oxidizing Compounds - Table 1)	3811-04-9	$ClKO_3$								122.5412	7.10E+00	2.32E+00	4.00E+02	ND
Potassium dinitrobenzofuroxane (KDNBF)		$KC_6H_4N_4O_6$	D003											
Sulfur (indicator)	7704-34-9	S							lab specific	256.48	Practically insoluble	2.07E+00	4.45E+02	1.68E+02
Tetranitroaniline	53014-37-2	$C_6H(NO_2)_4NH_2$								ND	ND	ND	ND	ND
Tetranitrocarbazole	4543-33-3	C12-H5-N5-O8												
Tetrazene	109-27-3	C_2-H_8-N_{10}-O							8331					
Triethylene glycol dinitrate (TEGDN,TEGN,alphatic nitate ester)		$C_6H_{12}N_2O_8$												
tri-nitroso-dinitro-hexahydro-1,3,5-triazine (TNX)														
COMPOUNDS *NOT* REGULATED AND *NOT* OF INTEREST														
1,1,1,2-Tetrafluoroethane	811-97-2									102.0314	ND	ND	-2.62E+01	ND
1,2,3-trihydroxybenzene (pyrogallol)	87-66-1	$C_6H_6O_3$								126.1116	6.25E+01	1.45E+00	3.09E+02	ND
1,4 Diglycidyloxybutane	2425-79-8									202.2498	1-5	1.05E+00	2.66E+02	ND
1-hydroxy-2-propanone	116-09-6	$C_3H_6O_2$								74.0792	ND	1.08E+00	145-146	5.60E+01
1-Methyoxy-2-acetoxypropane	108-65-6									132.159	ND	9.69E-01	1.46E+02	4.20E+01
2 Ethyl-4-methylimidazole	931-36-2									110.1584	ND	9.75E-01	292-295	1.55E+02
2- Ethylhexanoic acid	149-57-5	$C_8H_{16}O_2$								144.2132	<0.1	9.03E-01	2.28E+02	1.18E+02
2,2,4-trimethylhexane	16747-26-5	C_9H_{20}								128.257	ND	7.16E-01	1.27E+02	ND
2,2,4-trimethylpentane	540-84-1	C_8H_{18}								114.2302	insoluble	6.92E-01	9.92E+01	-1.20E+01
2,2-dimethylbutane	75-83-2	C_6H_{14}								86.1766	<0.1	6.44E-01	4.97E+01	-4.80E+01
2,2'-Methylenebis(4-methyl-6-tert-butylphenol)	119-47-1	$C_{23}H_{32}O_2$								340.5046	ND	ND	ND	ND
2,3-benzofuran	271-89-6	C_8H_6O								118.1348	0.01-0.1	1.09E+00	1.73E+02	5.00E+01
2,3-dihydro-4-ethyl-1H-indene														
2,3-dimethylbutane	79-29-8	C_6H_{14}								86.1766	<0.1	6.62E-01	5.80E+01	-2.90E+01
2,3-dimethylhexane	584-94-1	C_8H_{18}								114.2302	ND	7.12E-01	1.16E+02	ND
2,3-dimethylpentane	565-59-3	C_7H_{16}								100.2034	ND	6.95E-01	9.00E+01	-6.00E+00
2,4-dimethylpentane	108-08-7	C_7H_{16}								100.2034	ND	6.73E-01	8.10E+01	ND
2,5-dimethylhexane	592-13-2	C_8H_{18}								114.2302	ND	6.94E-01	1.09E+02	2.60E+01

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Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
2,5-diphenyloxazole	92-71-7	C_7H_9NO								221.258	ND	ND	3.60E+02	ND
2-aminoanthraquinone	117-79-3	$C_{14}H_9NO_2$								223.2306	<0.1	ND	(subl)	ND
2-chlorobenzaldehyde	89-98-5	C_7H_5ClO								140.5689	0.1-0.5	1.25E+00	2.12E+02	8.70E+01
2-methyl-1-butene	563-46-2	C_5H_{10}								70.134	insoluble	6.50E-01	3.10E+01	ND
2-methylheptane	592-27-8	C_8H_{18}								114.2302	ND	6.98E-01	1.18E+02	4.00E+00
2-methylhexane	591-76-4	C_7H_{16}								100.2034	ND	6.79E-01	9.00E+01	-3.00E+00
3-methylhexane	589-34-4	C_7H_{16}								100.2034	ND	6.87E-01	9.20E+01	-3.00E+00
4-ethyltoluene	622-96-8	C_9H_{12}								120.1938	ND	8.61E-01	1.62E+02	3.60E+01
Acetal Molding														
Acetic Acid	64-19-7	$C_2H_4O_2$								60.0524	miscible	1.05E+00	1.18E+02	4.00E+01
Acetyltriethylcitrate	77-89-4	$C_{14}H_{22}O_8$								318.323	ND	1.14E+00	132 at 1 mmHg	ND
Acrylic resin	n/a													
Acrylonitrile/1,3-butadiene polymer	9003-18-3									ND	ND	ND	ND	ND
Adhesive Proxseal														
Akardit II														
Alkyd Resin	n/a													
Amyl alcohol	71-41-0									88.1492	1-5	8.15E-01	137.9 - 139	3.20E+01
Anhydride harderners	n/a													
Anthraquinone	84-65-1	$C_{14}H_8O_2$								208.216	<0.1	1.44E+00	3.80E+02	1.85E+02
Asbestos	1332-21-4	n/a								ND	ND	ND	ND	ND
Asphalt Oxide	64742-93-4									ND	ND	ND	ND	ND
Asphaltum	8052-42-4	n/a								ND	ND	ND	ND	ND
Aurine	603-45-2	$C_{19}H_{14}O_3$								290.3178	ND	ND	ND	ND
Bees wax	8012-89-3									ND	ND	ND	ND	ND
Benzanthrone	82-05-3	$C_{17}H_{10}O$								230.2654	ND	ND	ND	ND
Benzothiophene	11095-43-5	C_8H_6S								134.1954	ND	ND	ND	ND
Benzyl Phenylundecane	n/a													
Binder														
Bismuth	7440-69-9	Bi								208.9804	ND	9.80E+00	1.50E+03	ND
Bisphenol A Epichlor	25085-99-8									262.3048	ND	ND	ND	ND
Bisphenol a fumarat	n/a													

Table 4A-2. Master List of U.S. Army Garrison Yuma OB/OD MTF Compounds and Elements

Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
Bisphenol a propelyn	39382-25-7													
Butyl acetate	123-86-4	$C_6H_{12}O_2$								116.1596	6.80E-01	8.82E-01	1.26E+02	2.20E+01
Calcium	7440-70-2	Ca								40.08	decomposes	1.54E+00	1.48E+03	ND
Calcium carbonate	471-34-1	$CCaO_3$								100.0892	ND	2.93E+00	ND	ND
Calcium Chloride	10043-52-4	$CaCl_2$								110.986	ND	ND	1.60E+03	ND
Calcium Phosphate	10103-46-5	$Ca_3O_8P_2$								310.18272	ND	ND	ND	ND
Calcium Resinate	9007-13-0	$C_{40}H_{58}CaO_4$								642.9758	ND	ND	ND	ND
Calcium Silicate	1344-95-2	Ca_2O_4Si								172.2436	ND	ND	ND	ND
Calcium Silicide	12013-55-7	$CaSi_2$								ND	ND	ND	ND	ND
Calcium stearate	1592-23-0	$C_{36}H_{70}CaO_4$								607.0266	ND	ND	ND	ND
Camphor	76-22-2	$C_{10}H_{16}O$								152.2358	1.20E-01	9.90E-01	2.07E+02	6.40E+01
Candelilla wax	8006-44-8									ND	ND	ND	ND	ND
Carbon Black	1333-86-4	C								12.011	Insoluble	ND	4.20E+03	ND
Carbon Dioxide	124-38-9	CO_2								44.0098	1.40E-01	ND	-7.84E+01	ND
Carbonyl sulfide	463-58-1	COS								60.0704	Soluble	ND	-5.02E+01	ND
Carborundum	409-21-2	CSi								40.097	ND	ND	ND	ND
Cellulose	9004-34-6	n/a								ND	insoluble	ND	ND	ND
Cellulose acetate	9004-35-7	n/a								ND	ND	1.27E+00	ND	ND
Cellulose Strip														
Charcoal	7440-44-0	C								12.011	ND	1.80E+00	ND	ND
Chipboard														
Chlorinated Rubber	9006-03-5													
Chlorine	7782-50-5	Cl_2								70.906	7.00E-01	ND	-3.41E+01	ND
Chloroacetophenone	1341-24-8	C_8H_7ClO								154.5957	ND	ND	ND	ND
CI Solvent black	8005-02-5									ND	0.1	ND	ND	ND
Citric acid	77-92-9	$C_6H_8O_7$								192.125	>=10	1.54E+00	(dec)	1.00E+02
Citroflex														
Columbium	7440-03-1									92.9064	ND	ND	ND	ND
Cryolite	15096-52-3	Na_3AlF_6								ND	ND	ND	ND	ND
CTG paper														
Cumene hydroperoxide	80-15-9	$C_9H_{12}O_2$								152.1926	<0.01	1.02E+00	1.53E+02	7.90E+01

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Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
Cyclopentane	287-92-3	C_5H_{10}								70.134	insoluble	7.45E-01	4.90E+01	-3.70E+01
Cyclopentanone	120-92-3	C_5H_8O								84.1176	insoluble	9.51E-01	1.31E+02	3.10E+01
Decanal	112-31-2	$C_{10}H_{20}O$								156.2674	ND	8.25E-01	207 - 209	8.50E+01
Dextrin	9004-53-9	n/a								ND	ND	ND	ND	ND
Dgecf-epoxy resin	28064-14-4									ND	ND	ND	ND	ND
Di-(2-ethylhexyl)-sebacate	122-62-3	$C_{26}H_{50}O_4$								426.6786	Insoluble	9.14E-01	2.48E+02	2.15E+02
Di-2-ethylhexyl azelate	103-24-2	$C_{25}H_{48}O_4$								412.6518	ND	ND	ND	ND
Diacetone Alcohol	123-42-2	$C_6H_{12}O_2$								116.1596	miscible	9.40E-01	1.66E+02	5.80E+01
Diatomaceous earth	61790-53-2									ND	ND	ND	ND	ND
Diethylene Triamine	111-40-0	$C_4H_{13}N_3$								103.1668	miscible	9.51E-01	2.07E+02	9.00E+01
Dihydroxypolydimethylsiloxane	70131-67-8									ND	ND	ND	ND	ND
Dimethyacrylate ester	n/a													
Dimethyl Siloxane	63148-62-9									ND	ND	9.63E-01	ND	3.00E+02
Dimethylpoly siloxane	8050-81-5	$(CH_3)_2SIO$								ND	ND	ND	ND	ND
Di-n-propyl adipate	106-19-4	$C_{12}H_{22}O_4$								230.3034	ND	9.79E-01	144 at 10 mm Hg	1.40E+02
Dodecyclippiperidines	n/a													
EC	n/a													
Epichlorohydrin/poly	n/a													
Epoxy Resin										ND	ND	ND	ND	ND
Estane / polyurethane	9009-54-5	$C_3H_8N_2O$								88.109	ND	ND	ND	ND
Ethyl 2-cyanoacrylate	7085-85-0									125.1268	ND	1.06E+00	54 - 56 at 1.6 to 3.0 mm Hg	ND
Ethyl 3-ethoxypropanoate	763-69-9	$C_7H_{14}O_3$								146.1858	ND	9.50E-01	1.70E+02	5.90E+01
Ethyl alcohol	64-17-5	C_2H_6O								46.0688	>=10	7.89E-01	7.83E+01	1.20E+01
Ethyl lactate	97-64-3	$C_5H_{10}O_3$								118.1322	ND	1.03E+00	1.51E+02	4.60E+01
Ethylene Dimethylacrylate														
Ethyltriacetoxysilane	17689-77-9									234.281	ND	ND	ND	ND
Fiber Acrylic														
Fiber Craft														
Fiber Polyester														
Fiberglass	65997-17-3									ND	ND	ND	ND	ND

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Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
Fibroin (silk)	n/a													
Flushed Alkali Blue	n/a													
Formamide	75-12-7	CH_3NO								45.0408	miscible	1.13E+00	2.10E+02	1.54E+02
Gold	7440-57-5	Au								196.9665	ND	ND	2.80E+03	ND
Graphite	7782-42-5	C								12.011	Insoluble	ND	ND	ND
Ground Glass														
Guar gum	9000-30-0									ND	<0.1	ND	ND	ND
Gum Arabic	9000-01-5									ND	5-10	1.35E+00	ND	ND
Gum Tragacanth	9000-65-1									ND	ND	ND	ND	ND
Gypsum	13397-24-5									ND	ND	ND	ND	ND
Halon-G-80 (A form of Teflon)														
Heptanal	111-71-7	$C_7H_{14}O$								114.187	<0.1	8.17E-01	1.53E+02	3.50E+01
Hexafluoropropylene	116-15-4	C_3F_6								150.0234	ND	ND	ND	ND
HX-868														
Iron	7439-89-6	Fe								55.845	ND	7.86E+00	3000-3500	ND
Iron Oxide	1309-37-1	Fe_3O_4								159.6882	insoluble	5.24E+00	ND	ND
Isobutane	75-28-5	C_4H_{10}								58.123	Insoluble	ND	-1.17E+01	-8.28E+01
Isobutyl Acetate	110-19-0	$C_6H_{12}O_2$								116.1596	6.70E-01	8.74E-01	1.18E+02	1.80E+01
Isophorone diisocyanate	4098-71-9	$C_{12}H_{18}N_2O_2$								222.2864	<0.1	1.06E+00	158 at 15 mm Hg	ND
Isopropyl Alcohol	67-63-0	C_3H_8O								60.0956	miscible	7.85E-01	8.24E+01	1.20E+01
Kaolin	1332-58-7									ND	ND	ND	ND	ND
Ketones	n/a									ND	ND	ND	ND	ND
Kraft Paper	n/a													
Laminac 4116														
Lignin	9005-53-2									ND	ND	ND	ND	ND
Linseed oil	8001-26-1									ND	<.1	9.30E-01	3.43E+02	ND
Lithium Hydroxystear	7620-77-1									306.4127	ND	ND	ND	ND
Magnesium	7439-95-4	Mg								24.305	Insoluble/Reactive	1.74E+00	1.11E+03	5.00E+02
Magnesium silicate	1343-90-5	$Mg_2O_8Si_3$								ND	ND	ND	ND	ND
Methyl Abietate	127-25-3	$C_{21}H_{32}O_2$								316.4826	ND	ND	ND	ND
Methyl Ethyl Ketoxime	96-29-7	C_4H_9NO								87.1212	>=10	9.23E-01	1.52E+02	6.00E+01

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Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
Methyl Oximo Silane	22984-54-9									ND	ND	ND	ND	ND
Methylaminoanthraquinnone (MAA) (disperse red dye 9) (methylphthalate)	82-38-2	$C_{15}H_{11}NO_2$								237.2574	ND	ND	ND	ND
Methylcellulose	9004-67-5									ND	0.5-1.0	ND	ND	ND
Methylcyclopentane	96-37-7	C_6H_{12}								84.1608	<0.1	7.49E-01	7.18E+01	-1.00E+01
Methylpentane	43133-95-5	C_6H_{14}								86.1766	ND	ND	ND	ND
m-ethyltoluene	620-14-4	C_9H_{12}								120.1938	ND	ND	ND	ND
Methyltriacetoxysilane	4253-34-3	$C_7H_{12}O_6Si$								220.2542	ND	ND	ND	ND
Methyltrimethoxysilane	1185-55-3	$C_4H_{12}O_3Si$								136.223	ND	9.55E-01	1.02E+02	1.10E+01
Mg oxide	1309-48-4	MgO								40.3044	insoluble	3.58E+00	3.60E+03	ND
Mica	12001-26-2									ND	ND	ND	ND	ND
Microcrystalline Cellulose														
Mineral Oil	64742-65-0									ND	ND	ND	ND	ND
N,N-Dialkyltoluidine	613-48-9									163.262	ND	9.24E-01	103 at 10 mm Hg	9.30E+01
NA Carbonate	497-19-8	CO_3 2Na								105.98874	ND	2.53E+00	1.60E+03	ND
NA Carbonate monohydrate														
n-butane	106-97-8	C_4H_{10}								58.123	0.0061	6.01E-01	-4.50E-01	-1.38E+02
n-decane	124-18-5	$C_{10}H_{22}$								142.2838	<0.1	7.30E-01	1.74E+02	4.60E+01
n-heptane	142-82-5	C_7H_{16}								100.2034	0.01	6.84E-01	9.84E+01	-4.00E+00
Nitrogen	7727-37-9	N_2								28.0134	Slightly soluble	ND	-1.96E+02	ND
N-methyl-N, ndiphen														
n-nonane	111-84-2	C_9H_{20}								128.257	<0.1	7.22E-01	1.51E+02	3.10E+01
N-octane	111-65-9	C_8H_{18}								114.2302	Slightly soluble	7.03E-01	1.26E+02	1.30E+01
Nonanal	124-19-6	$C_9H_{18}O$								142.2406	<0.1	8.23E-01	93 at 23 mm	6.30E+01
N-pentane	109-66-0	C_5H_{12}								72.1498	0.04	6.26E-01	3.61E+01	-4.90E+01
N-propylbenzene	103-65-1	C_9H_{12}								120.1938	insoluble	8.62E-01	1.59E+02	4.70E+01
Nylon	63428-83-1	$C_6H_{11}NO$								ND	ND	ND	ND	ND
o-anisidine	90-04-0	C_7H_9NO								123.1542	<0.01	1.09E+00	2.25E+02	1.07E+02
Octanal	124-13-0	$C_8H_{16}O$								128.2138	ND	8.21E-01	1.71E+02	5.10E+01
o-ethyltoluene	611-14-3	C_9H_{12}								120.1938	ND	8.87E-01	164 - 165	3.90E+01

Table 4A-2. Master List of U.S. Army Garrison Yuma OB/OD MTF Compounds and Elements

Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
Oxamide	471-46-5	$C_2H_4N_2O_2$								88.0658	ND	1.67E+00	ND	ND
Paper														
Paper Onionskin														
Paper Sealing														
Paraffin	8002-74-2									ND	ND	ND	ND	1.98E+02
Pentosan	116001-96-8									308.2748	ND	ND	ND	ND
Phenol Formaldehyde	9003-35-4									ND	ND	ND	ND	ND
Phenylacetaldehyde	122-78-1	C_8H_8O								120.1506	ND	9.39E-01	1.95E+02	8.60E+01
Pigment	n/a													
Plastic														
Plastic Insulation														
Plastic/ Nylon														
Poly(dimethyl)siloxane	9016-00-6									ND	ND	9.80E-01	ND	ND
Polyamide Resin	68410-23-1													
Polybutadiene	9003-17-2	$(C_4H_6)_n$								ND	ND	8.90E-01	ND	2.60E+02
Polycarbonate										ND	ND	ND	ND	ND
Polyester tape														
Polyethylene	9002-88-4	C_2H_4								28.0536	ND	9.20E-01	ND	ND
Polyglycol dimethacrylate	25852-47-5									ND	ND	ND	ND	ND
Polyisobutylene	9003-27-4	C_4H_8								56.1072	ND	9.18E-01	ND	ND
Polymethylmethacrylate	9011-14-7	$(C_5H_8O_2)_n$								100.117	ND	1.19E+00	ND	ND
Polypropylene	9003-07-0	C_3H_6								42.0804	ND	ND	ND	ND
Polystyrene	9003-53-6	$(C_8H_8)_n$								104.1512	ND	1.05E+00	ND	ND
Polysulfide	68611-50-7									ND	ND	ND	ND	ND
Tetraflouroethylene	116-14-3	C_2F_4								100.0156	ND	ND	-7.63E+01	ND
Polytetrafluoroethylene (teflon)	9002-84-0	$(C_2F_4)_n$								100.0156	ND	2.00E+00	ND	ND
Poly-tfe, alpha cyc	65530-85-0													
Polyvinyl acetate	9003-20-7	$C_4H_6O_2$								86.0902	ND	1.18E+00	ND	ND
Polyvinyl alcohol	9002-89-5	C_2H_4O								44.053	ND	1.30E+00	ND	7.90E+01
Polyvinyl chloride	9002-86-2	$(C_2H_3Cl)_n$								62.4987	<0.1	1.40E+00	ND	ND
Portland cement	65997-15-1									ND	ND	ND	ND	ND

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CAS Name	CAS #	Chemical Symbol												
Potassium	7440-09-7	K								39.09	decomposes	ND	7.70E+02	ND
Potassium hydroxide	1310-58-3	HKO								56.0973	107	2.04E+00	1.32E+03	ND
Potassium oxalate	583-52-8	$C_2K_2O_4$								166.1996	ND	ND	ND	ND
Potassium sulfate	7778-80-5	K_2O_4S								174.2376	ND	2.66E+00	ND	ND
Potassium Tert-Butoxide	865-47-4	C_4H_9KO								112.2045	ND	ND	2.75E+02	ND
Primer Perc #34														
Propellant	n/a													
P-Tertiary-Butylcatechol	98-29-3	$C_{10}H_{14}O_2$								166.2194	ND	ND	2.85E+02	1.29E+02
Quarternary ammonium	68953-58-2									ND	ND	ND	ND	ND
Rareox (Cerium dioxide)	1306-38-3	CeO_2								172.1148	ND	7.13E+00	ND	ND
Rayon Cloth														
Red Gum (Eucalyptus Oil)	8000-48-4									ND	ND	9.10E-01	ND	ND
Resin														
Resin and additives														
Resistor Paste														
Resorcylic acid	89-86-1	$C_7H_6O_4$								154.122	ND	ND	ND	ND
Saccharin	81-07-2	$C_7H_5NO_3S$								183.1814	>=10	8.28E-01	(subl)	ND
Salicylic acid	69-72-7	$C_6H_7O_3$								138.1226	ND	1.44E+00	211 at 20 mm Hg	1.57E+02
Shellac	9000-59-3									ND	ND	ND	ND	ND
Silica, Amorphous Hydrated	7631-86-9	O_2Si								ND	ND	ND	ND	ND
Silica, Amorphous Fumed	112945-52-5	O_2Si								60.0848	ND	ND	ND	ND
Silica, Crystalline	14808-60-7	O_2Si								60.0848	Insoluble	2.20E+00	2.23E+03	ND
Silicon	7440-21-3	Si								28.086	ND	2.33E+00	2.36E+03	ND
Silicone	63148-62-9									ND	ND	9.63E-01	ND	3.00E+02
Silicone Rubber seal	25035-81-8													
Silk Tape														
Sodium	7440-23-5	Na								22.98977	decomposes	9.00E-01	8.92E+02	4.00E+00
Sodium hydroxide	1310-73-2	HNaO								39.99707	5.00E+01	2.13E+00	1.39E+03	ND
Sodium Ortho-Phenylphenol	132-27-4	$C_{12}H_9O$ Na								192.19227	>=10	ND	ND	ND
Sodium Salicylate	54-21-7	$C_7H_5NaO_3$								160.10447	ND	ND	ND	ND
Sodium silicate	1344-09-8	Na_4O_4Si								184.04268	ND	ND	1.02E+02	ND

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CAS Name	CAS #	Chemical Symbol												
Sodium Silico Fluoride	16893-85-9	$F_6Si\ 2Na$								188.05594	soluble	ND	ND	ND
Sodium Sulfate	7757-82-6	Na_2O_4S								142.03714	ND	2.68E+00	ND	ND
Sodium Sulfide	22868-13-9	Na_2S								78.03954	ND	ND	ND	ND
Soybean oil	8001-22-7									ND	ND	ND	ND	ND
Starch	9005-25-8	n/a								ND	ND	1.50E+00	ND	ND
Stearic Acid	57-11-4	$C_{18}H_{36}O_2$								284.4812	0.1-1	8.47E-01	3.61E+02	1.96E+02
Stearyl Alcohol	112-92-5	$C_{18}H_{38}O$								270.4976	ND	8.12E-01	3.36E+02	1.85E+02
Synthetic Esters	n/a													
Synthetic resins	n/a													
Synthetic rubber														
Talcum powder	14807-96-6	$Mg_3H_2(SiO_3)_4$								ND	<0.1	ND	ND	ND
Tantalum	7440-25-7	Ta								180.948	ND	ND	ND	ND
Tape Pressure Sens														
Telomer of Polytetra	79070-11-4													
Terpenic type oils (non-aromatics)	n/a													
Tetraethylenepentamine	112-57-2	$C_8H_{23}N_5$								189.3032	>=10	9.98E-01	3.40E+02	1.39E+02
Thread Polyester														
Titanium	7440-32-6	Ti								47.867	insoluble	4.51E+00	3.28E+03	ND
TNC	6202-15-9	$C_{12}H_5N_5O_8$								347.2002	ND	ND	ND	ND
Toluidine red toner	2425-85-6	$C_{17}H_{13}N_3O_3$								307.308	<0.1	ND	ND	ND
Triacetin (1,2,3-propanetriol triacetate)	102-76-1	$C_9H_{14}O_6$								218.206	ND	1.16E+00	2.58E+02	1.48E+02
Tricresylphosphate	1330-78-5	$C_{21}H_{21}O_4P$								368.36826	<0.1	1.25E+00	4.20E+02	4.10E+02
Tripentaerythitol														
Triphenyl bismuth	603-33-8	$C_{18}H_{15}Bi$								440.2969	ND	ND	ND	ND
Tungsten	7440-33-7	W								183.85	ND	ND	5.77E+03	ND
Vinyl Alcohol	557-75-5	C_2H_4O								44.053	ND	ND	ND	ND
Vinylidine fluoride	75-38-7	$C_2H_2F_2$								64.0346	0.018	ND	-8.60E+01	ND
Vinylite	9002-86-2	C_2H_3Cl								62.4987	<0.1	1.40E+00	ND	ND
Viton A														
Wad paper														
Water	7732-18-5	H_2O								18.0152	>=10	9.95E-01	1.00E+02	ND

Table 4A-2. Master List of U.S. Army Garrison Yuma OB/OD MTF Compounds and Elements

Element / Compound Information			Waste Code (D-code)[1]	TCLP Level (mg/L)	UHC	UTS (mg/kg)[2]	Appendix VIII List	Appendix IX List	Analytical Method[4]	MW (g/mole)	Water solubility (g/100ml)	Density	Boiling Point (degrees C)	Flash Point (degrees C)
CAS Name	CAS #	Chemical Symbol												
Wax	71808-29-2									ND	ND	ND	ND	ND
Wollanstonite (Calcium silicate, NYAD 325)	13983-17-0	$O_3Si Ca$								ND	<0.1	2.10E+00	ND	ND
Wool Felt														
Zirconium	7440-67-7	Zr								91.22	insoluble	ND	2.90E+03	ND
ZR Carbide	51680-56-9													
ZR hydride	7704-99-6	H_2Zr								95.2516	insoluble	ND	ND	ND
1,2,4-trimethylbenzene	95-63-6	C_9H_{12}								120.1938	Slightly soluble	8.76E-01	1.69E+02	4.80E+01
1,3,5-trihydroxybenzene (phloroglucinol)	108-67-8	$C_6H_3N_3O_6$								120.1938	insoluble	8.65E-01	1.65E+02	4.40E+01
1,3,5-trimethylbenzene	108-73-6	$C_6H_6O_3$								126.1116	ND	ND	ND	ND
2,3,4-trimethylpentane	565-75-3	C_8H_{18}								114.2302	ND	7.19E-01	1.13E+02	ND
Dichlorofluoromethane	75-43-4	$CHCl_2F$								102.9233	ND	ND	9.00E+00	ND
Hexamethylamine diisocyanate	822-06-0	$C_8H_{12}N_2O_2$								168.195	Reacts	1.04E+00	2.55E+02	1.40E+02
Hydrogen sulfide	7783-06-4	H_2S								34.0758	437	ND	-6.03E+01	-8.24E+01
Nitrogen Dioxide	10102-44-0	NO_2								46.0055	Miscible	ND	2.12E+01	ND
Aliphatic Naptha	54847-97-1													
Aliphatic petroleum	64742-89-8									ND	ND	ND	ND	ND
DEH-24 (Triethylenetetramine)	112-24-3	$C_6H_{18}N_4$								146.235	>=10	9.82E-01	2.67E+02	1.43E+02
Ferric Phosphate	10045-86-0									150.81636	ND	ND	ND	ND
Paint Waterbase Acrylic														
Phosphate	14265-44-2	H_3O_4P								97.99506	ND	ND	ND	ND
Propane	74-98-6	C_3H_8								44.0962	insoluble	ND	-4.21E+01	ND
Propane isobutane	68476-86-8									ND	ND	ND	ND	ND
Titanium Dioxide	13463-67-7									79.8658	<0.1	4.26E+00	2.90E+03	ND
Ink Printers														

1. Characteristic waste codes are tentatively identified for information purposes only. D-codes will be assigned based upon analytical results.
2. Nonwastewater - mg/kg, unless noted as TCLP value - mg/L.
3. Non-residential soil values
4. Analytical methods to be verified/specified by analytical laboratory.
5. Sum of all nitro aromatic compounds w/out SRLs is < 340 mg/kg.

Chemical properties obtained from Chemfinder.com.

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PERMIT ATTACHMENT 5

WASTE ENVIRONMENTAL PROPERTIES

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WASTE ENVIRONMENTAL PROPERTIES

5.1 WASTE COMPOSITION DATA

5.1.1 Pre-Treatment Waste Composition

The items treated at the Open Burn/Open Detonation Munitions Treatment Facility (OB/OD MTF) at the U.S. Army Garrison Yuma Proving Ground (USAGYPG) are comprised mostly of explosives in casings and propellants. They also include small amounts of plastic, rubber, adhesives, ink, paint, wire, etc. Most military munitions have a complete description of their physical characteristics and chemical components in the Munitions Items Disposition Action System (MIDAS). The USAGYPG has provided a compilation of representative MIDAS reports for the PEP treated at the OB/OD facility to ADEQ (YPG 2004c, Submittal 9).

Permit Attachment 4 (Constituents of Potential Concern) details the chemical composition data of wastes typically treated at the OB/OD MTF, and associated EPA waste codes.

5.1.2 Post-Treatment Waste Composition Data

5.1.2.1 Composition of Containerized Ash

The USAGYPG submitted to ADEQ documentation concerning laboratory analysis data on ash residues (YPG 2004c, Submittal 20). That submittal includes records of waste ash analysis for four sampling events (July 1995, December 1996, June 1999, and November-December 2002). The November-December 2002 ash results included analyses using Method 1311/8260B (toxicity characteristic leaching procedure (TCLP) for volatile organic compounds (VOC)), Method 8270C (semi-volatile organic compounds (SVOC)), Method 1311/6010 (TCLP Metals), Method 1311/7470 (TCLP Mercury (Hg)), Method 8330 (Explosives), and Method E335.1 (Amenable Cyanide), whereas the first three sampling events only included results for leachable lead (TCLP Lead (Pb)).

Based on the lab results contained in the submittal, leachable lead has been detected in ash residues in excess of 5 milligrams per liter, characterizing the waste as hazardous waste (EPA Hazardous Waste Code D008). Leachable lead results for the dates of analysis above were 1.97 milligrams per liter (mg/l), 5.81 mg/l, 30.80 mg/l, and 0.35 mg/l, respectively. It is important to note that recent analyses of the ash (November-December 2002) tested below the 5 mg/l limit for lead and was, therefore, deemed non-hazardous solid waste. Characterization of the ash will continue to ascertain the regulatory status of these wastes.

Other constituents detected during the 2002 sampling at levels that are not characteristic of hazardous waste included four SVOCs (nitrobenzene, 2,4-Dinitrobenzene (DNT), N-nitrosodiphenylamine, and di-n-butylphthalate), several metals (Sb, As, Ba, Be, Cd, Pb, Ni, Ag, and Zn), two explosive compounds (Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) and 2,4-DNT), and amenable cyanide. Amenable cyanide was detected in the ash residue at 65 milligrams per kilogram (mg/kg) in excess of the Arizona SRL of 30 mg/kg but below the 40 CFR 261.23(a)(5) level.

5.1.2.2 Composition of Residues in Soil

As a comparison, 2,4-DNT, 2,6 DNT, Trinitrotoluene (TNT), 1,3,5-Trinitroperhydro-1,3,5-triazine (RDX), HMX, lead, and barium were also detected in near-surface soils at the former location of OB treatment on the ground prior to 1987 (YPG 2004c, Submittal 4, pages 98-112). Only lead was detected above the extraction procedure (EP) toxicity level, only 2,4-DNT was detected above the residential screening reference level (SRL), and only DNT-mixture was detected above the non-residential SRL (see Permit Attachment 7 (Environmental Impact from OB/OD Operations)).

Lead was detected above the EP Toxicity level of 5.0 mg/l at four out of 19 locations sampled in 1983, and four out of 6 locations sampled in 1986. 2,4-DNT was detected above the residential SRL (130 mg/kg) but below the non-residential SRL (1,400 mg/kg).

Based on the waste composition results above, the chemical, physical, and biological properties of primarily only lead, 2,4-DNT, and cyanide are evaluated in Permit Attachment 5 Section 5.2 below.

5.2 ENVIRONMENTAL PROPERTIES OF POST-TREATMENT WASTE

5.2.1 Solubility in Water

Hazardous waste lead, historically characteristic of the residual ash from OB operations, has a low solubility in water (HSDB, 2003d).

2,4-DNT also has a low solubility in water (HSDB 2003b).

Hydrogen cyanide is expected ultimately to volatilize from soil. It is likely that cyanide that persists in soil is bound to metals. Hydrogen cyanide and metal cyanides both are soluble in water (HSDB, 2003a & 2003c).

5.2.2 Mobility in Soil

When released in soil, lead is expected to convert to less soluble forms such as lead sulfate ($PbSO_4$), lead phosphate ($Pb_3(PO_4)_2$), lead sulfite (PbS), and lead oxide (PbO). It also forms complexes with organic matter and clay minerals that limit mobility (HSDB, 2003d).

2,4-DNT is considered moderately mobile in soil based upon an estimated K_{oc} of 282 milliliters per gram (ml/g) (HSDB, 2003b).

Metal cyanides are mobile in soil (HSDB, 2003a).

5.2.3 Physical State and Molecular Properties

The general characteristics and classification, as well as the chemistry and physics of energetic materials, are contained in the U.S. Army Technical Manual TM 9-1300-214, Military Explosives, September 1984.

Properties of the COPCs are included in the COPC listing provided in Permit Attachment 3 (WAP).

5.2.4 Mobility in Groundwater

Modeling (using the HELP code and conservative site-specific data) has demonstrated that water will infiltrate from the ground surface to the aquifer within 100 years; therefore, contaminants dissolved in the percolating water can potentially reach the groundwater table within 100 years (YPG 2004c, Submittal 12).

5.2.5 Sorption to Environmental Media

Sorption is the action of soaking up or attracting substances. Soils at and around the OB/OD Treatment Facility have a pH range of 7.2 to 8.2, contain medium to high levels of salinity, and have moderate clay content (YPG 2004c, Submittal 6-3).

Lead deposited upon the soil at the OB/OD MTF is expected to sorb and remain near the surface because of the soil pH. Recent soil sampling and remedial actions, taken adjacent to the north burn pad at the OB/OD MTF, found that the lead contamination did not extend beyond 1.5 feet in depth (Jason 2000).

2,4-DNT is expected to sorb to some extent to the clay fraction. 2,4-Dinitrotoluene sorbs significantly to the organic component of soils. However, the organic component of the soils at the OB/OD MTF is expected to be low.

Cyanides are not expected to sorb to the soil at the OB/OD treatment facility.

Studies conducted at the OB/OD MTF confirm that, with the exception of lead, elevated concentrations of potentially hazardous substances do not appear to be accumulating in soils above RCRA limits (YPG 2004c, Submittal 2).

5.2.6 Biodegradation, Biotransformation, and Bioconcentration

The biodegradation/biotransformation and bioconcentration of any waste or products of combustion relative to the environmental medium of water have been eliminated from further discussion in this section. Water is the environmental medium with the least potential for receiving any contamination by OB/OD activities due to the depth to groundwater and the lack of surface water at the site.

The bioavailability of lead in soil is contingent upon specific environmental conditions: low pH (less than 5.0), low salinity, and low clay content. Soils at and around the OB/OD MTF have a pH range of 7.2 to 8.2, contain medium to high levels of salinity, and have moderate clay content (YPG 2004c, Submittal 6-3). Therefore, biodegradation/ biotransformation and bioconcentration of lead at the OB/OD MTF are not anticipated.

2,4-DNT in some instances biodegrades in water. There is no evidence for biodegradation in soil (HSDB, 2003b).

Cyanides can be biodegraded in water using acclimated bacteria. It is toxic to unacclimated strains. Biodegradation of cyanide in the environment is speculative. (HSDB, 2003c).

5.2.7 Photodegradation of Waste

Photodegradation refers to the decomposition of chemicals by the action of sunlight.

Lead in the environment is not affected by sunlight, though specific lead compounds may be modified by sunlight.

2,4-DNT undergoes photodegradation in water and may photodegrade in soil (HSDB, 2003b).

Cyanides in soil are not expected to be subject to photodegradation (HSDB, 2003c).

5.3 REFERENCES

The following documents from the 2007 RCRA Permit issued by ADEQ are incorporated by reference into this 2016 renewal permit:

HSDB 2003a — HSDB (Hazardous Substances Data Bank). Calcium Cyanide. Database available through the National Library of Medicine's Toxicology Data Network (TOXNET). Accessed on-line at http://toxnet.nlm.nih.gov/.

HSDB 2003b — HSDB (Hazardous Substances Data Bank). 2,4-Dinitrotoluene (2,4-DNT). Database available through the National Library of Medicine's Toxicology Data Network (TOXNET). Accessed on-line at http://toxnet.nlm.nih.gov/.

HSDB 2003c — HSDB (Hazardous Substances Data Bank). Hydrogen Cyanide. Database available through the National Library of Medicine's Toxicology Data Network (TOXNET). Accessed on-line at http://toxnet.nlm.nih.gov/.

HSDB 2003d	HSDB (Hazardous Substances Data Bank). Lead Compounds. Database available through the National Library of Medicine's Toxicology Data Network (TOXNET). Accessed on-line at http://toxnet.nlm.nih.gov/.
Jason 2003	Jason Associates Corporation, "Open Burn/Open Detonation Facility, RCRA Operating Permit Application," Volume VI, Submittal 12, Doc. #AR01549, February 2003.
YPG 2004c	RCRA Operating Permit Application, Open Burn/Open Detonation Facility, U.S. Army Yuma Proving Grounds, prepared by Jason Associates Corporation, September 2004 Update. • YPG 2004c, Submittal 2: *"U.S. Army Yuma Proving Ground, Historical Records Review, OB/OD Site"*, August 2004 • YPG 2004c, Submittal 6-3: "*Soil Survey of the U.S. Army Yuma Proving Ground, Arizona, parts of La Paz and Yuma Counties",* by Christopher C. Cochran, Soil Conservation Service, 1991. • YPG 2004c, Submittal 9: "Munitions Items Disposition Action Systems (MIDAS) *Reports*" (5 volumes). • YPG 2004c, Submittal 12: Southwest Ground-Water Consultants, Inc., July 10, 2004, *QA Project Plan, Infiltration Study, OB/OD Treatment Facility, Kofa Firing Range*, U.S. Army Yuma Proving Ground, Yuma County, Arizona, EPA ID No. AZ5213820991; and Southwest Ground-Water Consultants, Inc., October 28, 2004, *Infiltration Study, OB/OD Treatment Facility, Kofa Firing Range*, U.S. Army Yuma Proving Ground, Yuma County, Arizona, EPA ID No. AZ5213820991. • YPG 2004c, Submittal 20: "*OB Ash Laboratory Analysis Reports*"

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OB/OD OPERATIONS

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OB/OD OPERATIONS

6.1 PREPARATION FOR OB/OD OPERATIONS

The operation of the U.S. Army Garrison Yuma Proving Ground (USAGYPG) Open Burn/Open Detonation Munitions Treatment Facility (OB/OD MTF) is governed by strict adherence to Army Regulations (ARs) and local standard operating procedures (SOPs) based on ARs. Prior to commencing an OB/OD activity and throughout the day, one of the USAGYPG meteorological stations is contacted to evaluate conditions to determine whether conditions are conducive to safe and environmentally responsible operations. The determination for conducting OB/OD operations is based on meteorological factors, including no chance of precipitation or electrical storms, wind speeds of greater than 3 miles per hour (mph) and less than 15 mph, visibility greater than 1 mile (i.e., no dust storms), cloud cover less than 80%, and ceiling estimated greater than 2,000 feet. Additionally, OB/OD operations cannot be performed during inversion conditions. If any one of these parameters falls below the established criteria, OB/OD activities will be cancelled until conditions change. If in the opinion of the onsite Ordnance Response Technician (ORT), meteorological conditions are unsafe, the ORT can cease operations at anytime. Typically, meteorological factors do not inhibit the ability to perform OB/OD at the USAGYPG. In addition, the following restrictions are applied to the operation of the OB/OD MTF:

1. Compliance with Federal and State environmental restrictions is mandatory, including;

2. All entry and egress of the area is coordinated with Range Control (see Permit Attachment 8 (Security Provisions));

3. A Barricade is placed and warning device(s) are activated (at a minimum, a red warning flag shall be flown but also flashing lights may be activated) at locations specified in Permit Attachment 6 Section 8.2.3 (Barricades and Red Warning Devices) as soon as the ORT personnel access the site with a pending OB/OD operation, and they remain until the facility is verified clear;

4. Firing approval is granted through Range Control. Range control will ensure there is no air traffic within the proximity of the OB/OD facility during applicable operations;

5. Maximum accumulation of waste residue is limited to a single 55-gallon drum, which is removed when 75 percent full (see Permit Section 3.2.5 (Frequency of Analyses)); and

6. Inspections prior to OB/OD activities are completed (see Permit Attachment 11 (Inspection Plan)).

OB/OD MTF is allowed to burn and detonate YEAR ROUND. Burns and detonations will be conducted when:

1. Atmospheric conditions or local circumstances do not make fires hazardous;

2. There is no air stagnation advisory in effect in the area of burn or detonation; and

3. Wind conditions which prevent dispersion of smoke into populated areas; do not cause a visibility impairment on traveled roads or airports to the extent that a safety hazard results; do not create a public nuisance; and do not cause uncontrollable spreading of fire.

Burns and detonations will not be conducted during periods when smoke can significantly impair visibility. Such visibility impairment can be anticipated during periods of heavy regional haze and/or calm wind conditions.

6.2 LOADING & UNLOADING

Before any treatment of waste propellant, explosives and pyrotechnics (PEP), wastes must be characterized prior to transfer to the OB/OD MTF using DoD protocols and applicable forms (DA Form 4508 – Ammunition Transfer Record, YT Form 2407 – Ammunition For Demilarization, DD 1348-1 – Single Line Item Release/Receipt Document, or YT Form 24 – Bulk Propellant Burn Control Register). Blank examples of these forms are provided in Permit Attachment 3 (Waste Analysis Plan), Attachment 3B.

The Summary Treatment Form (Permit Attachment 6B) documents the treatment weather conditions, location, and amounts. This form is completed by the lead ORT assigned to an event on the day of the event.

A form documenting the acceptability for treatment (Permit Attachment 6B) may be used to verify acceptance of waste for treatment. In many cases the PEP items are already well characterized based on past OB/OD events, and may not require a verification of acceptance. This is at the discretion of the Lead ORT assigned to the event.

Forms other than the above may be used as long as they contain the same required information. Equivalent electronic only forms and database tools may also be used. The required forms will be completed through various offices. As described in Permit Attachment 15, all completed forms (paper or electronic) will be stored in the Operating Record.

All vehicles must be driven on the OB/OD MTF roads as described in Permit Attachment 8 (Security Provisions). No vehicles are allowed within 20 feet outside of the sidewalls of OD Pits 2 and 3 to prevent accidental sidewall collapse. The parking area for loading and unloading of waste is at the pit entrance or at the OB Pads. Permit Attachment 6A, Figure 6A-1 shows the general loading and unloading areas to be used in the OB/OD MTF. Except as previously noted, the loading and unloading areas are not exact and can vary as needed according to site conditions and configuration of PEP items to be treated.

Containers of waste explosives are unloaded at the specified OB/OD MTF according to the type of treatment required and in accordance with approved SOPs. Explosive materials are unloaded by hand or forklift as appropriate. The container (drum or bag) the waste is transported in must be declared 'RCRA Empty' prior to reuse, recycle or disposal (40 CFR 261.7). Material Handling Equipment (MHE) may be used in instances where waste explosives are transferred to the site in containers too large for human handling. (The SOP requires that munitions transported by vehicle to or within the OB/OD MTF be secured on the transport vehicle and that the transportation be done in accordance with applicable DOT requirements.)

Personnel operating MHE are fully trained in the handling of explosive materials and possess valid military operators' licenses (see Permit Attachment 13 (Training Plan)). Loading and unloading operations using forklift MHE will follow all applicable safety standards prescribed in Section C (Equipment Related Safety) of SOPs YP-YTAM-K-0002 and YP-YTAM-K-0028 disscussed in Section 6.3 of Permit Attachment 6. OB/OD MTF personnel operating forklifts will place additional emphasis on the following safety provisions:

1. Always travel with forks in lowered position;
2. Do not travel with load in raised position;
3. Do not raise or lower forks while moving;
4. Avoid sharp turns;
5. Do not exceed forklift capacity; and
6. Forklifts will not travel 6 inches near OB pad sump or over sump grate.

Waste explosives are placed directly on the ground in preparation for OD operations or in the burning pan(s) for OB operations. The construction of the OD Pits and Burn Pads/Pans minimizes trip and fall hazards. There are no stairs or obstructions to impede loading or unloading. The OB Pads do not have any curbs, thus eliminating any trip or spill hazard.

The unloading operations are from a truck parked at an OD Pit entrance or at the OB Pads, and the items for treatment are carried by hand or forklift into the treatment device. This path is cleared and maintained in accordance with the SOPs and the pre-operational inspection procedures (Permit Attachment 11). Unloading operations follow the shortest path possible to avoid potential problems of PEP spillage, vibratory shock, droppage impact, and holes in the ground.

The transport vehicle is withdrawn prior to un-packaging any items.

6.3 OB/OD OPERATIONS

OB/OD operations are conducted in strict accordance with Department of Defense (DoD) Explosives Safety Board (DDESB), U.S. Army, and the USAGYPG safety standards and procedures. Waste munitions are accepted for treatment in accordance with the Waste Analysis Plan (WAP) (Permit Attachment 3). After receipt, the SOPs govern treatment operations. The SOPs incorporate applicable DoD and Army environmental safety and health requirements. The SOPs that govern OB/OD MTF operations are:

1. SOP YP-YTAM-K-0002: Demilitarization by Detonation and Open Burn
2. SOP YP-YTAM-K-0028: Surface Range Clearance
3. SOP YPY-RO-P-1000: Range Operations

SOPs for the OB/OD MTF and best management practices limit the potential for human exposure, as well as limit access to the facility. All OB/OD activities are conducted in strict accordance with the SOP's.

The SOP's are reviewed and updated as required on a periodic basis for safety and other measures, as directed by ARs.

Pursuant to A.A.C R-18-8-260.D (c) [Title 40 of the Code of Federal Regulations, Section 270.12 (40 CFR 2701.12)], the USAGYPG has determined that the above SOPs are "Confidential Information" due to National Security concerns. The USAGYPG will provide ADEQ with copies of the latest versions of the above SOPs with each page marked as "Confidential Information" ***only*** when:

1. ADEQ requests a copy; or
2. When a revision to an SOP triggers a class 2 or class 3 permit modification request.

The SOPs are referenced in Attachment 6C, and are kept by ADEQ in a confidential file.

Since ARs are under the control of higher U.S. Army organizations, any changes to such documents do not constitute a permit modification request to ADEQ. Rather, revisions in the above SOPs that result from AR changes may trigger permit modification requests to ADEQ as appropriate.

6.3.1 OB Operations

Propellant, black powder or other energetic materials are poured or placed into burn pans on concrete pads. An electric or non-electric firing system is placed in the pan to ignite the contents. Following a cool-down period, the Lead ORT will determine if it is safe to enter the area. As soon as possible after this determination (no later than 72 hours after this determination, and prior to the next OB event), the burn pans and pads are inspected and then cleared of ash and other splatter materials.

Propellant is placed in pans to a depth no greater than 3 inches (for loose propellants) or one layer (for composite or cast propellants) and the black powder is placed in separate pans in a thin uniform layer not to exceed 50 pounds. Time fuses or electric squibs (initiators) are attached. Fuzes and initiating propellant charges are strategically placed with the PEP to maximize the combustion process and reduce ejecta. The material is ignited. A burn pan is used only once in a day and, following the OB action (when the Lead ORT determines it is safe), burn pads/pans are cleaned (scraped and vacuumed) and the lids are closed. If a vacuum is utilized during the cleaning process, it must be declared a 'RCRA Empty' container prior to reuse (40 CFR 261.7). Burn residue is bagged, sealed, and put in the hazardous waste barrel at the satellite accumulation site.

The following requirements are applicable to the OB operation through ARs or SOPs or a combination of both;

1. Loose propellant depth in Burn Pan is not to exceed 3 inches. Bulk propellant will be placed in a single layer. It will not be mixed with black powder.

NOTE: With the above propellant depth limits, there is approximately 9 inches of freeboard in the OB Pan (This freeboard will vary some with the type of cast propellant to be destroyed). Limiting the propellant to these depths minimizes the potential for propellant to be blown out of the Pan prior to propellant ignition.

2. Black powder is not to exceed 50 pounds per burn. It will not be mixed with propellant.

NOTE: Fifty pounds of black powder spread over the OB Pans results in a very small layer of powder. The treatment of black powder has more than 11 inches of freeboard

3. OB operations are to be conducted from the hours of one-hour after sunrise to two-hours before sunset.

NOTE: OB/OD-related operations (paperwork, munition accounting, preparation, etc.) may be conducted at locations not at the OB/OD MTF during times (e.g., darkness) outside the above hours if allowed by operations SOP or other base approved documents.

4. All burns shall be conducted in Burn Pans.

5. Burn Pans shall only be used once daily, and only after a sufficient cooldown period and wait time has elapsed from a previous-day burn, as determined by the Lead ORT.

6. Consideration of whether OB operation shall be undertaken shall be made if the Burn Pan is wet. Wet propellant or a thin layer of black powder may be hard to ignite

and/or burn completely if the PEP is moist to very wet; thus, inhibiting the effectiveness of OB treatment.

NOTE: No PEP hazardous waste that reacts with water (see 40 CFR 261.23(a)(2-4)) will be treated in the OB units.

6.3.2 OD Operations

The OD unit consists of three open areas for open detonation of waste ordnance. Two trenched areas are approximately 9 meters (30 feet) wide and 4.5 meters (15 feet) deep. The third area is not a defined excavation, but is an open area used for detonation of items with sub-munitions.

The following requirements are applicable to the OD operation through ARs or SOPs or a combination of both.

1. Projectiles without sub-munitions shall be covered with dirt to eliminate the scattering of fragments.

2. Projectiles with submunitions (such as M692, M731, M718, M741, M483, M509, and M864) will not be covered with dirt.

3. OD operations are conducted between the hours of one-half hour after sunrise and one-half hour before sunset.

4. Consideration of whether OD operation shall be undertaken shall be made if the pit is wet or moist. Munitions covered by wet soil may be hard to ignite and/or destroy completely if it is moist to very wet; thus, inhibiting the effectiveness of OD treatment.

Detonation Pits #2 and 3: the detonation pit is prepared by using equipment to establish a hole for placement of the items. The items to be detonated are placed in the open trenches. Munitions (projectiles, fuzes, other confined explosives, etc,) are carefully and strategically placed on their sides or in a position to expose the largest surface area to the initiating donor charges. Donor charges are placed to facilitate complete detonation, and the assemblage is then covered with a minimum of 24 inches of soil (for items without sub-munitions). The donor charges are then remotely detonated with electric or non-electric initiation to render the energetic material non-reactive. After a proper detonation activity and after an appropriate safe wait time (as determined by the Lead ORT), the trenches are inspected and the area cleared of fragments.

Detonation On-Ground Area: items with sub-munitions are placed directly on the open on-ground area and are <u>not covered with soil</u>. Munitions are carefully and strategically placed on their sides or in a position to expose the largest surface area to the initiating donor charges. Donor charges are placed to facilitate complete detonation. The donor charges are then remotely detonated with electric or non-electric initiation to render the energetic material non-reactive.

After a proper detonation activity and after an appropriate safe wait time (as determined by the Lead ORT), the area is inspected and cleared of fragments.

6.4 PREVENTION OF REACTION OF IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTE

6.4.1 General Requirements

Precautions shall be taken to prevent accidental ignition or reaction of ignitable or reactive waste. This waste must be separated and protected from sources of ignition or reaction including but not limited to (40 CFR 264.17(a)):

- Open Flames,
- Smoking,
- Cutting,
- Welding,
- Hot Surfaces,
- Frictional Heat,
- Static Sparks,
- Electrical Sparks,
- Spontaneous Ignition, and
- Radiant Heat.

When dealing with ignitable, reactive, and incompatible (I/R/I) waste, personnel shall take appropriate measures to prevent reactions that (40 CFR 264.17(b)):

- Generate extreme heat,
- Generate extreme pressure,
- Generate uncontrolled fire,
- Generate uncontrolled explosions,
- Generate violent reactions,
- Produce uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health or the environment,
- Produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosion,
- Damage the structural integrity of the device or facility, or

- Through similar means threaten human health or the environment.

6.4.2 Procedures to Prevent Accidental Ignition or Reaction

The means to prevent accidental ignition or reaction of wastes are provided through strict adherence to:

1. Safety procedures implemented through the approved SOP's and ARs;
2. Other HW permit requirements such as those listed in the following sections;
3. DoD/Army safety directives; and
4. DOD policy.

6.4.3 Additional Procedures

The following precautions will be in place to ensure that ignition of combustible materials or reaction of wastes does not occur. The safety procedures include but are not limited to the following:

6.4.3.1 General

All waste streams present in the OB/OD MTF will be contained and managed in such a way as to prevent any action that could promote an uncontrolled chemical reaction, fire, or explosion.

No waste is accumulated at the site until after OB/OD treatment. Treatment removes the reactive or explosive nature of the waste. This does not include OB/OD residue or debris that contains PEP, and must be temporarily accumulated in the OB/OD unit to be treated during the next OB/OD event.

6.4.3.2 Ignition Sources

The following precautions will be in place to ensure that ignition of combustible materials does not occur:

1. The entire OB/OD MTF (including buffer zone) is designated as a nonsmoking area. "No Smoking" signs are posted at the site entrance and are conspicuously displayed inside and outside the buffer zone.

2. No personal ignition sources (lighters, matches, etc.) will be allowed within the entire OB/OD MTF (including buffer zone).

3. No work-related ignition sources shall be allowed within the entire OB/OD Treatment Facility unless specifically authorized by the Lead ORT through implementation of DoD policy or SOP. One example is use of a flame torch to burn off PEP residue found on the ground surface after an OB/OD *event.*

4. Open flame, cutting, and welding will not be allowed in the OB/OD MTF unless a repair is required, in which case the equipment will be secured and open flame sources will be isolated from other equipment and wastes.

5. Prohibition of spark-producing equipment and tools near explosive materials unless specifically authorized by the Lead ORT through implementation of DoD policy or SOP.

6. Material handling equipment (e.g., bulldozers, forklifts, etc.) used on or near the waste munitions and residues shall meet the requirements of SOPs.

7. Motor vehicles used to transport waste munitions shall meet the requirements SOPs.

NOTE: Neither the MHE or the transport vehicles used at the site are required to have their bottoms steel reinforced or have explosion–proof motors; however, they must follow site requirements and meet DOT regulations for handling and transporting hazardous waste, as specified in Sections C (Equipment-Related Safety) and D (Explosive Transportation Safety) of SOPs YP-YTAM-K-0002 and YP-YTAM-K-0028.

.

8. Grounding cables shall be used on the OB Pans to prevent static sparks.

9. Grounding rod shall be touched (or other method of grounding as allowed by SOP) and shall be used at the Safety bunker work table to prevent static sparks when working with PEP or removing the shunt

10. Grounding straps in conjunction with an earth ground (or other method of grounding as allowed by SOP) shall be used to prevent static sparks when disassembling rockets.

11. No PEP to be treated shall have a flash point or lower explosion limit that exceeds 90% of the maximum possible hottest temperature of the ground, steel pans, refractory liner, pad concrete, or other structure or working tool that is in contact or near the PEP waste.

NOTE: Black desert gravel often exceeds 160 F in the summer months. Triacetin flashes at 280 F and tetracene explodes at 320 F. This is acceptable.

12. For OB activity there is no DoD requirement for the electrical conductivity between the person (special PPE) and the pad floor.

13. There is no requirement for electrical motors, generators, or wiring on the vacuum, MHE, and other equipment to be explosion-proof rated or contained in an NEMA Type9 enclosure.

14. If any OB and/or OD operations will occur at the same time at the site, both PEP-related operations shall be performed in accordance with approved SOP and DoD policy in such a manner as to avoid accidental ignition of PEP at the other location.

6.4.3.3 Incompatibility

The following precautions will be in place to ensure that reaction of incompatible wastes does not occur:

1. Incompatible materials shall not be treated at the same locations unless the OB or OD unit has been properly decontaminated. For example, DNT is incompatible with nitrates; and black powder is not to be mixed with any other propellant.

2. All construction materials comprising the OB/OD MTF are compatible with the wastes to be stored or treated.

3. All wastes will be compatible with the hazardous waste containers (including bags) that will hold the waste prior to shipment offsite to an approved TSDF.

4. All wastes shall be compatible with the working tools (e.g., vacuum, broom, fire extinguisher foam, etc.) used on or near the wastes.

5. Only new or cleaned U.S. Department of Transportation (DOT)-approved containers will be used to store OB/OD MTF process waste. If the past use of the container is unknown a liner will be used to contain the waste, this precludes any possible residues even in a clean drum. This will prevent any incompatibility of wastes. In addition, only one waste stream is generated from the process.

6.4.3.4 Inspections

Supervisors perform inspections of hand tools and mechanical devices to ensure that they have not become unsafe for use.

Inspections are performed periodically and prior-to-use or while-in-use to ensure the above precautions and procedures are safe, in place, and are followed (see Permit Attachment 11 (Inspections)).

6.4.3.5 Training

All ORTs are trained to strict ammunition safety standards, in accordance with Permit Attachment 13 (Training Plan).

6.4.4 Compliance Documentation

The above procedures and precautions, when followed, document partial compliance with the regulatory standards regarding ignitable, reactive, and incompatible waste. This includes documentation of inspections necessary to maintain compliance. When field work is necessary that requires ignition sources (open flames, welding, etc.) or other device which might cause accidental ignition or reaction of ignitable, reactive, or incompatible waste, compliance with 40 CFR 264.17(c) shall be documented.

ARs sets explosive safety standards for handling, treating, and accumulating ignitable or reactive waste (No incompatible wastes shall be mixed at this site.). Compliance with ARs is reviewed by the Army Explosives Safety Council and coordinated through the DDESB. DoD procedures for the transport, handling, treating, and accumulating PEP wastes and residues are of sufficient detail to prevent problems with ignitable, reactive, and incompatible wastes. These procedures have sufficient history to show compliance with the requirements. The USAGYPG Safety Office has documented a history of over 20 years of operations at the OB/OD MTF with no reportable injuries or emergencies.

6.5 EFFECTIVENESS OF TREATMENT

The objective of each OB or OD event is to thoroughly treat the reactive and ignitable components of a waste munition item or group of items. Maximum effectiveness is achieved by ORT personnel following SOPs which incorporate many decades of DoD OB/OD experience, testing and refinement, and engineered approaches selected for their ability to achieve treatment effectiveness. The skill and competence by ORT personnel in treating waste munitions ensure that treatment effectiveness is achieved.

OB/OD treatment effectiveness can be determined only by a combination of visual observation and sampling of residual media (e.g., ash from OB), rather than technical performance standards (e.g., destruction and removal efficiency, such as for an incinerator). Examples of technical performance standards and their associated issues include:

1. Due to the highly energetic and short-duration nature of OB/OD events, actual emissions from OB/OD can be estimated only by applying emission factors derived from credible scientific investigations. There are no stacks to monitor or sophisticated mass/chemical balances to calculate emissions from controlled treatment processes.

2. It is not cost effective and prudent to place an air particulate monitoring station at each of the four sides of the site and periodically analyze a particulate sample it collected.

3. It is not cost effective or prudent to require sampling the soil in and around the unit after each OB/OD event.

4. The ash tested from the OB treatment had no appreciable explosives content, and for secondary explosives, would require > 10% explosives to be considered reactive. Reactivity of primary explosives is determined on a case-by-case basis.

5. Due to the inevitable deposition of hazardous constituents in the pits and around the OB and OD treatment units, the area has been designated as a SWMU and will be subject to site investigation, characterization and, as necessary, remediation of contaminated soils under the RCRA Corrective Action Program and during closure.

Because the OB and OD phenomena differ, with each having attendant issues, a separate discussion of each are provided below.

6.5.1 Open Burning

Engineered approaches are used to maximize the effectiveness of each OB event by optimizing combustion and minimizing ejecta (in the case of OB, the expulsion of splatter from the conflagration or deflagration). Fuzes and initiating propellant charges are strategically placed with the PEP to maximize the combustion process and reduce ejecta. Optimum combustion minimizes emissions, improves the chances that ash residues will be non-hazardous, and results in less deposition of hazardous constituents on surrounding soils of the OB unit.

By definition, this treatment technology results in atmospheric releases; these are addressed in a document, which cites an extensive effort at Dugway Proving Ground (YPG 1992) to characterize emissions by burning propellant in a contained enclosure and deriving emission factors that was applied to past OB permitting at the OB/OD MTF (YPG 2004c, Submittal 11). The atmospheric releases do contain hazardous constituents (gaseous and particulate), with most of the particulate settling on the ground at the treatment unit (and small remaining quantities settling at other locations downwind) and gaseous constituents dispersed into the atmosphere.

In the course of treatment, the volume of PEP is reduced dramatically. For example, in 2000 about 51,030 kilograms (112,500 pounds) of PEP were treated by OB, resulting in about 495 kilograms (1,091 pounds) of ash, for an average reduction factor of > 99%. The resulting ash residue, free of un-reacted energetic material, is subsequently characterized (see Permit Attachment 3 (WAP)) to determine if hazardous waste (due to the possible presence of heavy metals, TC organics, etc.), and managed in accordance with characterization results. During the OB process, small quantities of incomplete burned splatter can be ejected from the conflagration onto the concrete burn pads on which the burn pans are placed.

6.5.2 Open Detonation

Engineered approaches are used to maximize the effectiveness of each OD event by optimizing combustion and minimizing ejecta [in the case of OD, defined as the expulsion of Munitions Constituents (MC), Discarded Military Munitions (DMM) and Munitions Scrap from the event]. These engineered approaches include soil placement of a specified thickness atop the assemblage, the geometry of energetic materials placement based on individual characteristics, as well as the strategic placement and attachment of initiating charges, and the timing of initiation (in some cases, multiple charges might be timed to fire within milliseconds of each other to enhance the detonation process). Soil placement dampens the explosive forces by absorbing energy, thereby reducing the velocity (and carrying distance) of shrapnel (metal pieces of munitions casings, etc). Typically, the explosive pressure lifts the soil covering off the ground and disperses much of it in the air.

Optimized combustion increases treatment effectiveness, reduces emissions, and imparts fewer explosive constituents to OD soils. By minimizing ejecta from each event, maximum practical effectiveness is served because most of the munitions are detonated and minimal MC, DMM, and munitions scrap is expelled from the event. Minimizing MC, DMM, and munitions scrap reduces the safety-intensive removal actions required after each event. While the munitions, initiator placement geometry, and the firing timing seek to eliminate ejecta, from a practical standpoint this cannot always be avoided. At the end of the appropriate wait time, the demolition area is searched and cleared of munitions scrap (primarily metals but does include some energetic residue) remaining from the detonation(s).

By definition, OD results in atmospheric releases; these are addressed in a document, which cites an extensive effort at Dugway Proving Ground (YPG 1992) to characterize emissions by detonating explosives in a contained enclosure and deriving emission factors that can be applied to OD permitting (YPG 2004c, Submittal 11). This effort determined that the mass-balance conversion to carbon for the OD of Trinitrotoluene (TNT) resulted in 97% Carbon Dioxide (CO2), 0.5% Carbon Monoxide (CO), 0.57% semi and non-volatiles, and 1.7% particulate matter (PM) as soot. This equates to 99.8% conversion and be taken as a measure of the effectiveness of OD treatment. However, the atmospheric releases from OD do contain hazardous constituents (gaseous and particulate); most of the particulate settles on the ground at the treatment unit and gaseous constituents disperse into the atmosphere.

In the course of each treatment event, the volume of explosives [expressed as net explosive weight (NEW)—the gross weight of the munitions minus all non-explosive components such as shell casings] is typically reduced either significantly or completely [with the former being cases with ejecta called a dirty detonation.] However, in some unusual cases, the munitions may only detonate partially, or a munition may not detonate as part of the assemblage – also called a dirty detonation]. Any ejected MC / DMM / munitions scrap that does not detonate is recovered using rigorous safety precautions and disposed of during a subsequent OD event. The ORT is trained to identify, recover and detonate unexploded ordnance.

6.6 RANGE MAINTENANCE ACTIVITIES

6.6.1 Post-OB Range Maintenance

Upon clear evidence that an OB event was successfully executed, reentry can occur as soon as particulates and emissions have dispersed (as determined visibly) to verify results. After the Lead

ORT determines it safe, the burn pans may be cleaned and used for a subsequent event the next day. This daily restriction also applies to pans not used but on the same pad.

When it is safe pursuant to the SOPs to inspect and clean-up the OB area, the area shall be inspected pursuant to the Inspection Plan (Permit Attachment 11). Any incidental releases or releases requiring implementation of the contingency plan will be managed pursuant to the Contingency Plan (Permit Attachment 10) and documented according to the recordkeeping and record retention procedures (Permit Attachment 15). Provisions for cleanup inside the units (OB Pans) and its secondary containment (OB Pad, and if applicable the OB retention basin) shall be performed according to ash and residue management procedures and the WAP (Permit Attachment 3).

The following requirements apply for OB-related Ordnance and Explosives (OE) items:

1. Identify and flag all OE items that are unable to be safely moved as dangerous items. Safely treat (flash) the flagged dangerous items. Inspect the area to ensure complete treatment. For OE items outside the OB Pad and retention basin, stake the location after the complete destruction of the dangerous item. See Permit Attachment 10 (Contingency Plan) and Permit Attachment 15 (Recordkeeping and Reporting) for sampling and documentation requirements.

2. For OE items outside the OB Pad and retention basin that can be safely moved, stake the location in the field notes to be submitted to the Operating Record. The items are moved to an OB Pan for subsequent flashing. See Permit Attachment 10 (Contingency Plan) and Permit Attachment 15 (Recordkeeping and Reporting) for sampling and documentation requirements.

3. Collect all visual OE residues that can be safely moved, consolidating these items in a container to be treated in the next OB operation. The container shall be appropriately labeled and managed according to 40 CFR 262.34 provisions until the contents are destroyed. If the propellant grain cannot be destroyed the same day, the hazardous waste propellant shall be removed from the site.

6.6.2 Post-OD Range Maintenance

For military munitions that do not have self-destruct (SD) mines, SD fuzes, or antidisturbance devices, the following SOP requirements apply:

1. In the event of misfire, reentry will not occur any sooner than 30 minutes after the misfire;

2. Upon clear evidence that an OD event was successfully executed, reentry to the area can occur as soon as particulates and emissions have dispersed (as determined visibly); and

3. When personnel have left the OD area after completion of operations, the facility, Range Control shall be notified the operations are complete.

For military munitions that do have self-destruct (SD) mines, SD fuzes, or antidisturbance devices, the following SOP requirements apply:

1. In the event of misfire, reentry will not occur any sooner than 30 minutes after the misfire;

2. Upon clear evidence that an OD event was successfully executed, reentry to the area by ORT personnel shall not occur before the SD time plus 4 hours (no less than 18 hours), and OD particulates and emissions are dispersed (as determined visibly); and

3. When demolition operations are completed, the barricades shall be removed only after the SD plus the four hour wait time has elapsed, and the ORT will advise Range Control that the Demolition Site is Off limits to all personnel until further notice.

After every operation, the ORTs will conduct an inspection of the impacted area in accordance with the requirements in Permit Attachment 11 (Inspection Plan). It will include a sweep of the area (minimum of a 200-foot radius surrounding the OD area – a larger radius can be used at the discretion of the Lead ORT based on the actual OD event and the items treated) with the following general sequence of events:

1. Identify and flag all High Explosive (HE) items that are unable to be safely moved as dangerous items.

2. Safely treat the flagged dangerous items by detonation in place using the same procedures for an OD event. Inspect the area to ensure complete treatment. Mark the location in the field notes to be submitted to the Operating Record. See Permit Attachment 10 (Contingency Plan) and Permit Attachment 15 (Recordkeeping and Reporting). This area may be subject to future sampling events, and may be further considered for specific attention during a closure action.

3. Identify and collect all visual HE residues that can be safely moved, consolidating these items in a container to be treated in the next OD operation.

4. Collect and dispose of non HE related items including but not limited to inert metal parts, plastics, wood, trash, etc. Place the materials on a plastic liner or plywood. Prior to disposition, all debris will be inspected and declared by an ORT to ensure that all items are free and clear of explosive residue. The ORT uses the Scrap Certification form or the Range Residue Turn In/Destruction Certificate (Permit Attachment 6, Permit Attachment 6B) to document the item's status.).

5. For safety and to reduce the potential migration of HE residues, a 25-meter (82 feet) radius will be flashed around the pits removing potentially accumulated non-observed

energetic materials. This will be conducted at a minimum annually (circa June – mid-year) if that pit has been used during the previous year, or more frequently at the discretion of the senior ORT. If ash is generated from the flashing operations, it will be collected and treated similar to the ash residues from the OB operations. The flashing can be conducted using appropriate fuel and oxidizer to cause the temperature of the item to exceed auto-ignition or decomposition temperature of the PEP waste usually by a handheld flame device or if it is a larger area, a vehicle mounted flame device. A note of when the flashing operation occurs and any relevant observations will be placed in the operating record.

6. Periodically a large magnet is pulled over the grounds to gather MC / DMM / munitions scrap not immediately visible. The magnet is turned off and the metallic debris is dropped onto a cover. The ORT then visually inspects and thereby sorts the items segregating them into separate piles: one that is turned into the metal recycling yard and one that is retreated to remove, the explosive residues. The ORT uses the Scrap Certification form or the Range Residue Turn In/Destruction Certificate (Permit Attachment 6, Permit Attachment 6A) to document the item is clean. The items that do not pass inspection will be retreated.

6.7 OTHER WASTE MANAGEMENT ACTIVITIES

A sample will be collected from the OB Pad retention basin when storm water reaches a height in the OB retention basin defined in the WAP (Permit Attachment 3). The sampling and analyses of the storm water will include those methods listed in the WAP. Based on the results of the analysis, the stormwater will be managed appropriately.

6.8 REFERENCES

The following documents were used in the preparation of this Attachment, and provide additional supporting data and guidance:

U.S. Army, Department of the Army Pamphlet 385–64 (DA PAM 385-64), Ammunition and Explosives Safety Standards, May 2011 (latest version, publically available at: https://armypubs.army.mil/Search/ePubsSearch/ePubsSearchDownloadPage.aspx?docID=0902c85180010a01).

The following documents from the 2007 RCRA Permit issued by ADEQ are incorporated by reference into this 2016 renewal permit:

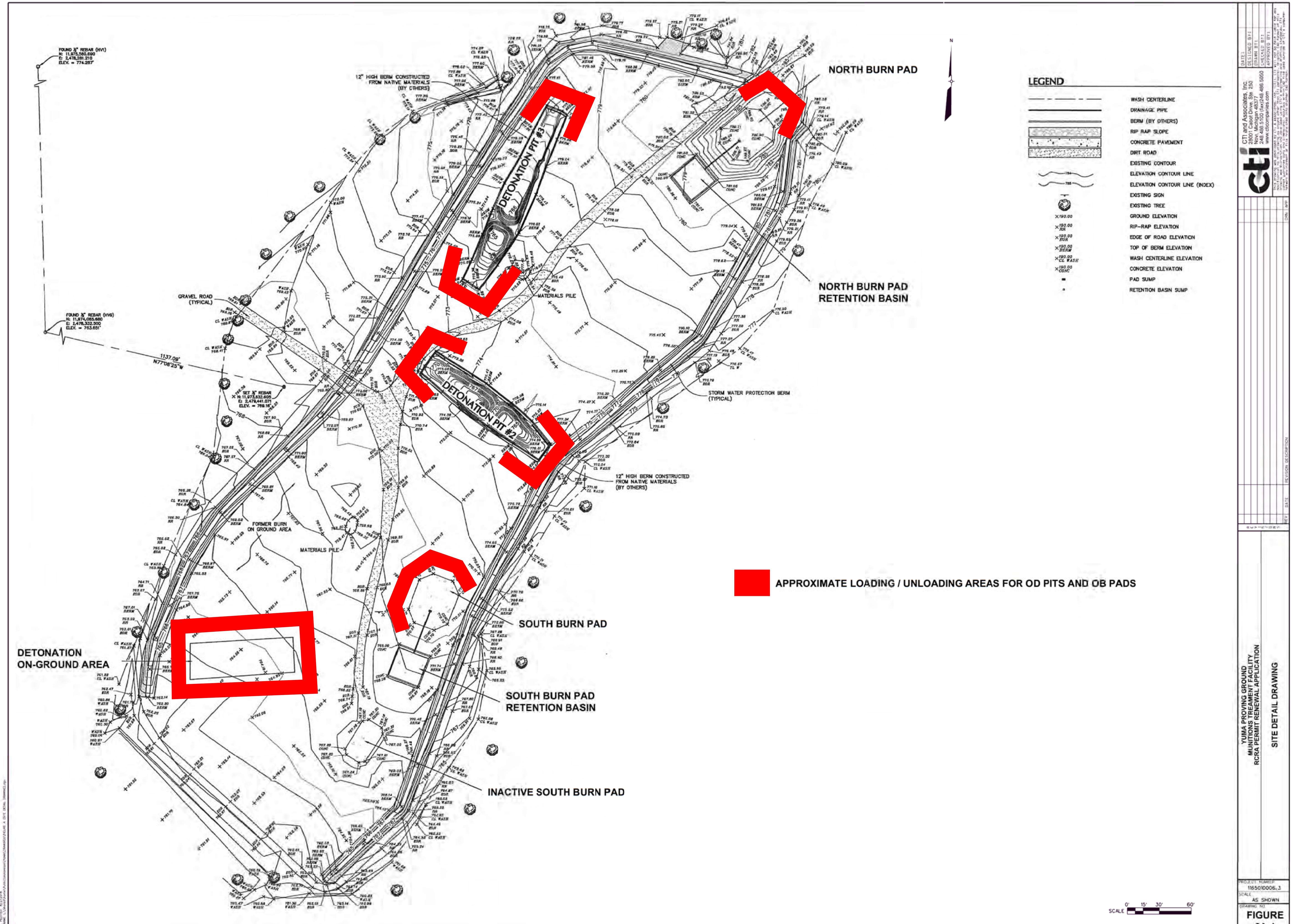
YPG 1992	Development of Methodology and Technology for Identifying and Quantifying Emission Products From Open Burning and Open Detonation Thermal Treatment Methods, U.S. Army, January 1992.

YPG 2004c	RCRA Operating Permit Application, Open Burn/Open Detonation Facility, U.S. Army Yuma Proving Grounds, prepared by Jason Associates Corporation, September 2004 Update. • YPG 2004c, Submittal 11, Item 2: "Air Quality Evaluations of OB/OD Operations, U.S. Army Yuma Proving Ground, Yuma, Arizona, prepared by Jason Associates Corporation, dated December 2002, sealed by Michael Strong, Utah Registered Environmental Professional Engineer.

ATTACHMENT 6A

FIGURES

Figure 6A-1. Munitions Loading / Unloading Locations for the OD Pits and OB Pads


NORTH BURN PAD
NORTH BURN PAD RETENTION BASIN
DETONATION PIT #3
DETONATION PIT #2
12" HIGH BERM CONSTRUCTED FROM NATIVE MATERIALS (BY OTHERS)
GRAVEL ROAD (TYPICAL)
MATERIALS PILE
STORM WATER PROTECTION BERM (TYPICAL)
FORMER BURN ON GROUND AREA
SOUTH BURN PAD
SOUTH BURN PAD RETENTION BASIN
DETONATION ON-GROUND AREA
INACTIVE SOUTH BURN PAD
APPROXIMATE LOADING / UNLOADING AREAS FOR OD PITS AND OB PADS
LEGEND
WASH CENTERLINE
DRAINAGE PIPE
BERM (BY OTHERS)
RIP RAP SLOPE
CONCRETE PAVEMENT
DIRT ROAD
EXISTING CONTOUR
ELEVATION CONTOUR LINE
ELEVATION CONTOUR LINE (INDEX)
EXISTING SIGN
EXISTING TREE
GROUND ELEVATION
RIP-RAP ELEVATION
EDGE OF ROAD ELEVATION
TOP OF BERM ELEVATION
WASH CENTERLINE ELEVATION
CONCRETE ELEVATION
PAD SUMP
RETENTION BASIN SUMP
SCALE 0' 15' 30' 60'
CTI and Associates, Inc.
28001 Cabot Drive, Ste. 250
Novi, Michigan 48377
248.486.5100 (fax)248.486.5050
www.cticompanies.com
YUMA PROVING GROUND
MUNITIONS TREAMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION
SITE DETAIL DRAWING
PROJECT NUMBER 1165010006.3
SCALE AS SHOWN
FIGURE 6A-1

ATTACHMENT 6B

OPERATIONAL FORMS

Summary Treatment Form

Scrap Certification Form

Range Residue Turn In/Destruction Certificate

Acceptability for OB/OD Treatment Declaration Form

US ARMY GARRISON YUMA PROVING GROUND - OB/OD MUNITIONS TREATMENT FACILITY

SUMMARY TREATMENT FORM

INSTALLATION: YPG					DEMOLITION RANGE LOCATION: OB/OD				REPORTING MONTH/YEAR		
DATE	TIME	TEMP	RELATIVE HUMIDITY	WIND		SKY CONDITION	LOCAL PARAMETERS		MATERIAL DESTROYED		
				SPEED MPH	DIRECTION		INVERSION	Other	QTY	Form	TYPE

Note: Chance of precipition or electrical storms must be less than 50%, wind speeds must be greater than 3 mph but less than 15 mph, visibility must be greater than 1 mile,

Name: ______________________ **Signature:** ______________________ **Date:**

US ARMY GARRISON YUMA PROVING GROUND – OB/OD MUNITIONS TREATMENT FACILITY

SCRAP CERTIFICATION FORM

Name: **Page _____of_____**

DESCRIPTION	QUANTITY	LOCATION

I declare that the items listed hereon have been inspected by me and, to the best of my knowledge and belief, contains no items of a dangerous or environmentally hazardous nature.

Signature: ____ **Date:** ___________________________

Range Residue Turn In/Destruction Certificate

Test Officer:	JONO:	Date:

Nomenclature/Description	QTY/LBS

The explosives safety status of material potentially presenting an explosive hazard (MPPEH) shall be determined by one of two methods: (a) 100-percent visual inspection and an independent 100-percent re-inspection by qualified personnel or (b) processing by a DoD Explosives Safety Board (DDESB)-approved method with appropriate post-processing inspection (e.g., sampling, etc.) of the material A certification/verification statement as shown shall be signed and dated by a DoD contracted person or a Government employee. This documentation is only valid if the material listed is properly segregated and secured, and the chain-of-custody is maintained until the material's release from DoD control.
Ordnance Recovery Technician:
Signature:
Ordnance Recovery Technician:
Signature:

ARF-016 (MAY 12)

SCRAP CERTIFICATION FORM

EXAMPLE: SCRAP CERTIFICATION FORM

Name: John Doe **Page _1___of__1__**

DESCRIPTION	QUANTITY	LOCATION
Fragmented metals	~25 pounds	Pit#2 East bottom
Fins from 60 mm mortar	~10 pounds	West side of Pit#3 10-25 meters out
Fragmented metals from magnet operations	~50 pounds	South of pit #2 to far south edge

I certify that the items listed hereon have been inspected by me and, to the best of my knowledge and belief, contains no items of a dangerous or environmentally hazardous nature.

Signature: ________John Doe________________________________ **Date:** __**16 Jan 2016**________________

US ARMY GARRISON YUMA PROVING GROUNDS – OB/OD MUNITIONS TREATMENT FACILITY

Acceptability for OB/OD Treatment Declaration

Reference:

Treatment Control/Transfer Form	Document Control Number
DD Form 1348-1	
DA Form 4508	
DA Form 2407	
YT Form 24	

I declare that the following items meet the requirements for acceptable treatment found in the U.S. Army Garrison Yuma OB/OD Treatment Facility permit Waste Analysis Plan. The conditions for which an item is deemed acceptable for OB/OD treatment include:

a. The waste is classified as a military munition, military energetic material, or military explosive as defined by *Dept. of Transportation regulations* and *40 CFR 260.10*, and
b. The item only contains chemicals, elements, or compounds that are listed on the Master COPC table in the permit and,
c. The item has an accurate datasheet detailing the components and compounds that comprise the item or, adequate generator knowledge of the components and compounds contained in the item.
d. A competent person, knowledgeable in the munition's components, certifies the above.

Documentation of Acceptability

Initial All Applicable	Type Of Documentation And Details
	MIDAS database verification of compounds / components. (Insert national stock number (NSN) used for verification)
	Other technical reference (specify, include appropriate pages)
	Personal inquiry into the components / compounds (include details or record of conversation)

Printed Name: ______________________________ Title: ______________________________

Signature: _________________________________ Date: ______________________________

ATTACHMENT 6C

STANDARD OPERATING PROCEDURES

(Placed in ADEQ *CONFIDENTIAL* File)

SOP YP-0000-K-02: Demilitarization by Detonation and Open Burn

SOP YP-0000-K-028: Surface Range Clearance

SOP YP-YTRO-P-1000: Range Operations

ARIZONA HAZARDOUS WASTE MANAGEMENT PERMIT

EPA I.D. NO. AZ5213820991

U.S. ARMY GARRISON YUMA PROVING GROUND

PERMIT ATTACHMENT 7

GROUNDWATER MONITORING PLAN

TABLE OF CONTENTS

CONTENTS PAGE

GROUNDWATER MONITORING PLAN

7.1 GENERAL DESCRIPTION

7.1.1 Introduction

The Groundwater Monitoring Plan for the OB/OD MTF was originally submitted to ADEQ in 2010, and then revised under a Class II permit modification request submitted to ADEQ on June 27, 2013. ADEQ approved the Class II permit modification request for the revised Groundwater Monitoring Plan on August 15, 2014. Upon further review by ADEQ in 2017, an Addendum to the May 2014 Groundwater Monitoring Plan was required to address ADEQ concerns.

The objectives of the Groundwater Monitoring Plan are to assess the groundwater quality at the OB/OD MTF and determine whether groundwater quality has been impacted as a result of the facility operations. This plan describes the processes for obtaining groundwater samples for laboratory analysis, water quality field parameter data, and depth to water measurements.

The Groundwater Monitoring Plan is included in Attachment 7A-1. The Addendum is provided in Attachment 7A-2

7.1.2 PE Certification

The Class II permit modification request submitted to ADEQ in June 2013 was in turn amended by The U.S. Army Garrison Yuma Proving Ground on January 15, 2014 and on May 23, 2014. As a result of the changes made to the Groundwater Monitoring Plan since its 2013 submission, a review/certification of the final plan, dated May 2014, was required. The review/certification is included in Attachment 7B.

7.1.3 Groundwater Monitoring Data

A groundwater sampling event was accomplished for the OB/OD MTF in August 2016. A report on the sampling event and the results was provided to ADEQ in November 2016. A copy of that report is provided in Attachment 7C.

ATTACHMENT 7A

GROUNDWATER MONITORING PLAN

Attachment 7A-1	**Groundwater Monitoring Plan for the Munitions Treatment Facility, May 2014**
Attachment 7A-2	**Addendum of Groundwater Monitoring Plan for the Munitions Treatment Facility, April 2017**

FINAL

GROUNDWATER MONITORING PLAN FOR THE MUNITIONS TREATMENT FACILITY

Submitted To:

U.S. ARMY GARRISON YUMA PROVING GROUND

Revised by:

USAGYPG Environmental Sciences Division

May 2014

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APPENDICES

ACRONYMS AND ABBREVIATIONS

ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
ASTM	American Society for Testing and Materials
AWQS	Aquifer Water Quality Standard
bgs	Below Ground Surface
CFR	Code of Federal Regulations
DIDC	Document Information/Document Control
ESD	Environmental Sciences Division
IDW	Investigative Derived Waste
MCL	Maximum Contaminant Level
MTF	Munitions Treatment Facility
OB/OD	Open Burn/Open Detonation
OSHA	Occupational Safety and Health Administration
PMR	Permit Modification Request
PVC	Polyvinyl Chloride
RCRA	Resource Conservation and Recovery Act
RL	Reporting Limit
ROC	Range Operations Control
RSL	Regional Screening Levels
SAP	Sampling and Analysis Plan
SDWA	Safe Drinking Water Act
SSHP	Site Safety and Health Plan
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
USAGYPG	United States Army Garrison Yuma Proving Ground
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
SVOC	Semivolatile Organic Compound

SECTION 1.0
INTRODUCTION

This document presents a revision to the Munitions Treatment Facility (MTF) Groundwater Monitoring Plan dated September 2010. The plan incorporates changes based on a Class 2 Permit Modification Request dated June 26, 2014. Monitoring of groundwater at the MTF is required under current Arizona Hazardous Waste Management Act Permit, EPA I.D. No AZ5213820991.

The objectives of this monitoring plan are to assess the groundwater quality at the MTF and determine whether it has been impacted as a result of the facility operations.

This plan describes the process for obtaining groundwater samples for laboratory analysis and water quality field parameter data from the two groundwater monitoring wells, and depth to water measurements from two groundwater monitoring wells and one industrial use production well, at five year intervals under a detection monitoring program as required by the operating permit.

1.1 PURPOSE

The Arizona Department of Environmental Quality (ADEQ) issued an Arizona Hazardous Waste Management Act hazardous waste treatment permit to USAGYPG on June 29, 2007. This permit, number AZ5213820991, governs the operations and closure activities for the MTF located on the Kofa Firing Range of USAGYPG. Included in the permit is a schedule of compliance for activities to be performed by the permittee. Part I General Permit Conditions, Section I. Schedule of Compliance, paragraph 1.b of the permit required the installation of a groundwater monitoring well network, consisting of not less than one up-gradient and three down-gradient wells, for the assessment of groundwater quality at the facility. USAGYPG completed the installation of monitoring wells MTF-MW1 up-gradient and MTF-MW3 down-gradient on April 26, 2011 and wells MTF-MW2 and MTF-MW4 slated for future installation, dependent on the outcome of nine rounds of sampling.

The purpose of revising this Groundwater Monitoring Plan is to support USAGYPG's Class 2 Permit Modification Request (PMR) dated June 26, 2013. The PMR will reduce the number of downstream monitoring wells from three to one, and reduce the frequency of sampling from biennially to every five years to coincide with the long term surface soil sampling respectively.

USAGYPG completed nine rounds of groundwater sampling as required by the Permit. USAGYPG submitted the Draft Final Groundwater Monitoring Report, KOFA OB/OD Munitions Treatment Facility 2011-2013 to ADEQ on February 14, 2014. Based on the data contained in the report USAGYPG has determined that biennial sampling is not needed since constituents of concern were not detected at or above regulatory limits defined in the Permit.

1.2 BACKGROUND

1.2.1 Facility Description

The MTF is on the Kofa Firing Range, approximately 10 miles north of the Kofa Firing Range complex (Figure 1). The facility is a fenced area encompassing approximately 1 square mile (Figure 3). Active treatment units, including burn pads/retention basins, and demolition trenches, cover an area of approximately 2 to 3 acres in the central portion of the facility and the remaining area provides a safety buffer zone. The monitoring wells are located outside of the fence at the northeast corner (MTF-MW1) and the southwest corner (MTF-MW3). There is an industrial use production well (Well M) located approximately 1.4 miles up-gradient of the facility that is used solely to measure groundwater levels. Figure 2 is a drawing of the MTF showing operable units of the facility.

1.2.2 Process Operations Description

USAGYPG is a modern research and development facility focused on testing military equipment, weapons systems, and munitions. In conducting these test programs USAGYPG uses significant quantities of munitions and explosives. Each year, quantities of these materials must be treated as wastes. These wastes include out-of-date explosives and propellants, items in storage or manufacture that have failed quality assurance tests, and any unsafe munitions items, components, or explosives. OB/OD is normally the safest method currently available for the effective destruction, decontamination, and treatment of explosives and explosive wastes.

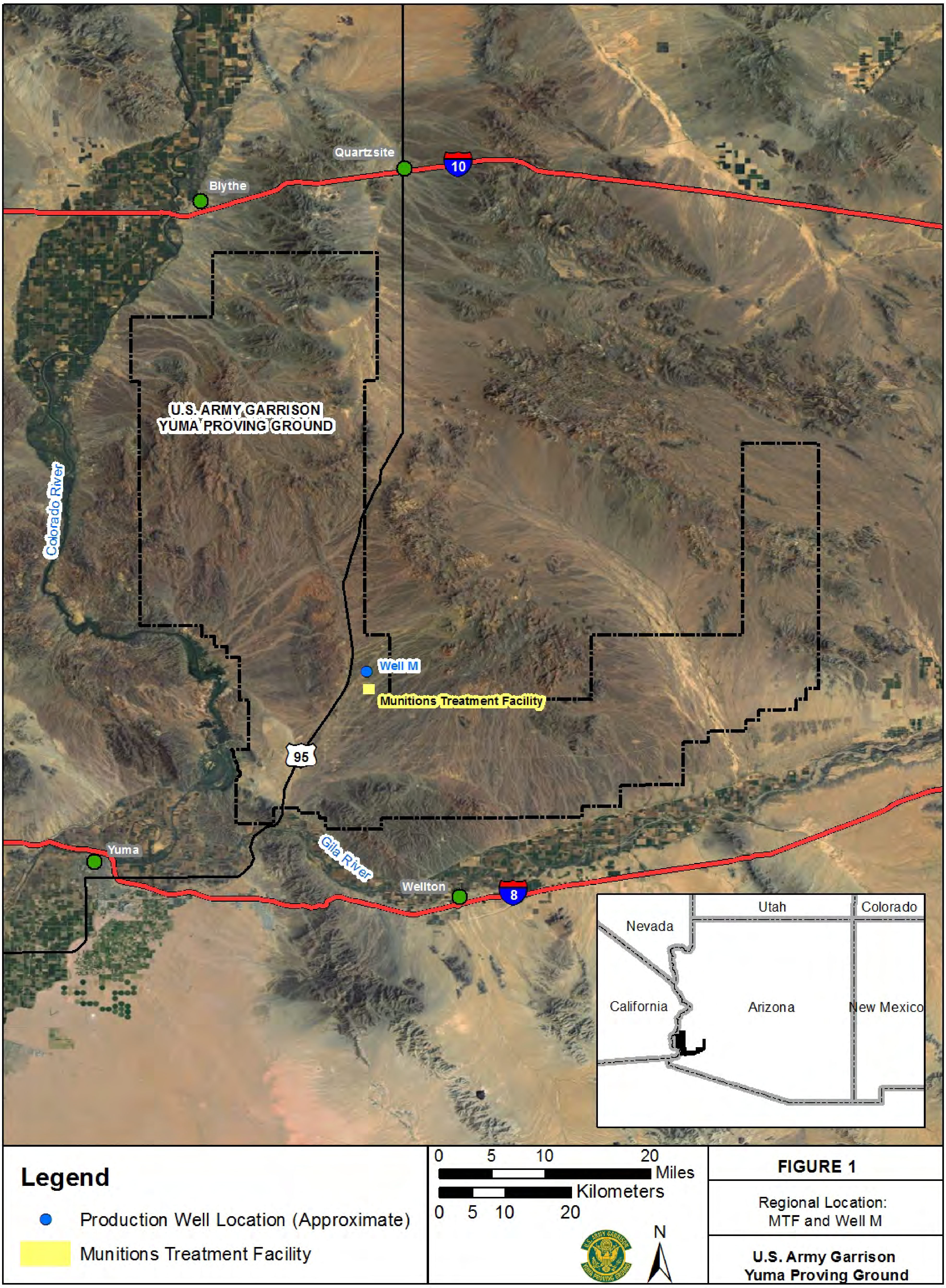

FIGURE 1 - Site location Map showing the USAGYPG boundary, the MTF, and the location of the nearest production wells, U.S. Army Garrison Yuma Proving Ground, Arizona.

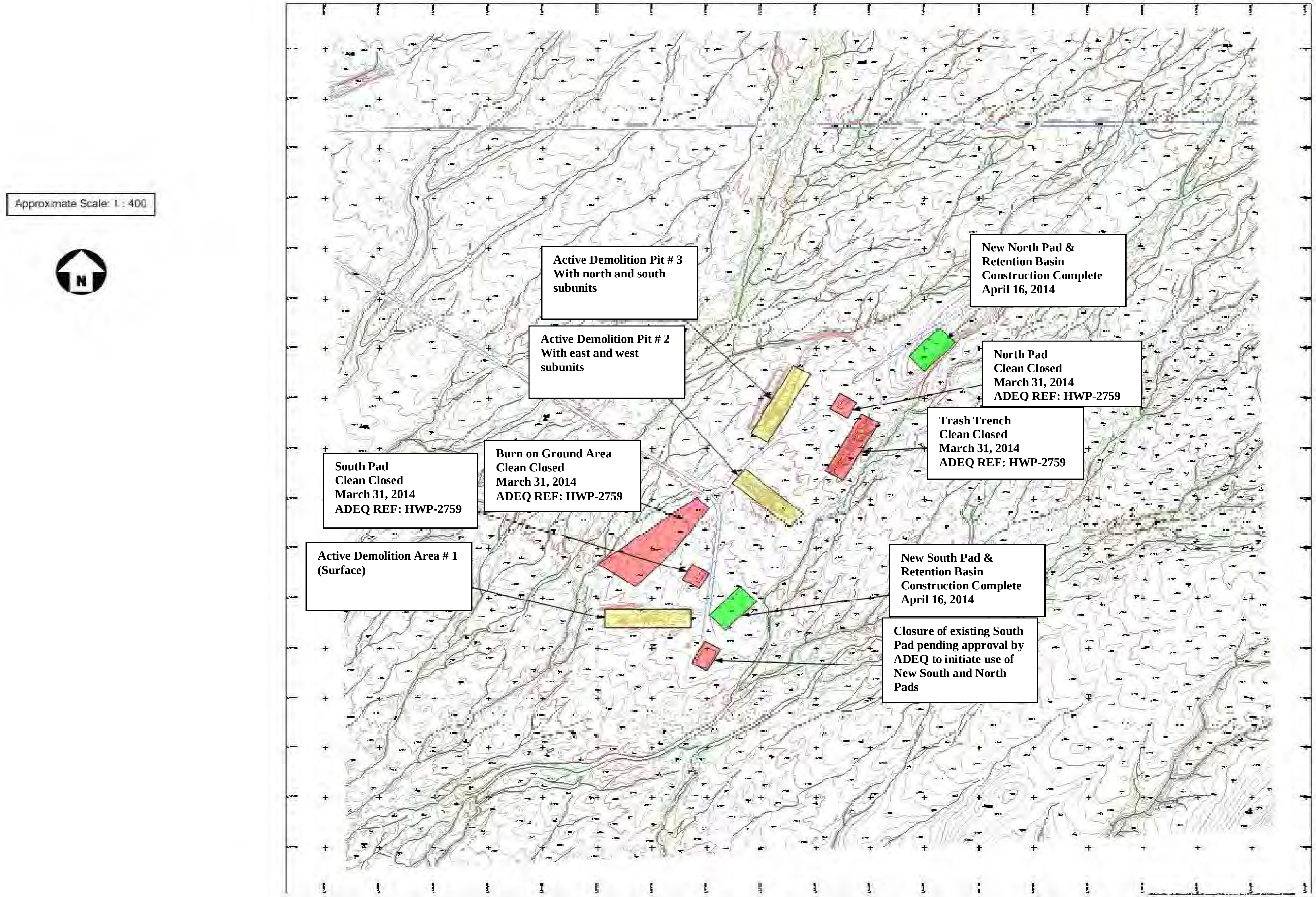

FIGURE 2 – The Active Portion of the Munitions Treatment Facility Detail Showing Active, Inactive , and new Units, U.S. Army Garrison Yuma Proving Ground (ADEQ, 2007)

SECTION 2.0
GROUNDWATER SETTING

2.1 EXISTING MONITORING WELL NETWORK

There are two monitoring wells, MTF-MW1 and MTF-MW3, a few feet outside the perimeter fence of the OB/OD area (Figure 3). Installation of these wells was completed on April 26, 2011. USAGYPG conducted nine quarterly groundwater sampling events, with the last event completed on May 2013. A summary of the data collected, sampling results, and ground water flow direction are included in Appendix D (Table D.2 Summary of Analytical Laboratory Detections) along with statistical analysis of the sampling data.

Industrial use production Well M is located about 1.4 miles up-gradient at the Castle Dome Heliport. The well is approximately 1,000 feet deep, with the last 100 feet in bedrock. Water was encountered at 720-730 feet below ground surface (bgs) but the static water level in the well is approximately 635 feet bgs.

2.2 DEPTH TO GROUNDWATER

Depth to groundwater at the MTF is 624 feet and 552 feet bgs as measured from monitoring wells MTF-MW1 and MTF-MW3 respectively. This was determined using the data that was collected from May 2011 through May 2013. A summary of the data is provided in Appendix D (Table D-1, Kofa OBOD Water Level Measurements).

SECTION 3.0
MONITORING WELLS

3.1 WELL INSTALLATION

The Schedule of Compliance in MTF permit required the wells to be installed no later than June 30, 2012. After discussion and agreement with ADEQ, USAGYPG completed installation of one up-gradient and one down-gradient wells, MTF-MW1 and MTF-MW3 respectively, on April 26, 2011.

3.2 OVERVIEW OF WELL SPECIFICS

The up-gradient well (MTF-MW1) sampling data will be used to assess background conditions and the down-gradient well (MTF-MW3) to determine if operations at the MTF are impacting the groundwater. Based on the location of the MTF relative to the Colorado and Gila Rivers and that groundwater typically mimics topography, the groundwater flows from northeast to southwest.

Each well was constructed using 4-inch inner diameter Schedule 80 polyvinyl chloride (PVC) casing and sixty feet of well screen, with 20 feet above and 40 feet below the static water table. The monitoring wells are constructed in such a manner that representative samples of the groundwater can be collected in a way that meets the data quality objectives. A dedicated pump is installed at each monitoring well due to the significant depth-to-water at the MTF.

The up-gradient well, MTF-MW1, is located northeast of the unit, on the north side of the access road that runs along the north boundary of the MTF. The middle down gradient well, MTF-MW3, is located at the southwest corner. Figure 3 shows the locations of MTF-MW1 & 3 along with location of production Well M. Production Well M will be used to measure depth to groundwater only and will not be used to monitor groundwater quality at the MTF. This configuration should capture groundwater leaving the MTF based on the groundwater gradient estimated to exist in the area of the MTF. A potentiometric map illustrating the direction of groundwater flow is presented in Figure 3A and the three point calculations are presented in Appendix D Figures 1 and 2 respectively.

The monitoring wells were installed according to state standards and through permits acquired from Arizona Department of Water Resources (ADWR).

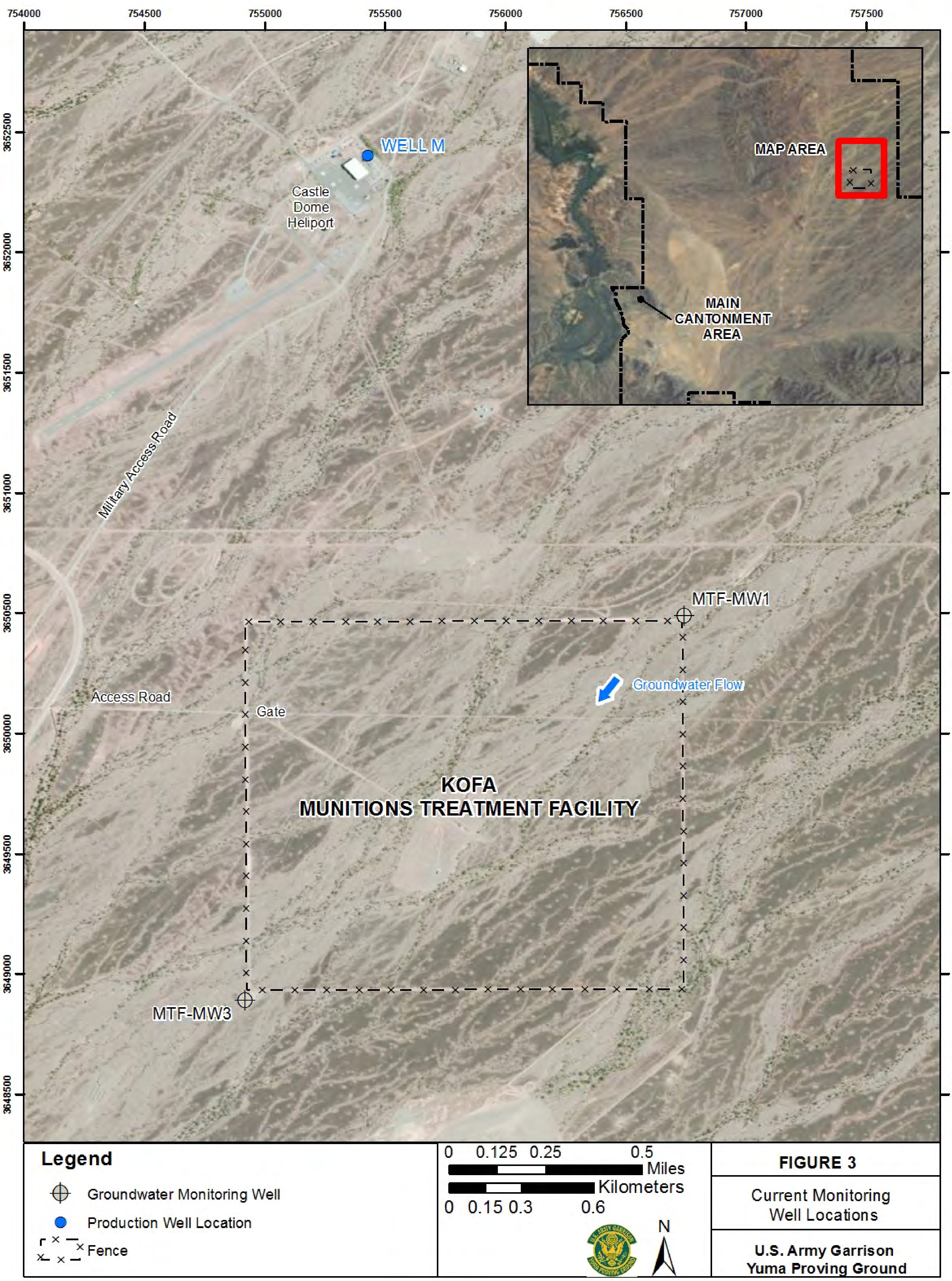

FIGURE 3 – CURRENT WELL MONITORING LOCATIONS
U.S. Army Garrison Yuma Proving Ground, Yuma, Arizona

3.3 WELL SECURITY

Access to the MTF and the monitoring wells is controlled by the Installation Range Operations Control (ROC) Office. All unauthorized personnel requesting access must obtain a badge at the Installation Visitor's Center. Upon arrival at the MTF all personnel must sign-in at the gate and be accompanied by authorized facility personnel. To prevent unauthorized access to monitoring wells, padlocks are placed on all well covers. The USAGYPG ESD controls all keys and only authorized personnel will possess keys. As part of the well sampling procedures, any signs of tampering or damage to wells will be noted in the field logbook and reported to ESD and ROC. Procedures for the security of samples are addressed in the Sampling and Analysis Plan developed for this monitoring (see Section 4.0).

3.4 WASTE MANAGEMENT

There will be no regulated waste generated as a result of groundwater sampling. Regulated waste generated as a result of OBOD operations is managed and disposed of in accordance with the USAGYPG Installation Hazardous Waste Management Plan and applicable RCRA regulations. Purge water will be released at the site in accordance with ADEQ IDW policy.

SECTION 4.0
GROUNDWATER SAMPLING AND ANALYSIS

During the sample collection process, the field parameters of pH, temperature, conductivity; dissolved oxygen and Redox potential are measured. Evaluation of groundwater flow direction and hydraulic gradient will be established from groundwater level measurements taken at MTF-MW1, MTF-MW3, and industrial use production Well M prior to purging and sample collection.

For the initial detection monitoring and to establish a baseline, groundwater samples were collected over nine quarters of sampling at monitoring wells MTF-MW1 (up-gradient well) and MTF-MW3 (down-gradient) located at the Kofa OB/OD MTF. Groundwater samples were analyzed for volatile organic compounds (VOC)s, semi-volatile organic compounds (SVOC)s, explosives, perchlorate, TAL metals, nitrate/nitrite, and ammonia. A statistical analysis was performed on the analytical data. The objective of the statistical analysis was to determine if there is statistically significant evidence of migration of hazardous constituents to the water table aquifer (see Section 5.2).

Based on the analytical results and the statistical analysis VOCs, SVOCs, nitrate/nitrite and ammonia were removed from the list. As a result, the current analyte list consists of explosives, perchlorate, and TAL metals. A summary of analytical results for the sampling effort is presented in Appendix D, Table D-2. There is no evidence from the data to indicate migration of hazardous constituents from the MTF operations to the ground water. Based on this, USAGYPG will continue the groundwater monitoring detection program on a five year cycle to coincide with the long term surface soil sampling as proposed in the class 2 PMR.

For strictly anthropogenic compounds (i.e., explosives, and perchlorate), statistically significant evidence of contamination is defined as concentrations above reporting limits in down-gradient wells. For inorganics (i.e., TAL metals), statistically significant evidence of contamination is defined as levels in down-gradient wells that are statistically elevated when compared with up-gradient (background) well concentrations.

The hazardous constituents for which groundwater protection standards (40 CFR §264.93) apply consist of the explosives, perchlorate, and TAL metals. The potential adverse effects on groundwater quality will be considered when determining the applicability of a compliance monitoring program and groundwater protection standards. Current and future groundwater use and quality, potential for health risks from human exposure (i.e., results of a risk assessment), potential for further migration in groundwater, and other factors as presented in 40 CFR §264.93 will be considered in determining whether a contaminant is capable of posing a substantial hazard to human health or the environment. As discussed above, groundwater protection standards will be established if hazardous substances capable of posing a substantial threat to human health or the environment are detected in groundwater in the down--gradient wells (i.e., if there is statistically significant evidence of contamination in down-gradient wells). These groundwater protection standards will be developed per 40 CFR §264.92 as part of a compliance monitoring program and will take into consideration background concentrations based on upgradient well data, Arizona Aquifer Water Quality Standards (AWQSs), the Federal Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs), and/or U.S. Environmental Protection Agency (USEPA) Regional Screening Levels for tap water. If a groundwater protection standard for a hazardous constituent is exceeded at the point of compliance, a permit modification will also be submitted to develop a plan for corrective action to ensure compliance with groundwater protection standards per 40 CFR §264.100.

The point of compliance for the MTF is the vertical surface located at the hydraulically down-gradient limit of the facility, MTF-MW3. At this point the groundwater quality will be assessed to achieve cleanup goals should there be evidence of contamination resulting from operations at the facility.

A detailed Groundwater Monitoring Sampling and Analysis Plan (SAP) is attached as Appendix B. The SAP addresses all the following elements:

- laboratory test methods and reporting limits (RLs);
- sample frequency;

- containers, preservatives and volumes;
- collection methods, including well purging and sample collection;
- field and laboratory quality control samples – including duplicates and blanks;
- holding times;
- sample numbering;
- field documentation;
- sample integrity – i.e., chain of custody procedures and sample security in the field and at the laboratory;
- corrective action to be taken if issues are identified;
- data management and reporting; and
- data verification and validation requirements.

4.1 GROUNDWATER LEVEL MEASUREMENTS

Prior to sampling the monitoring well MTF-MW1 and MTF-MW3, the water levels in these wells and Well M are measured to the nearest 0.01 ft. with an electronic water level indicator. Measurements in the monitoring wells are measured at a mark or notch at the top of the casing that has been previously surveyed by an Arizona licensed surveyor. The water level indicator probe is decontaminated prior to and after use by rinsing with water meeting requirements of American Society for Testing and Materials (ASTM) Type II reagent water. The probe and tape are decontaminated in the same manner as sampling equipment if it becomes excessively soiled. Measurements from the monitoring well network are collected within a 24-hour period prior to any of the wells in the network being sampled. A potentiometric surface map of the measurements is generated and the hydraulic gradient indicated.

Within the same 24-hour period the water level in the industrial use production well, Well M, located at Castle Dome Heliport will also be collected. This depth to water measurement will be collected after the well pump has been shut down for a minimum of 24 hours so that the water level can stabilize. Depth to water measurements will be collected from Well M during the MTF sampling events.

4.2 GROUNDWATER SAMPLING PROCEDURE

Prior to sampling, each of the monitoring well, MTF-MW1 and MTF-MW3, will be purged in order to obtain samples of formation water. Purging of the well is performed with the dedicated pump installed in the well. Purging of the wells continues until at least three casing volumes are removed or the field parameters of DO and Redox potential have stabilized, that is, measurements are within 10% of one another over three consecutive measurements.

After purging is satisfactorily completed, sample containers are filled. All containers are new and level I certified according to USEPA quality assurance cleaning protocols. The sampling team members at each well wear new, disposable gloves for each sample. Preservatives, if required by the analytical method, are added to the containers by the laboratory prior to the containers being shipped to USAGYPG. Preservation in the field is completed only if the laboratory cannot provide pre-preserved sample containers.

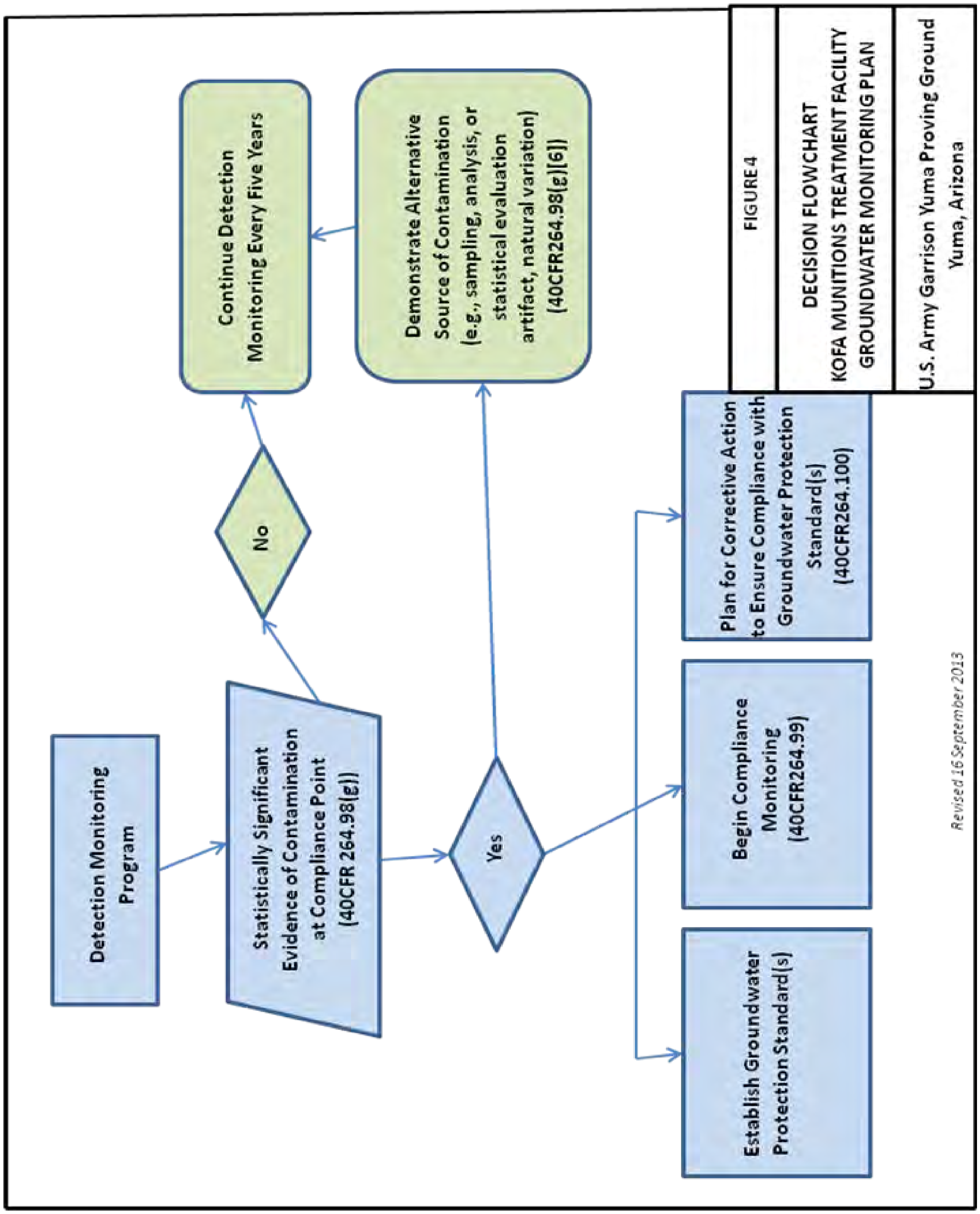

FIGURE 4 – DECISION FLOWCHART, KOFA MUNITIONS FACILITY

SECTION 5.0
DATA EVALUATION AND ANALYSIS

5.1 DATA QUALITY OBJECTIVES

Groundwater monitoring is conducted in accordance with the indicator parameters required under RCRA in 40 CFR §264.94, 40 CFR §264.98(a), and the MTF permit. A risk based approach will be used for cleanup, if required. The potential for contamination of the groundwater at the MTF is minimal, therefore monitoring is conducted to determine if there is statistically significant evidence of contamination. For strictly anthropogenic compounds (i.e., explosives, and perchlorate), statistically significant evidence of contamination is defined as concentrations above detection limits in down-gradient wells. For inorganics (i.e., TAL metals), statistically significant evidence of contamination is defined as levels in down-gradient wells that are statistically elevated when compared with up-gradient (background) well concentrations.

If there is statistically significant evidence of contamination, ADEQ will establish groundwater protection standards based on AWQSs, the Federal SDWA MCLs, and USEPA Regional Screening Levels (RSLs) for residential tap water, and/or background concentrations. A comparison of laboratory reporting limits (RLs) and typical method detection limits (MDLs) with these groundwater regulatory limits indicates that the detection limits are sufficient for decision-making purposes. Typical MDLs are less than AWQSs and Federal MCLs, and most are also less than USEPA RSLs, as well.

These Data Quality Objectives are based on nine quarterly sampling events conducted by USAGYPG. Based on the analytical results VOCs, SVOCs, nitrate/nitrite and ammonia were removed from the list. As a result, the current analyte list consists of explosives, perchlorate, and TAL metals.

5.2 STATISTICAL ANALYSIS AND DECISION MAKING

A statistical analysis was performed on the analytical data collected over nine quarters, August 2011 through August 2013, of sampling at monitoring wells MTF-MW1 (up-gradient well) and MTF-MW3 (down-gradient) located at the Kofa OB/OD

MTF. The groundwater samples were analyzed for metals, explosives, VOCs, perchlorate, and SVOCs. The objective of the statistical analysis was to identify concentration differences between samples collected from the up- and down-gradient monitoring wells, potentially indicating impacts to groundwater from site activities. A summary of analytical results for the sampling effort is presented in Table D-2. Only metal analytes were detected consistently above laboratory reporting limits. Multiple statistical methods were used to determine if there is a statistical difference between the up- and down-gradient monitoring wells. The statistical analysis shows that there is no evidence from the data to indicate migration of hazardous constituents from the MTF. USAGYPG will continue the groundwater monitoring detection program on a five year cycle to coincide with the long term surface soil sampling. The statistical analysis summary is provided in Appendix D.

SECTION 6.0
PROJECT MANAGEMENT

6.1 PROJECT ORGANIZATION

The project organization reflects the relationship between the ADEQ regulatory oversight of the project, the USAGYPG technical point of contact, and the contractor team assembled to plan, organize, control, and execute this groundwater monitoring program. The ADEQ Staff Project Manager (PM) has the responsibility for all oversight and final approval of the project. The USAGYPG PM is the interface with the ADEQ and has overall responsibility for the performance and completion of the project. Within a contractor team, the key positions are the Project Manager, the Principal Site Geologist, and the Site Health and Safety Officer. The following sections list the responsibilities for these individuals. Additional project responsibilities are outlined in the SAP (Appendix B).

6.1.1 Project Manager

The USAGYPG Environmental Science Division (ESD) Staff Environmental Engineer serves as PM and is responsible for implementation of the MTF Groundwater Monitoring Plan. USAGYPG may delegate this responsibility to a USAGYPG contractor. The manager is USAGYPG's representative and is responsible for implementation of this plan. The manager's responsibilities include:

- Overall project management
- Total planning, organization, and execution of the monitoring plan
- Maintaining contact with the USAGYPG management throughout the work
- Reviewing and approving all deliverables
- Schedule and budget tracking
- Quality and timeliness of deliverables
- Resolving SAP issues
- Directing the Principal Site Geologist

6.1.2 Principal Site Geologist

The USAGYPG ESD Field Supervisor or Sampling Team Supervisor serves as Principal Site Geologist. USAGYPG may delegate this responsibility to a USAGYPG contractor. The Principal Site Geologist is responsible for coordinating all site activities, including those of the on-site contractors, and all laboratory activities. These include execution of the fieldwork in accordance with this monitoring plan. Specific responsibilities include:

- Keeping Project Manager and USAGYPG management informed
- Approving uses of technical resources
- Coordinating all assigned resources
- Periodic review of progress and progress reporting
- Day to day execution of the monitoring plan and SAP
- Coordinating, directing, and overseeing field technical support staff
- Ensuring that all staff and subcontractors meet USAGYPG security requirements
- Completing all appropriate field logs for project activities
- Providing overall supervision of the collection, handling, and shipping of all samples
- Monitoring all sampling operations to ensure that all project site personnel are executing the provisions of this Work Plan
- Understanding the quality requirements of each field task, and bringing to the attention of management, conditions which may adversely impact the quality of the data or other work product.
- Execution of all field QC procedures as dictated by the SAP

6.1.3 Site Health and Safety Officer

The USAGYPG Staff Safety Officer serves as Site Health and Safety Officer. USAGYPG may delegate this responsibility to a YPG contractor. The Site Health and Safety Officer is responsible for:

- Directing all health and safety activities on site
- Reporting safety-related incidents or accidents to the Project Manager and the USAGYPG technical representative

- Temporarily suspending field activities, if health and safety of personnel are endangered
- Maintaining health and safety equipment on-site
- Conducting daily health and safety meetings
- Verifying personnel working on the site have completed medical surveillance and health and safety training.
- Maintaining documentation of health and safety measures taken at the site, including
- Communication of provisions of the Site Safety and Health Plan
- Levels of protection and required upgrades
- Incident reporting
- Upgrading or downgrading levels of protection in response to field conditions

The Site Health and Safety Officer duties can be concurrently held by the Principal Site Geologist, so long as the Principal Site Geologist is qualified to hold them.

6.2 TRAINING REQUIREMENTS

Personnel executing the requirements of this plan are appropriately trained with adequate experience or supervision based on the assignment. The personnel may be directly employed by USAGYPG, USAGYPG contractor or by the contractor's subcontractors depending on project requirements. All personnel will fully understand the assignment, the specific protocols to be used, and the potential hazards of the site. USAGYPG or USAGYPG contractor at any time may rotate or replace personnel based on field requirements. All personnel assigned are noted in the master project logs, which are retained in the data management system upon project completion.

Occupational Safety and Health Administration (OSHA) regulations covering Hazardous Waste Operations and Emergency Response require training of all site personnel in accordance with 29 CFR 1919.120. A Site Specific Health and Safety Plan (SSHP) will be prepared by the USAGYPG or USAGYPG contractor 120 days before any sampling activities and a copy will be submitted to the ADEQ.

Before arrival on site, USAGYPG or USAGYPG contractor is responsible for certifying that his/her employees meet the requirements of pre-assignment training, consistent with OSHA 29 CFR § 1910.120(p). USAGYPG or USAGYPG contractor will maintain documentation certifying that each general site worker has received 24 hours of instruction off the site with 8 hours of job experience. All personnel must also receive 8 hours of refresher training annually.

The training and experience noted above represents the minimum required and may be modified during the execution of this project.

6.3 SAFETY AND HEALTH

A SSHP will be prepared by the USAGYPG or USAGYPG contractor 120 days before any sampling activities and a copy will be submitted to the ADEQ. The plan will describe the USAGYPG or USAGYPG contractor, Health and Safety policy, program responsibilities, training, medical surveillance and emergency care, safety equipment, program audits, record keeping and information distribution, and other work-related health and safety procedures. Prior to groundwater sampling activities, field personnel will read, understand, and sign to the contents of the SSHP.

6.4 REPORTING

6.4.1 Notification of Tentative Sampling Dates

The USAGYPG will provide ADEQ a notice of tentative sampling dates for the first five year cycle due of sampling scheduled for August 2018. This notification will be provided 21 days in advance.

6.4.2 Compliance Monitoring Summary Reports

After the initial five year sampling event, a statistical evaluation of the analytical results will be performed

Upon completion of data validation, analytical data summaries will be submitted to ADEQ. Similar reports will be submitted every five years thereafter. The compliance monitoring report will include sections on project activities, analytical results summary, and recommendations for future sampling. The project activities section will include project objectives, a summary of groundwater sampling activities, a summary of laboratory analyses, and a summary of the data quality evaluation. The results section will include well gauging data, analytical results summary and an evaluation of human health risks, if any. Raw analytical data and the full data quality validation will be submitted as appendices to the report.

The report will be prepared under the direction of and sealed by an Arizona Registered Professional Engineer.

6.4.3 Future Sampling Reports

Future monitoring events are scheduled every five years (beginning in Aug 2018) and will coincide with the USAGYPG Long -Term Surface Soils Monitoring Plan. Collected samples will be analyzed for explosives, perchlorate, and TAL metals analytes as identified in Sampling and Analysis Plan, Appendix B Table B-1. This analyte list is based on the statistical evaluation, of the analytical results for the groundwater samples collected at the Kofa OB/OD facility over nine quarters, which shows that there is no evidence from the data to indicate migration of hazardous constituents from the MTF. As a result VOCs, SVOCs, nitrate/nitrite and ammonia were removed from the list. The statistical analysis is provided in appendix D.

6.4.4 Reporting of Evidence of Contamination

If there is statistically significant evidence of contamination for hazardous constituents the USAGYPG will notify the ADEQ in writing within 7 days of making the determination.

6.5 RECORDKEEPING

All documents pertaining to this project are maintained in the USAGYPG Document Information/ Document Control system (DIDC). The DIDC system is designed to adhere to 40 CFR § 265.74, 40 CFR § 265.112(a), 40 CFR § 270.10(i), and 40 CFR § 270.14(d)(2). This system allows for retrieval of documents from a centralized location at USAGYPG. All original records and electronic documents are placed in the system as soon as practicable. All documents are scanned with optical character recognition (OCR) and uploaded to the DIDC.

Access to the DIDC is controlled by USAGYPG Environmental Sciences Division, and can be obtained by contacting the Environmental Sciences Chief. The public may request documents through the Freedom of Information Act by contacting the Public Affairs Office. Arrangements can be made for viewing documents related to this project and copies reproduced for regulatory agencies as required. All electronic documents are maintained on networked servers at.

The DIDC files are stored on a server, which is backed up daily. The server is a secure system with limited access. Closed files are retained for seven years then archived on an inactive storage system.

The records for this facility will be retained until closure of the MTF is completed. Then these records will be stored with the facility closure records for their required retention period.

SECTION 7.0
REFERENCES

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U.S. Occupational Safety and Health Administration (OSHA), 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response."

U.S. Environmental Protection Agency (USEPA), 40 CFR §264 "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities."

APPENDIX A

-RESERVED-

APPENDIX B

Sampling and Analysis Plan

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ACRONYMS AND ABBREVIATIONS

ADEQ	Arizona Department of Environmental Quality
ADHS	Arizona Department of Health Services
°C	Degrees Celsius
CCV	Continuing Calibration Verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CRQL	Contract-Required Quantification Limit
DIDC	Document Information/ Document Control system
DQO	Data Quality Objective
EOP	Environmental Operating Procedure
FTL	Field Team Leader
FSP	Field Sampling Plan
HDPE	High Density Polyethylene
IDW	Investigation-Derived Waste
KFR	Kofa Firing Range
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
mL	Milliliters
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MTF	Munitions Treatment Facility
MW	Monitoring Well
OB/OD	Open Burning/ Open Detonation
ORT	Ordnance Recovery Technician
OSHA	Occupational Safety and Health Administration
PDF	Portable Document Format
PM	Project Manager
PSHO	Project Safety and Health Officer
QA	Quality Assurance
QC	Quality Control
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RL	Reporting Limit
RPD	Relative Percent Difference
SAP	Sampling and Analysis Plan

ACRONYMS AND ABBREVIATIONS (CONTINUED)

SOP	Standard Operating Procedure
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TIC	Tentatively Identified Compound
TM	Task Manager
US	United States
USEPA	United States Environmental Protection Agency
USAGYPG	United States Army Garrison Yuma Proving Ground
VOC	Volatile Organic Compound

SECTION B.1
PROJECT DESCRIPTION

B.1.1 PURPOSE

This Sampling and Analysis Plan provides the basis and details to collect and evaluate sampling data from groundwater monitoring wells in the Munitions Treatment Facility (MTF) at U.S. Army Garrison Yuma Proving Ground (USAGYPG). The primary purpose of this sampling effort is to obtain sufficient characterization information to assess contamination caused by the MTF. The sampling is being completed as a requirement under the Subpart X permit under the Resource Conservation and Recovery Act (RCRA). This Sampling and Analysis Plan (SAP) describes the sampling, analysis, and quality assurance/quality control (QA/QC) procedures to be used.

This document was prepared in accordance with the United States Environmental Protection Agency (USEPA) document *USEPA Requirements for Quality Assurance Project Plans* (USEPA, 2001). Earlier guidance (USEPA, 1988) developed by USEPA for their Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program, described a SAP as containing two elements: a quality assurance project plan (QAPP) and a field sampling plan (FSP). The newer USEPA document now combines the elements previously defined for both the QAPP and FSP. Accordingly, this SAP, following the new direction, is intended to fulfill the functions of both plans. In order to facilitate easy comparison of this SAP with the requirements of USEPA 2001, Sections 2 through 5 of this plan are laid out in accordance with the four standardized plan elements or groups presented by USEPA. The four standard plan elements cover the entire project as it moves from planning through implementation to assessment, and are designated by USEPA 2001 as follows:

- Group A Project Management
- Group B Data Generation and Acquisition
- Group C Assessment and Oversight
- Group D Data Validation and Usability

All field activities will be performed in accordance with Occupational Safety and Health Administration (OSHA) standards, safety policies, and procedures.

B.1.2 FACILITY BACKGROUND

The USAGYPG is a modern research and development facility focused on the testing of military equipment. A great deal of the military equipment includes weapons systems. In conducting test programs, USAGYPG produces, stores, and uses significant quantities of munitions and explosives. Each year, quantities of materials must be treated as wastes. The wastes include out-of-date explosives and propellants, items in storage or manufacture that have failed quality assurance tests, out-of-date and excess munition items, and any unsafe munition items, components, or explosives.

At present, open burning (OB) and open detonation (OD) are means of demilitarizing many explosive items, removing explosives from large metal objects, and reducing most combustibles to a smaller volume. OB/OD is normally the safest method currently available for effective destruction, decontamination, and treatment of explosives and explosive wastes. Figure B.1 is a site map for the MTF located at USAGYPG. The Arizona Department of Environmental Quality (ADEQ) has primacy over implementation of RCRA within the State.

The MTF facility is on the Kofa Firing Range (KFR), approximately 10 miles north of the KFR complex. The facility is a rectangular fenced area encompassing approximately 1 square mile. The active treatment units, including the existing burn pad/pans, new OB pads/retention basins and demolition trenches, cover an area of approximately 2 to 3 acres in the central portion of the site and the remaining area provides a safety buffer zone.

B.1.3 ANALYTICAL LABORATORY

The analytical laboratory providing analytical services for this project will be certified by the Arizona Department of Health Services (ADHS) for the performance of the analyses described in this SAP. Section 2.1.8 describes responsibilities of the laboratories (referred to in this document as the Contract Laboratory even though more than one laboratory may be involved). The contract with the Contract Laboratory will include a form to be signed by the laboratory manager that acknowledges receipt of this plan and states that the laboratory will adhere to the procedures in this plan.

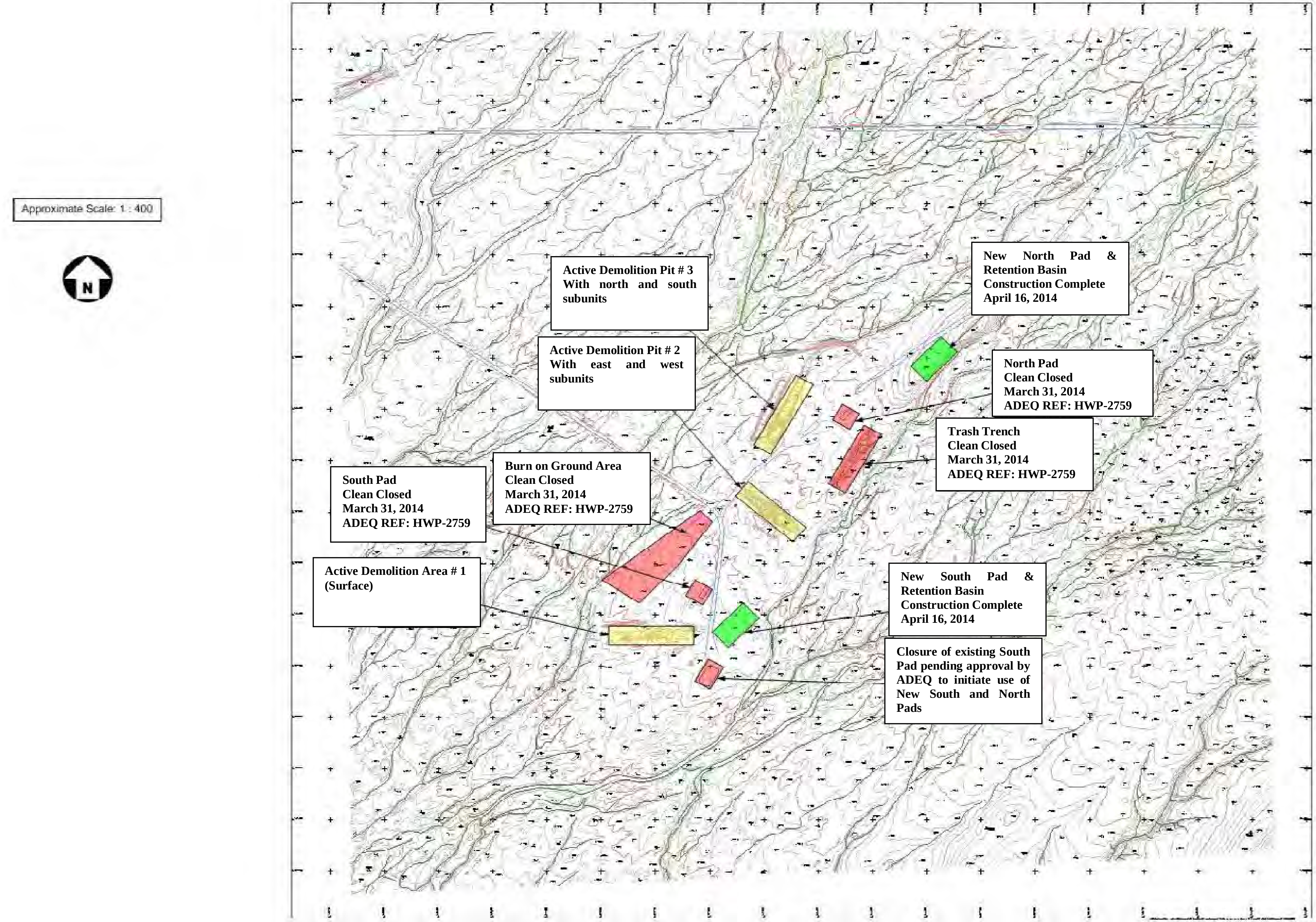

Figure B.1. OB/OD Operations Area, U.S. Army Garrison Yuma Proving Ground

SECTION B.2
PROJECT MANAGEMENT

B.2.1 PROJECT ORGANIZATION

The USAGYPG Environmental Sciences Division (ESD) is monitoring the groundwater in the vicinity of the MTF to determine if there has been migration of contaminants to the groundwater beneath the unit. The ESD is responsible for managing activities related to characterization of the OB/OD units, including those described in this SAP. This SAP was prepared in accordance with USEPA QA/R-5, March 2001; therefore, it also meets the requirements of a QAPP.

B.2.1.1 USAGYPG Environmental Coordinator

The USAGYPG ESD Staff Environmental Engineer serves as MTF Environmental Coordinator, and is responsible for the review and approval of this SAP. The Environmental Coordinator is also responsible for approval of the final sampling report and document storage at USAGYPG until closure of the entire MTF site is completed.

B.2.1.2 USAGYPG Project Manager

USAGYPG ESD Staff Environmental Engineer will serve as USAGYPG Project Manager (PM). The PM is responsible for the overall implementation of this plan. The PM will review and recommend approval of the final SAP. The PM will evaluate project changes and non-conformance with the SAP, particularly its quality assurance aspects. The PM will approve corrective actions for conformance with the quality assurance aspects of the SAP. The PM will oversee the preparation of the Sampling Report and ensure that all project documentation is accurate and complete. The PM is responsible for interaction with the Contract Laboratory, including the tasks listed below:

- Scheduling of analytical services
- Scheduling of QC analyses performed by the laboratory
- Ensuring data are obtained from the analytical laboratory in accordance with contractual requirements, providing copies to the QA Manager and transmitting copies to team members upon request
- Providing day-to-day communications with the analytical laboratory to ensure that samples are analyzed within project requirements and to resolve any problems regarding sample analysis in conjunction with the QA Manager.

B.2.1.3 Project Safety and Health Officer

USAYPG Staff Safety Officer or USAGYPG Contractor Health and Safety Officer serves as the Project Safety and Health Officer (PSHO). The PSHO has specialized occupational health and safety training and experience with sampling activities. The PSHO has responsibility for development of the Project Safety and Health Plan and defining exposure monitoring and hazard control measures. The PSHO reserves the right to audit the site at any time to determine HASP compliance. The PSHO provides expert advice to project staff in dealing with health and safety issues encountered during the project. As appropriate, the PM may fulfill the PSHO responsibilities.

B.2.1.4 Quality Assurance Manager

USAGYPG Staff Environmental Engineer will serve as the QA Manager and will be responsible for the QA/QC program. The QA Manager is responsible for evaluating the project work for conformance with quality assurance elements of this SAP. The QA Manager will review all field and laboratory data, ensuring that chemical data are validated in accordance with procedures identified in this SAP. The QA Manager is responsible for overseeing the review of all field data for accuracy, completeness, and reasonableness, for overseeing the validation of analytical data and for transmitting validated data to the PM.

B.2.1.5 Sampling Field Team

USAGYPG ESD or USAGYPG Contractor will supply a Sampling Field Team. This group will perform all field-sampling operations and the associated field duties. The Sampling Field Team will collect and document samples in accordance with this SAP. The Sampling Field Team will support preparation of the Sampling Report based on the analytical data as directed by the PM.

Field Team Leader

USAGYPG Staff Geologist or USAGYPG Contractor will serve as the Field Team Leader (FTL), and will be responsible for coordination of all phases of the work, including reporting of any identified variances and non-conformance. The FTL will provide technical guidance to the field team as needed. At the conclusion of the work, the FTL will assist in preparation of the Sampling Report.

The FTL will also coordinate and oversee the sampling activities and ensure that the sampling team meets the applicable requirements of this plan. The sampling oversight task includes the items listed below:

- Obtain sampling equipment and supplies,
- Obtain sampling containers from field laboratory,

- Supervise the collection of samples,
- Supervise the packing and shipping of samples,
- Check field documentation,
- Ensure that all sample control notation is completed accurately prior to transfer of samples to the laboratory,
- Track sample and analytical data status; coordinate with the QA Manager on any issues concerning data quality and completeness,
- Communicate problems, variances, and non-conformance to the PM, and
- Interface and cooperate with the OB/OD operators to obtain MTF facility access, and coordinate sampling event scheduling.

Sampling Technicians

Under the direction of the FTL, the Sampling Technician(s) will collect and package samples consistent with the SAP. The technicians will assist in preparing sample control documentation for the samples.

B.2.1.6 Data Management Coordinator

USAGYPG Staff FTL or USAGYPG Contractor serves as the Data Management Coordinator and will have responsibility for planning, implementation, and reporting of project activities. The Data Management Coordinator for this project works with the PM and others to ensure that protocols follow those written into the QA/QC elements of this SAP. This person inspects the laboratory reports for QA/QC and is responsible for in-house data storage, retrieval, and report completion.

B.2.1.7 Contract Laboratory

USAGYPG will contract with ADEQ certified laboratories to provide analytical services for the project. Information regarding laboratory certification will be provided to ADEQ 120 days prior to any sampling activities. These Contract Laboratories will designate a Project Manager who will report directly to the PM. The Laboratory Project Manager will be responsible for managing laboratory operations to provide services necessary to satisfy the requirements described in the SAP.

The Contract Laboratories are responsible for performing chemical analyses requested by the PM. The Contract Laboratories will perform all analyses in accordance with contract requirements and federal, state, and local guidelines, using USEPA-approved or other standard, approved analytical methods. The Quality Assurance Manager for each of the Contract Laboratories will verify that the laboratory maintains documentation of sample handling, custody information, analytical data, and internal QC data. Additionally, the Quality Assurance Managers will verify that the Contract Laboratories analyze QC samples as indicators of analytical accuracy and precision in accordance with the requirements of this plan, method requirements, and internal laboratory quality assurance program requirements. The Contract Laboratories will report results from analysis of environmental and QC samples as requested by the PM.

Laboratory Project Manager

The Laboratory Project Manager ensures laboratory resources are available, reviews final analytical reports produced by the laboratory, reviews and approves QAPP, coordinates scheduling of laboratory analyses, and supervises in-house chain-of-custody procedures.

Laboratory Director

The Laboratory Director oversees data review and preparation of analytical reports and allots the appropriate laboratory resources to meet project goals.

Laboratory QA Officer

The Laboratory QA Officer maintains laboratory quality assurance procedures and QA/QC documentation. Mr. Turner also conducts periodic internal laboratory audits and recommends corrective actions when necessary. The laboratory QA officer also reviews and acknowledges the conditions of this SAP.

B.2.1.8 USAGYPG Ordnance Recovery Team

The Ordnance Recovery Team is comprised of lead, senior, and junior technicians from the Ammunition Recovery Branch. Junior and senior technicians are referred to as Ordnance Recovery Technicians (ORTs). The Lead ORT is responsible for ORTs who provide safety (avoidance) clearance at each location in conjunction with procedures described in the work plan, mostly by performing a visual clearance in advance of any fieldwork.

B.2.1.9 Arizona Department of Environmental Quality

The ADEQ will provide review and approval of this SAP before the start of activities. The ADEQ personnel will assist in interfacing with USEPA programs and requirements, as appropriate. Data generated and validated as described in this SAP will be included in the Sampling Report. This report will be submitted to ADEQ for review and approval before finalizing any further investigation. It is assumed that ADEQ involvement in this project will involve both a Project Manager and a Project QA Officer with responsibilities as described below.

ADEQ Project Manager

ADEQ Staff Project Manager will have overall responsibility for ADEQ's direction of the scope of work to be performed for the project. The ADEQ Project Manager provides final review and approval of documents, reports, plans, schedules, and other communications submitted pursuant to a Task Assignment. The ADEQ Project Manager also provides coordination of the overall project, and provides overview and direction to any ADEQ consultants.

ADEQ Project QA Officer

ADEQ Staff Project QA Officer is responsible for review of quality assurance documents submitted pursuant to a task assignment. The QA Officer provides comments and recommendations to the ADEQ Project Manager regarding appropriate methodologies, reporting limits, sampling and preservation techniques, Data Quality Objectives (DQOs), and other chemistry- and laboratory-related issues. The QA Officer reviews the data validation results, performs data validation tasks or assigns and supervises ADEQ data validation tasks as requested by the ADEQ Project Manager.

B.2.2 PROBLEM DEFINITION/BACKGROUND

Two groundwater monitoring wells in the MTF area are sampled to determine whether migration of contaminants from the treatment facility to the groundwater has occurred. Knowledge of past waste treatment activities in these areas support development of a list of potential contaminants that could be present. One up-gradient and one down-gradient groundwater monitoring wells were installed to meet the requirements for detection monitoring as specified in 40 CFR §264.98.

B.2.3 PROJECT DESCRIPTION

This project describes the process for obtaining groundwater samples for laboratory analysis and water quality field parameter data from the two groundwater monitoring wells, and depth to water measurements from two groundwater monitoring wells and one industrial use production well, at five year intervals under a detection monitoring program as required by the operating permit under which USAGYPG is currently operating.

As detailed in Section 4.1 of the monitoring plan, analytical samples will be collected from each well at five year intervals. During these sampling intervals, depth to groundwater data will be collected from the two groundwater monitoring wells, MTF-MW1 and MTF-MW3 and from the industrial use production well located at Castle Dome Heliport, Well M, in order to produce a poteniometric surface map, calculate the hydraulic gradient and estimate the groundwater flow direction. USAGYPG will analyze the groundwater samples for the analytes listed in Appendix B Table B-1. A report with a summary of the analytical laboratory results will be provided to ADEQ within 60 days of sampling event completion.

For the initial detection monitoring and to establish a baseline, groundwater samples were collected over nine quarters of sampling at monitoring wells MTF-MW1 (up-gradient well) and MTF-MW3 (down-gradient) located at the Kofa OB/OD MTF. Groundwater samples were analyzed for metals, explosives, volatile organic compounds (VOCs), perchlorate and semi volatile organic compounds (SVOCs). A statistical analysis was performed on the data. Based on this analysis, the analyte list was reduced to explosives, perchlorate, and TAL metals. The five year sampling schedule is based on the statistical evaluation which shows that there is no evidence from the data to indicate migration of hazardous constituents from the MTF. The groundwater monitoring detection program will continue at five year intervals that coincide with the long term surface soil sampling as proposed in the class 2 PMR.

Site characteristics and samples types, locations, frequencies, and methodologies are provided in Section 3.0 of this SAP.

B.2.4 DOCUMENTS AND RECORDS

All sampling activities will be noted in a field logbook to establish field and legal documentation of each condition, activity, or involved personnel that may affect the project outcome or conclusions. The logbook will be completed in accordance with the USAGYPG Environmental Operating Procedure (EOP), EOP-3, *Environmental Operating Procedures for Field Logbook* provided in Attachment B.7.

SECTION B.3
DATA GENERATION AND ACQUISITION

This section provides sample types, locations, frequencies, and methodologies for the MTF groundwater monitoring wells.

B.3.1 SAMPLING DESIGN

This sampling action calls for the collection of water samples from two groundwater monitoring wells at the MTF. Detailed environmental operating procedures providing collection methods and equipment; sample handling, preservation, packaging, and shipping; decontamination methods; waste handling; and field documentation methods are provided in Attachment B.7.

During each five year sampling event, groundwater samples will be collected for analysis explosives, perchlorate and TAL metals. The analytical protocol will also include an assessment of tentatively identified compounds (TICs) to reflect all types of explosive waste ever treated at the MTF. Both filtered and unfiltered (total) samples will be collected for metals analysis. One duplicate sample will be collected each sampling event. The two wells in the groundwater monitoring network will be selected for the duplicate location, once each sampling event. No equipment blank samples will be required, as the wells are equipped with dedicated pumps.

A summary of the samples to be collected from groundwater wells is provided in Table B.1, including the quality control samples. Figure B.2 shows the layout of the monitoring well network up- and down-gradient of the MTF facility. The individual analytes and reporting limits (RLs) for each are provided in Table B.2.

B.3.2 SAMPLING METHODOLOGY

Groundwater samples will be collected at the specified well locations in accordance with groundwater sampling procedures found in EOP-013, *Environmental Operating Procedure for Collecting Samples from Groundwater Monitoring Wells with Dedicated Pumps* which is included in Attachment B.7 (Environmental Operating Procedures).

TABLE B.1

SUMMARY OF GROUNDWATER SAMPLES TO BE COLLECTED FROM MTF GROUNDWATER MONITORING WELLS, EVERY FIVE YEARS

Sample Location	Analysis	Number of Samples
MTF-MW 1: up- gradient location	explosives, perchlorate, TAL metals (filtered), TAL metals (unfiltered)	2
MTF-MW3: down- gradient location	-same as above-	1
Well M ***** Industrial use production well	N/A depth to water measurements only	N/A
Field Blank	-same as above-	1
Duplicate	-same as above-	1
Total # of Samples (per five year event) :		5

The depth to water measurement will be collected after the well pump has been shut down for 24 hours.

B.3.3 QUALITY CONTROL SAMPLES

Field QC samples will include field duplicate samples. Duplicate samples will be collected for each sample event and analyzed for the full suite of analyses detailed in Table B.2. The two wells in the groundwater monitoring network will be selected for the duplicate location, once each sampling event. Individual analyte groups will require separate sample contractors.

The analytical laboratory's quality control will be consistent with the requirements and guidelines established under this SAP. Collection of matrix spike and matrix spike duplicate (MS/MSD) samples for the laboratory's use will be at a rate of 1 in 20 samples. The laboratory may use USAGYPG's matrix for the MS/MSD samples, however it will not be required from the USAGYPG matrix.

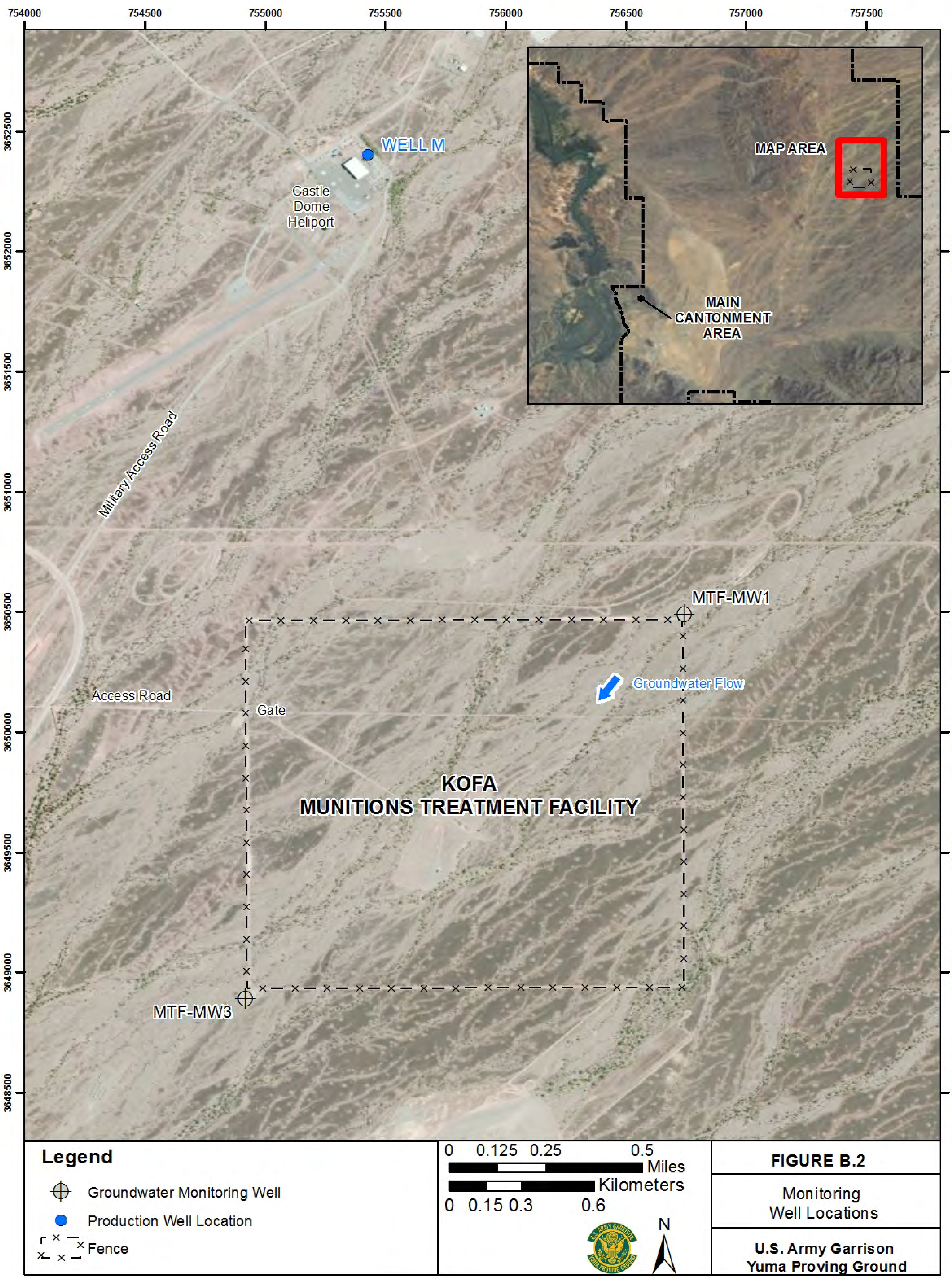

FIGURE B.2. Monitoring Well Locations

TABLE B.2

Analytical Methods, Practical Quantitation Limits, and Method Detection Limits for Groundwater Monitoring at the Munitions Treatment Facility at U.S. Army Garrison Yuma Proving Ground, Yuma, Arizona

Constituent	Analytical Method	Detection Limits (µg/L)		Applicable Regulatory Limits (µg/L)		
		Practical Quantitation Limit (PQL)	Typical Method Detection Limit (MDL)	USEPA Tap Water Regional Screening Level	Arizona Water Quality Standards	USEPA Maximum Contaminant Level
Inorganics						
Aluminum	SW6010B	200	17.9	37000	--	--
Antimony	SW6010B	60	3.49	15	6	6
Arsenic	SW6010B	10	2.98	0.045	50	10
Barium	SW6010B	10	0.309	7300	2000	2000
Beryllium	SW6010B	5	0.068	73	4	4
Cadmium	SW6010B	5	0.163	18	5	5
Calcium	SW6010B	100	27.6	--	--	--
Chromium (total)	SW6010B	10	0.318			
Cobalt	SW6010B	10	0.51	11	--	
Copper	SW6010B	10	1.11	1500	--	1300
Iron	SW6010B	100	9.54	26000	--	--
Lead	SW6010B	15	1.45	--	--	--
Magnesium	SW6010B	100	22.9	--	--	--
Manganese	SW6010B	15	0.566	880	--	--
Molybdenum	SW6010B	50	2.08	180	--	--
Mercury	SW7470A	0.2	0.0548	0.57		
Nickel	SW6010B	40	1.2	730	100	--
Potassium	SW6010B	500	67.7	--	--	--
Selenium	SW6010B	40	3.74	180	50	50
Silver	SW6010B	10	0.581	180	--	--
Sodium	SW6010B	1000	59.1	--	--	--
Thallium	SW6010B	20	1.46	--	2	2
Vanadium	SW6010B	20	1.08	2.6	--	--
Zinc	SW6010B	20	3.97	11000	--	--

Constituent	Analytical Method	Detection Limits (µg/L)		Applicable Regulatory Limits (µg/L)		
		Practical Quantitation Limit (PQL)	Typical Method Detection Limit (MDL)	USEPA Tap Water Regional Screening Level	Arizona Water Quality Standards	USEPA Maximum Contaminant Level
Explosives						
1,3,5-Trinitrobenzene	SW8330	0.5	0.139	1100	--	--
1,3-Dinitrobenzene	SW8330	1	0.252	3.7	--	--
2,4,6-Trinitrotoluene	SW8330	1	0.303	2.2	--	--
2,4-Dinitrotoluene	SW8330	0.5	0.125	0.22	--	--
2,6-Dinitrotoluene	SW8330	0.5	0.108	37	--	--
2-Amino-4,6-dinitrotoluene	SW8330	0.5	0.125	73		
4-Amino-2,6-dinitrotoluene	SW8330	0.5	0.108	73		
Hexahydro-1,3,5-tinitro-1,3,5-thazine (RDX)	SW8330	0.2	0.066	0.61	--	--
Methy1-2,4,6-tetranitroaniline (Tetryl)	SW8330	0.5	0.2	150	--	--
m-Nitrotoluene	SW8330	0.5	0.107	3.7	--	--
Nitrobenzene	SW8330	0.5	0.136	0.12	--	--
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	SW8330	0.2	0.035	1800	--	--
o-Nitrotoluene	SW8330	0.5	0.089	0.31	--	--
p-Nitrotoluene	SW8330	0.5	0.116	4.2	--	--
General Chemistry						
Perchlorate	E314.4	4	0.493	--	--	15*

Notes: The MCL for perchlorate is based on the interim drinking water health advisory level issued by USEPA January 8, 2009 (USEPA 2009).

B.3.4 SAMPLE CONTAINERS AND PRESERVATION TECHNIQUES

Samples will be containerized and preserved between collection and analysis using methods provided in EOP-039, *Sample Preservation and Container Requirements*. Table B.3 provides a summary of the sample containers, the holding times and the preservatives for each analytical method for this groundwater monitoring sampling.

B.3.5 SAMPLE HANDLING AND CUSTODY

Sample collection and custody records will be maintained to document the integrity of samples from the time of collection until the data is reported. All documentation will be legible, identifiable and recorded in permanent ink. Field personnel will complete field documentation as described in EOP-003, *Field Logbook* at the job site, during, or immediately after sample collection (Attachment B.7). Errors on forms will be corrected by drawing a single line through the error such that the original text remains legible, and the correct information is entered along with the date and the person's initials. The following paragraphs briefly describe each component of the sample control and documentation process.

B.3.5.1 Sample Identification System

Each sample will be uniquely identified with a sample number using the following standard format:

Each sample will be uniquely identified with a sample number. The sample numbers will have the following standard format: MTF-MW#-date. The MTF indicates the site. The location is indicated with the monitoring well number. As detailed in the monitoring plan, the wells will be numbered from 1 to 4, with #1 being the up-gradient well. The date will be coded in mm/dd/yy format. For example, the quarterly monitoring sample collected from the up-gradient well on January 5, 2012 would be identified as MTF-MW1-010512. Each duplicate sample will be given a suffix of FD to indicate that the sample is a duplicate.

If additional sample identification is needed, the method will be described in the field logbooks.

B.3.5.2 Sample Labeling

All sample labeling operations will be in accordance with EOP-001, *Sample Labels* (Attachment B.7).

TABLE B.3

CONTAINERS, PRESERVATIVES AND HOLDING TIMES BY ANALYTICAL METHOD

Constituent	Method	Volume	Material	Preservative	Holding Time
Metals	6010B	500 mL	HDPE	$HN0_3$ to pH<2	6 months
Mercury	7470	500 mL	HDPE	$HN0_3$ to pH<2	28 days
Explosives	8330	1-Liter	Amber glass	4°C	7 day extraction 40 day analysis
General Chemistry					
Perchlorate	314.1	250 mL	HDPE	4°C	28 days

B.3.5.3 Field Logbooks

Field logbooks are standardized at USAGYPG using EOP-003, *Field Logbook* (Attachment B.7). The sampling team will record pertinent sample collection information for each sample. The information will be included in a field logbook. The log will be completed at the time of collection. The log will become part of the permanent record describing sample collection conditions and the disposition of the sample. Sample collection documentation may be supplemented with log sheets to record additional sampling details not entered in the logbook. Copies of the log and log sheets will be transferred to the Project Supervisor/Project Manager and kept in the project files.

B.3.5.4 Chain of Custody Records

A chain of custody record will be maintained from the time of collecting the sample to final disposition. Every transfer of custody will be noted and signed for. When samples are not under direct control of the individual responsible for them, the samples will be stored in a secure area. Chain of custody records will be maintained as required in EOP-002, *Chain of Custody* (Attachment B.7).

B.3.5.5 Custody During Sampling, Storage, Packaging, and Shipping

Sealed containers will be placed in plastic coolers in the field immediately after sampling. The coolers shall be padded with absorbent material and their contents preserved with wet ice to maintain a temperature below 6°C.

Samples will be stored in coolers during field sampling operations, in custody of the sampler. At the end of the day, or other appropriate intervals, the coolers will be transported to the office or other field laboratory locations as appropriate for shipping preparation or field screening. An internal Chain of Custody Record will accompany samples providing an unbroken chain of documentation for those samples. When transferring samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents sample custody transfer and identification.

Samples will be packaged properly for shipment as described in EOP-004, *Sample Packaging and Equipment* (Attachment B.7) and dispatched to the appropriate laboratory for analysis, with a separate Chain of Custody Record accompanying each shipment (one for each cooler or container). Shipping containers are to be sealed for shipment to the laboratory. The method of shipment, courier name(s), and other pertinent information will be entered in the "Remarks" section of the Chain of Custody Record. The original record will accompany the shipment, and a copy is to be retained by the Project Supervisor/Project Manager. Freight bills, Postal Service receipts, and bills of lading will be retained as part of the permanent documentation.

All samples will be managed in accordance with A.A.C. R18-8-261.A [40 CFR §261.4(d)], for the exemptions from Hazardous Waste designation until the samples are of no analytical value.

B.3.5.6 Custody Seals

Custody seals will be affixed, immediately after packing, to each sample cooler intended for shipment to the analytical laboratory. Custody seals will be initialed and dated by a member of the sampling team. Refer to EOP-004, *Sample Packaging and Shipping* (Attachment B.7) for further requirements. Upon receipt, the laboratory will document the condition of the samples, including custody seal condition.

B.3.6 INVESTIGATIVE-DERIVED WASTE MANAGEMENT

All investigative-derived waste (IDW) will be managed in accordance with EOP-007, *Investigation-Derived Waste* (Attachment B.7).

B.3.7 ANALYTICAL METHODS - LABORATORY ANALYSES

Laboratory analyses will utilize USEPA analytical methods including those published in *Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (SW-846). In addition, analytical methods for developed by the *USEPA Office of Groundwater and Drinking Water* will be used to analyze for nitrate, nitrite, and perchlorate; ammonia will be analyzed according to the method published by *Standard Methods for the examination of Water and Wastewater.* Analytical procedures will follow established laboratory standard operating procedures (SOP) based on the referenced USEPA method. The Laboratory will comply with requirements specified in ADEQ Policies in Attachments B.5 and B.6 to test for matrix interference.

The selected laboratory is licensed by ADHS to perform analyses listed in this plan. The selected laboratory's SOPs and QA manual for these methods will be placed on file at USAGYPG in the Document Information/ Document Control system (DIDC).

SECTION B.4
DATA EVALUATION

B.4.1 DATA VERIFICATION/VALIDATION

Data verification will be conducted in accordance with the checklists in Attachment B.4 on 100% of the data packages from this project.

SECTION B.5
QUALITY CONTROL

B.5.1 FIELD QC SAMPLES

Field QC samples will be field duplicate and field blank samples. These will be collected and analyzed at the rate of one per sampling event (i.e., each quarter). Equipment blanks will not be collected, as each well will have a dedicated pump installed. Critical supplies and materials needed for field activities include sample bottles, de-ionized water, and site water. Critical field supplies and consumables will be inspected and accepted or rejected by the Task Manager. Certificates of purity or analysis for all items requiring cleanliness will be retained in project files and will be reported in data packages for resulting analysis.

B.5.2 LABORATORY QUALITY CONTROL

The Contract Laboratory will subject samples to comprehensive testing within established and strict QA/QC protocols and analytical procedures described in this QAPP and the QA/QC manual of the Contract Laboratory. The laboratory will process the USAGYPG samples as soon as possible upon receipt. To fulfill project requirements, analyses will be complete within the sample holding times specified in EOP-039 (Attachment B.7). Upon completion of analysis, results will be reported by electronic mail to the Project Manager. The Contract Laboratory will thereafter submit a written report on the results, to include QA/QC results and documentation. The Contract Laboratory will provide Level 4 reports in portable document format (PDF) and Electronic Data Deliverables. These reports include data, QC results (duplicates, matrix spikes, matrix spike duplicates) and all raw data. The laboratory will use Arizona Data Qualifiers (Attachment B.1) in their reports of analytical data results.

In accordance with ADEQ and local requirements, the Contract Laboratory will dispose of all unused samples and sample residuals. The Project Manager, however, may request certain unused samples be sent to a designated location.

B.5.3 LABORATORY QC SAMPLES

Laboratory QC samples will be analyzed with each investigative sample batch. The Contract Laboratory and its subcontractors will prepare and analyze all of the QC samples necessary to determine and document the required laboratory performance. Laboratory QC samples will include laboratory/method blanks, laboratory duplicates, laboratory spikes and other samples as required. The analytical laboratory will follow the established QC program described in their QA/QC program manuals. Table B.4 summarizes the QC samples to be prepared.

Potential sample contamination contributed by the laboratory will be discerned through the evaluation of laboratory or method blanks. Method blanks will be conducted at the beginning of each analytical method run and will be used to determine whether internal laboratory sources of contamination have affected the sample integrity.

All MS/MSD samples must be spiked by the laboratory before addition of extraction fluid. The MS/MSD compounds will be evaluated during the analytical program and potentially modified to meet analytical goals of the program.

TABLE B.4
LABORATORY QUALITY CONTROL SAMPLES

Sample Description	Purpose	Frequency Range (%)	
		Minimum	Maximum
Reagent blank/method blank	Verify extraction procedure and/or laboratory practices	5	20
Method blank	Verify method validity	5	20
Surrogate blank	Surrogate compounds	5	10
Spiked blank	Laboratory control for percent recovery	5	10
Field Duplicate/split samples	Precision of analysis, data validation	5	20
Matrix spike	Accuracy in matrix	5	20
Matrix spike duplicate	Precision in matrix	5	20
Field Blank	Verify sampling and transportation validity	5	10

Laboratory duplicate samples will be used to assess method bias and precision. Laboratory blank samples will be used to assess inadvertent contamination introduced at the laboratory. Method QC acceptance criteria will be followed. If no method QC acceptance is provided, then the laboratory may resort to historical laboratory data. The Contract Laboratory Project Manager, utilizing QC measures and acceptance criteria reported by the analytical laboratory, will perform data verification and validation. Table B.5 includes default limits in the absence of laboratory historical data for compounds.

If contamination is detected in any blank sample, all data associated with the blank will be evaluated to determine if there is an inherent variability in the data for the lot. In cases in which more than one blank is associated with a given sample, qualification will be based on a comparison with the blank having the highest concentration of the contaminant. Sample results greater than the Contract-Required Quantification Limit (CRQL), but less than 5 times the amount detected in a blank, will be reported with an explanation of the reasons for acceptance of the sample results. For a common laboratory contaminant (e.g., acetone, methylene chloride, toluene, methyl ethyl ketone [MEK], and common phthalate esters), the sample results will be reported with an explanation of the reasons for acceptance of the sample results when the analyte concentration is greater than the CRQL (or MRL) but less than 10 times the amount in any blank.

TABLE B.5
ACCEPTANCE CRITERIA

QC Type	Control Limits
Spiked Blank	75-125% Recovery
Field Duplicate / Split Samples	+/- 20% RPD
Matrix Spike (MS)	75-125% Recovery
Matrix Spike Duplicates (MSD)	75-125% Recovery
MS/MSD	15% RPD
Laboratory Control Samples (LCS)	75-125% Recovery
Laboratory Control Sample Duplicate (LCSD)	75-125% Recovery
LCS/LCSD	15% RPD

The contract laboratory will include the following data in their submittal of acceptance of SAP conditions (Attachment B.8):

1. The identity of required QC checks for the laboratory, for all analytical methods such as continuing calibration verification (CCV), matrix spikes (MS), matrix spike duplicates (MSD), laboratory control samples (LCS)/laboratory control sample duplicates (LCSD), lab replicates, instrument and method blanks, surrogates, or second column confirmations.
2. The acceptance criteria for quality control samples (initial and continuing calibration verification standards, matrix spikes recoveries, laboratory control spikes, relative percent difference for duplicates, etc.) must be documented. These acceptance criteria may be included in a table or may be referenced in the laboratory's quality assurance manual. If referencing the laboratory's quality assurance manual, then cite the pages where the quality control acceptance criteria are addressed for each of the target compounds and the associated matrix.
3. List the compounds that will be used for MS or cite the pages in the Lab QA Manual that state this information. The MS/MSD should consist of target compounds most likely to be present in samples. The LCS/LCSD must consist of all target compounds reported.

B.5.4 DOCUMENT CONTROL

In the laboratory, document control procedures will be practiced as described in the Contract Laboratory QA/QC manual.

B.5.4.1 Laboratory Quality Control Checks

Laboratory QC checks will include application of internal QC methods, such as analysis of spike samples, split samples, internal standards, QC samples, calibration standards, and calibration devices. Quality control checks include demonstration of daily standards, system performance checks, multiple internal standards for sample analysis, and method blanks for control of system contamination. The frequency, control limits, corrective actions, and purpose of quality control checks for the Contract Laboratory are largely implicit in the methods used.

B.5.4.2 Control Charts

Control charts will be used to monitor the trends and variations in the accuracy and precision of analyses. Control charts will contain the following information:

- Title, analyte, method number, and laboratory name
- Spike concentration
- Analysis date and/or code
- Percent recovery (X charts) or range (R charts) along the ordinate
- Upper and lower control limits
- Upper and lower warning limits

B.5.4.3 Uncontrolled Conditions

Uncontrolled conditions for all project aspects will be investigated, and appropriate corrective actions will be promptly instituted. Areas in which operator error is normally associated with uncontrolled conditions include:

- Failure to achieve calibration
- Record-keeping omissions
- Improper sample storage and preservation
- Poor analytical protocols

The detection of uncontrolled conditions always warrants some type of corrective action. Section 4.2 of this plan provides protocols for documenting corrective action.

B.5.5 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

For project activities, testing, inspection, and preventive maintenance will have three principal objectives: ensuring accuracy of measurement systems, minimizing downtime, and maintaining adequate critical spare parts, backup systems, and equipment. Preventive maintenance procedures outlined in individual laboratory SOPs will be followed. Calibration and maintenance schedules will be maintained in accordance with manufacturer recommendations in instrument operation manuals and with laboratory SOPs.

B.5.6 INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

Initial and daily calibrations of laboratory instruments will be conducted as stipulated in the procedures described in the Contract Laboratory QA/QC manual. At a minimum, before samples are analyzed, chemical calibration of a representative group of target analytes will be performed to ensure that analytical instrumentation is functioning within the established sensitivity range. Protocols defining the procedures and QC measurements for instrument calibration will be in accordance with criteria specified by *SW-846*.

The laboratory will perform initial calibrations for the methods to be used routinely in this project. Additional initial calibrations are not required unless the instrument fails method required QC acceptance criteria. Additionally, an initial calibration must always be performed if major modifications have been made to the instrument for either repair or preventive maintenance. Before an analysis is performed, each instrument will be calibrated to ensure that its response has not changed from the previous calibration. Calibration should be performed in accordance with the laboratory QC manual. A response within two standard deviations of the mean response for the same concentration as determined from pre-certification, certification, and prior initial/daily calibrations will be deemed acceptable. If the response fails that criterion, the daily standard will be reanalyzed. Failure of this reanalysis will necessitate that the instrument undergo initial calibration as specified in *SW-846*.

All calibration solutions and standards used for this project will be prepared and maintained under the normal laboratory standards tracking system. This system will ensure that preparation, checking, documentation, storage, and disposal standards are performed according to specified procedures and schedules appropriate for each analyte of interest.

B.5.7 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

Critical supplies and materials necessary for laboratory analysis include sample bottles, calibration gases, reagents, hoses, de-ionized water, and other materials. The Contract Laboratory QA/QC manual identifies requirements for inspection and acceptance/testing, certificates of purity or analysis, and handling and storage of critical supplies and consumables. The Laboratory QA Manager shall document this information on receipt of critical supplies.

Field staff will examine bottles and caps for cracks and chips, hoses for cracks or splits, and reagents or preservatives will be checked for discoloration.

B.5.8 DATA MANAGEMENT

The Contract Laboratory will transmit a laboratory report to the Project Manager. The report will be provided in electronic format (PDF file and database spreadsheet). The report will include a narrative summary of the analyses which details any data limitations and data qualifiers based on the data quality assessment performed by the Contract Laboratory Project Manager. The report will also include tables summarizing the analytical results, QA/QC results, and all original field and sample custody documentation.

The Contract Laboratory will provide all raw data, notes, and bench sheets (typically referred to as a Level 4 data package). These records shall include instrument tuning and calibration records, batch quality control sample data, control charts and calculations, sample tracking sheets, control documentation, raw analytical sample data, analytical results, and all other information necessary to completely detail the entire history of the analytical work. At the close of the project, the FTL or task manager (TM) will inventory this information for storage at USAGYPG in project files.

B.5.8.1 Data Reduction, Recording and Tracking

Project analysts will initially collect data, convert it to standard reporting units, and record it in standard formats. They will then use a variety of methods and procedures to conduct preliminary data analyses. Because many analytical instruments that will be used are microprocessor controlled, some of the requisite analyses can be performed directly in the instrument's operating or output mode. Data requiring manual recording, integration, and/or analysis can be converted to a more appropriate format before subsequent analyses.

Data reduction frequently includes computation of analytical results from raw instrument data and summary statistics, including standard errors, confidence intervals, test of hypothesis relative to the parameters, and model validation. Procedures that will be used address the reliability of computations and the overall accuracy of the data reduction. The numerical transformation algorithms used for data reduction will be verified against a known problem set to ensure that the reduction methods are correct.

The equations and typical calculation sequence followed to reduce data to the acceptable format are instrument and method specific. When standard methods are modified, the report accompanying the data will describe data reduction techniques.

Auxiliary data produced for internal records and not reported as part of the analytical data will include the following:

- Laboratory worksheets
- Laboratory notebooks
- Sample tracking system forms
- Instrument logs
- Standard records
- Maintenance records

- Calibration records
- Associated quality control

These sources will document data reduction and will be available for inspection during audits and for use in determining the validity of the data.

B.5.8.2 Calculation Equations for Quality Data

Precision. If calculated from duplicate measurements, relative percent difference is the normal measure of precision:

$$RPD = \frac{(C_1 - C_2) \times 100\%}{(C_1 + C_2)/2}$$

Where RPD = relative percent difference

C_1 = larger of the two values

C_2 = the smaller of the two values

If calculated from three or more replicates, use relative standard deviation instead:

RSD = (S/Y) × 100%

Where RSD = relative standard deviation

S = standard deviation

Y = mean of replicate analyses

Accuracy. For measurements where matrix spikes are used, the percent recovery is calculated as shown:

$\%R = 100\% \times [S\text{-}U/C_{sa}]$

Where %R = percent recovery

S = measured concentration in spiked aliquot

U = measured concentration in unspiked aliquot

C_{sa} = actual concentration of spike added

When a standard reference material is used:

$$\%R = 100\% \times [C_m/C_{srm}]$$

Where $\%R$ = percent recovery

C_m = measured concentration of SRM

C_{srm} = actual concentration of SRM

B.5.8.3 Data Storage and Retrieval

The analyst will quantify each analyte in the method blank and spiked QC sample each day of analysis. Method blank data will generally be reported as "less than" the quantitation limit for each analyte. Values detected above the quantitation limit will be reported as determined, with entry into the data management system in terms of concentration. Values below the quantitation limit will be quantified and flagged as estimated values. Additional sample lots will not be processed until the results of the previous lot have been calculated and plotted on control charts as required and the entire analytical method is shown to be under control. All data will be entered into the data management system with correct method numbers and appropriate Arizona Data Qualifiers (Attachment B.1).

SECTION B.6
ASSESSMENT AND OVERSIGHT

B.6.1 ASSESSMENTS AND RESPONSE ACTIONS

B.6.1.1 Field Audits

The QA Manager and/or TM will conduct an audit of sampling activities. The field audits will be used to determine if field procedures are being conducted in compliance with the SAP. Items reviewed will include sample collection and handling, documentation, and sampling technique.

The observation of actual work activities is considered the most effective technique for determining whether performance of these activities is adequate. The primary goal during observation will be to obtain the most complete picture possible of the performance. The observations will be put into perspective relative to the overall quality program. Before drawing conclusions, the auditor will verify the results through review of other project documentation.

The auditor will observe the sampling activities. Applicable sections of the checklist included in Attachment B.2 will be completed from the observation. Nonconformance with the SAP or the laboratory QA/QC manual will be noted. Noted nonconformance will be evaluated and reported as described in Section 6.2.

B.6.1.2 Laboratory Audit

The project team will audit the contract laboratories used. The audit will focus on QA activities at the laboratory involving samples from this site. This audit may be scheduled to coincide with other audit activities.

The contract laboratory participates in the Arizona Department of Health Services Laboratory Certification Program. This program evaluates laboratory procedures for necessary quality assurance and quality control procedures. The Laboratory Project Manager will perform one audit during the analytical program. Applicable sections of the checklist included in Attachment B.2 will be completed from the audit. Nonconformance with the SAP will be noted. Noted nonconformance will be evaluated and reported as described in Section 6.2. A report of this audit will be retained in project files at USAGYPG.

B.6.2 REPORTS TO MANAGEMENT

A nonconformance is any action or condition that does not meet SAP requirements. All identified instances of nonconformance will be documented, evaluated, and corrected to prevent recurrence. The nonconformance will be noted and described on an audit form as shown in Attachment B.2. A letter report describing the nonconformance and evaluating the impact to the quality of the data will be prepared. The letter report will contain a description of the nonconformance with reference to the procedure or specification violated an evaluation of the effects of the nonconformance, an evaluation of the cause of the nonconformance, and a recommendation for final disposition. The report will be transmitted to the FTL and the TM.

Whenever possible, immediate corrective actions shall be taken to rectify or prevent a nonconformance. The persons identifying the need for the action will document a corrective action. Disposition of nonconformance involving contract laboratory analyses will be approved before the performance of additional analyses. In some cases, the contract laboratory should provide a written description of the cause of the nonconformance and a description of planned corrective action.

SECTION B.7
DATA VALIDATION AND USABILITY

B.7.1 DATA REVIEW, VERIFICATION AND VALIDATION

Data validation is the process whereby an evaluation is made to determine the limitations, if any, of the analytical data when applied to the characterization of the groundwater near OB/OD units. The criteria for data acceptability depend on the referenced sampling and analytical methodologies and include the associated DQOs and QA/QC requirements. The guidelines to be used for validation of the project data are given in:

- Laboratory Documentation Requirements for Data Validation (USEPA Region 9, July 1997), Attachment B.3
- Data Quality Assessment: A Reviewer's Guide (QA/G-9R) (USEPA, 2006a)
- Data Quality Assessment: Statistical Tools for Practitioners (QA/G-9S) (USEPA, 2006b)
- USEPA Contract Laboratory Program, National Functional Guidelines for Organic Data Review
- Arizona Data Qualifiers, Attachment B.1

The QA Manager or independent contractor will verify 100% of the data packages for completeness, including field-sampling logs. The completeness checklists are included in Attachment B.4. The Data Quality Objective for Completeness is 95%. The following shows calculation of completeness:

Completeness is defined as follows for all measurements:

$$\%C = 100\% \times [V/n]$$

Where $\%C$ = percent completeness

V = total number of measurements judged to be valid

n = total number of measurements necessary to achieve a specified level of confidence in decision making.

The QA Manager will review the data packages to evaluate compliance with specified analytical requirements, DQOs, QA/QC requirements, data reduction procedures, and data-reporting requirements. The verification checklists are included in Attachment B.4. The following items are examples of what will be reviewed to verify completeness of the data:

- Sample holding times
- Documentation that the analytical results are in control and within the certified (linear) range of the analysis
- Qualitative and quantitative data used in determining the presence and concentration of target compounds
- Calibration data associated with specific methods and instruments
- Routine instrument checks (calibration, control samples, etc.)
- Documentation on traceability of instrument standards, samples, and data
- Documentation on analytical methodology and QC methodology
- The potential presence of interferences in analytical methods (check of reference blanks and spike recoveries)
- Documentation of routine maintenance activity to ensure analytical reliability
- Documentation of sample preservation and transport

Data assessment techniques will include routine QC checks and a system audit. Precision will be assessed from measurements of replicates at different times. Control charts will be maintained to provide a timely assessment of precision for measurement functions. Accuracy will be assessed from measurements of surrogate compounds and samples spiked with known concentrations of reference materials. The assessment for accuracy will be independent of the routine calibration process (reference materials will be obtained from independent sources and prepared independently).

The Laboratory will provide ADEQ a Data Validation Catalog (Table B.6) consisting of the testing parameters characterizing the sample delivery group(s) validated by an independent contractor in accordance with USEPA CLP Level 4 requirements for 10% for the data and according to Level 3 requirements for the remaining 90%. For each sample delivery group validated, the Data Validation Catalog table will document the consulting group, project site and address, field sample identification number, laboratory identification number, corresponding types of analyses performed, and associated sample collection dates.

TABLE B.6

EXAMPLE OF DATA VALIDATION CATALOG

Consultant: XYZ Consulting Date Sampled: 08/24/10 Site Address: 1011 W. Washington, Phoenix, AZ 85007
PROJECT SITE.....
SAMPLE DELIVERY GROUP.....

Field Sample Identification	Laboratory Identification Number	Method 6010B	Method 7470A	Method 8330	Method E314.4
Chip 10	123456-01		X		
Chip 11	123456-02	X	X		
Chip 12	123456-03				
Chip 13	123456-03	X	X		
Chip 14	123456-04	X			
Chip 15	123456-05		X		
Chip 16	123456-06	X	X		
MW-1	7891011-10			X	X
MW-3	7891011-12	X	X	X	
DM-SB1-5'	987654-23		X	X	
DM-SB1-10'	987654-24			X	
DM-SB1-15'	987654-25	X		X	
DM-SB2-10'	987654-13			X	X
DM-SB2-20'	987654-14			X	
DM-SB2-30'	987654-15			X	

USAGYPG may elect to subject up to fifteen percent of the data packages to in depth review (all elements of the package). This review is to be based upon results received, QA manager completeness review, and a review by a professional engineer. The review does not apply to wet chemistry methods such as pH, ignitability, and flashpoint. If the review results in significant findings of noncompliance all data packages will then be subject to an in-depth review. This review will be conducted using the guidelines in Attachments B.4, B.5, and B.6.

This project is not anticipated to require in depth review of data packages.

B.7.2 RECONCILIATION WITH USER REQUIREMENTS

The TM will conduct a review to reconcile all project information with the requirements of the SAP. The review will include field sampling documentation and laboratory data. Results of the review will be included in the Sampling Report.

Field sampling information generated under this SAP will be verified for quality. The TM will review, in detail, the sample collection log, custody forms, and other sample collection documentation. The documentation will be reviewed for accuracy, completeness, and reasonableness. The results of the field audits will be reviewed. The laboratory PM will be contacted to confirm that sample coolers meet appropriate shipping protocols. Nonconformance issues and corrective responses will be evaluated. The TM will determine if the quality of the sampling effort is sufficient to support the laboratory data generated under this SAP. The results of this review will be detailed in the Sampling Report.

Analytical data generated under this SAP will be verified for quality. The TM or FTL will review the reported analytical data in depth. Details of the data reduction, data validation, and reporting process will be confirmed. The results of the laboratory audit will be reviewed. Nonconformance issues and corrective responses will be reviewed. The FTL or TM will determine if the quality of the data is sufficient to satisfy the decision rule. The basis for this determination will be detailed in the Sampling Report. In cases where it is determined that the quality of the data is not sufficient to satisfy the decision rule, recommendations will be made for providing the necessary quality of data.

SECTION B.8
REFERENCES

USEPA, 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, Interim Final, USEPA/540/G 89/004, Office of Emergency and Remedial Response, Washington D.C., July.

USEPA Region 9, 1997. *Laboratory Documentation Requirements for Data Validation*, 9QA-07-97, Quality Assurance Program, USEPA Region 9, San Francisco, CA, July.

USEPA, 2001. *USEPA Requirements for Quality Assurance Project Plans USEPA QA/R-5*, USEPA/240/B-01/003, Office of Environmental Information, Washington D.C., March.

USEPA, 2006a. *Data Quality Assessment: A Reviewer's Guide (QA/G-9R)*, EPA/240/B-06/002, Office of Environmental Information, Washington D.C., February.

USEPA, 2006. *Data Quality Assessment: Statistical Tools for Practitioners (QA/G-9S)*, EPA/240/B-06/003, Office of Environmental Information, Washington D.C., February.

ATTACHMENT B.1
ARIZONA DATA QUALIFIERS

Arizona Data Qualifiers

Revision 1.0

03/--/2002

(Developed by the Sub-committee of the Arizona Environmental Laboratory Advisory Committee. This is a revised list with additional qualifiers added to the original list dated 12/11/2000) Source: Email from Robert Fleury, ADEQ to Dwight Clark of Jason Associates, dated 25 April 2002.

Microbiology:

A1 = Too numerous to count.

A2 = Sample incubation period exceeded method requirement.

A3 = Sample incubation period was shorter than method requirement.

A4 = Target organism detected in associated method blank.

A5 = Incubator/water bath temperature was outside method requirements.

A6 = Target organism not detected in associated positive control.

A7 = Micro sample received without adequate headspace.

Method Blank:

B1 = Target analyte detected in method blank at or above the method reporting limit.

B2 = Non-target analyte detected in method blank and sample, producing interference.

B3 = Target analyte detected in calibration blank at or above the method reporting limit.

B4 = Target analyte detected in blank at/above method acceptance criteria.

B5 = Target analyte detected in method blank at or above the method reporting limit, but below trigger level or MCL.

B6 = Target analyte detected in calibration blank at or above the method reporting limit, but below trigger level or MCL.

B7 = Target analyte detected in method blank at or above the method reporting limit. Concentration found in the sample was 10 times above the concentration found in the method blank.

Confirmation:

C1 = Confirmatory analysis not performed as required by the method.

C2 = Confirmatory analysis not performed. Confirmation of analyte presence established by site historical data.

C3 = Qualitative confirmation performed. See case narrative.

C4 = Confirmatory analysis was past holding time.

C5 = Confirmatory analysis was past holding time. Original result not confirmed.

Dilution:

D1 = Sample required dilution due to matrix interference. See case narrative.

D2 = Sample required dilution due to high concentration of target analyte.

D3 = Sample dilution required due to insufficient sample.

D4 = Minimum reporting level (MRL) adjusted to reflect sample amount received and analyzed.

Estimated Concentration:

E1 = Concentration estimated. Analyte exceeded calibration range. Reanalysis not possible due to insufficient sample.

E2 = Concentration estimated. Analyte exceeded calibration range. Reanalysis not performed due to sample matrix.

E3 = Concentration estimated. Analyte exceeded calibration range. Reanalysis not performed due to holding time requirements.

E4 = Concentration estimated. Analyte was detected below laboratory minimum reporting level (MRL).

E5 = Concentration estimated. Analyte was detected below laboratory minimum reporting level (MRL), but not confirmed by alternate analysis.

E6 = Concentration estimated. Internal standard recoveries did not meet method acceptance criteria.

E7 = Concentration estimated. Internal standard recoveries did not meet laboratory acceptance criteria.

Hold Time:

H1 = Sample analysis performed past holding time. See case narrative.

H2 = Initial analysis within holding time. Reanalysis for the required dilution was past holding time.

H3 = Sample was received and analyzed past holding time.

H4 = Sample was extracted past required extraction holding time, but analyzed within analysis holding time. See case narrative.

BOD:

K1 = the sample dilutions set-up for the BOD analysis did not meet the oxygen depletion criteria of at least 2 mg/L. Any reported result is an estimated value.

K2 = the sample dilutions set up for the BOD analysis did not meet the criteria of a residual dissolved oxygen of at least 1 mg/L. Any reported result is an estimated value.

K3 = the seed depletion was outside the method acceptance limits.

K4 = the seed depletion was outside the method and laboratory acceptance limits. The reported result is an estimated value.

K5 = the dilution water D.O. depletion was > 0.2 mg/L.

K6 = Glucose/glutamic acid BOD was below method acceptance criteria.

K7 = A discrepancy between the BOD and COD results has been verified by reanalysis of the sample for COD.

K8 = Glucose/glutamic acid BOD was above method acceptance levels.

Laboratory Fortified Blank/Blank Spike:

L1 = the associated blank spike recovery was above laboratory acceptance limits. See case narrative.

L2 = the associated blank spike recovery was below laboratory acceptance limits. See case narrative.

L3 = the associated blank spike recovery was above method acceptance limits. See case narrative.

L4 = the associated blank spike recovery was below method acceptance limits. See case narrative.

Note: The L1, L2, L3 & L4 footnotes need to be added to all corresponding analytes for a sample.

Matrix Spike:

M1 = Matrix spike recovery was high; the method control sample recovery was acceptable.

M2 = Matrix spike recovery was low; the method control sample recovery was acceptable.

M3 = the accuracy of the spike recovery value is reduced since the analyte concentration in the sample is disproportionate to spike level. The method control sample recovery was acceptable.

M4 = the analysis of the spiked sample required a dilution such that the spike concentration was diluted below the reporting limit. The method control sample recovery was acceptable.

M5 = Analyte concentration was determined by the method of standard addition (MSA).

M6 = Matrix spike recovery was high. Data reported per ADEQ policy 0154.000.

M7 = Matrix spike recovery was low. Data reported per ADEQ policy 0154.000.

General:

N1 = See case narrative.

N2 = See corrective action report.

Sample Quality:

Q1 = Sample integrity was not maintained. See case narrative.

Q2 = Sample received with headspace.

Q3 = Sample received with improper chemical preservation.

Q4 = Sample received and analyzed without chemical preservation.

Q5 = Sample received with inadequate chemical preservation, but preserved by the laboratory.

Q6 = Sample was received above recommended temperature.

Q7 = Sample inadequately dechlorinated.

Q8 = Insufficient sample received to meet method QC requirements. QC requirements satisfy ADEQ policies 0154 and 0155.

Q9 = Insufficient sample received to meet method QC requirements.

Q10 = Sample received in inappropriate sample container.

Q11 = Sample is heterogeneous. Sample homogeneity could not be readily achieved using routine laboratory practices.

Duplicates:

R1 = RPD exceeded the method control limit. See case narrative.

R2 = RPD exceeded the laboratory control limit. See case narrative.

R3 = Sample RPD between the primary and confirmatory analysis exceeded 40%. Per EPA Method 8000B, the higher value was reported.

R4 = MS/MSD RPD exceeded the method control limit. Recovery met acceptance criteria.

R5 = MS/MSD RPD exceeded the laboratory control limit. Recovery met acceptance criteria.

R6 = LFB/LFBD RPD exceeded the method control limit. Recovery met acceptance criteria.

R7 = LFB/LFBD RPD exceeded the laboratory control limit. Recovery met acceptance criteria.

R8 = Sample RPD exceeded the method control limit.

R9 = Sample RPD exceeded the laboratory control limit.

Surrogate:

S1 = Surrogate recovery was above laboratory acceptance limits, but within method acceptance limits.

S2 = Surrogate recovery was above laboratory and method acceptance limits.

S3 = Surrogate recovery was above laboratory acceptance limits, but within method acceptance limits. No target analytes were detected in the sample.

S4 = Surrogate recovery was above laboratory and method acceptance limits. No target analytes were detected in the sample.

S5 = Surrogate recovery was below laboratory acceptance limits, but within method acceptance limits.

S6 = Surrogate recovery was below laboratory and method acceptance limits. Reextraction and/or reanalysis confirm low recovery caused by matrix effect.

S7 = Surrogate recovery was below laboratory and method acceptance limits. Unable to confirm matrix effect.

S8 = the analysis of the sample required a dilution such that the surrogate concentration was diluted below the method acceptance criteria. The method control sample recovery was acceptable.

S9 = the analysis of the sample required a dilution such that the surrogate concentration

was diluted below the laboratory acceptance criteria. The method control sample recovery was acceptable.

S10 = Surrogate recovery was above laboratory and method acceptance limits. See Case narrative.

S11 = Surrogate recovery was high. Data reported per ADEQ policy 0154.000.

S12 = Surrogate recovery was low. Data reported per ADEQ policy 0154.000.

Method/Analyte Discrepancies:

T1 = Method promulgated by EPA, but not by ADHS at this time.

T2 = Cited ADHS licensed method does not contain this analyte as part of method compound list.

T3 = Method not promulgated either by EPA or ADHS.

T4 = tentatively identified compound. Concentration is estimated and based on the closest internal standard.

Calibration Verification:

V1 = CCV recovery was above method acceptance limits. This target analyte was not detected in the sample.

V2 = CCV recovery was above method acceptance limits. This target analyte was detected in the sample. The sample could not be reanalyzed due to insufficient sample.

V3 = CCV recovery was above method acceptance limits. This target analyte was detected in the sample, but the sample was not reanalyzed. See case narrative.

V4 = CCV recovery was below method acceptance limits. The sample could not be reanalyzed due to insufficient sample.

V5 = CCV recovery after a group of samples was above acceptance limits. This target analyte was not detected in the sample. Acceptable per EPA Method 8000B.

V6 = Data reported from one-point calibration criteria per ADEQ policy 0155.000.

V7 = Calibration verification recovery was above the method control limit for this analyte, however the average % difference or % drift for all the analytes met method criteria.

V8 = Calibration verification recovery was below the method control limit for this analyte, however the average % difference or % drift for all the analytes met method criteria.

Calibration:

W1 = the % RSD for this compound was above 15%. The average % RSD for all compounds in the calibration met the 15% criteria as specified in EPA method 8000B.

ATTACHMENT B.2

TECHNICAL SYSTEMS AUDIT CHECKLIST

TECHNICAL SYSTEMS AUDIT CHECKLIST

Audited Project:____

Auditee: ____

Audit Location:
____

Auditors: ____

Audit Dates: ____

Brief Project Description: ____

A. QUALITY SYSTEM DOCUMENTATION

AUDIT QUESTIONS	RESPONSE			COMMENT
	Y	N	NA	
1. Is there an approved QA Project Plan for the overall project and has it been reviewed by all appropriate personnel?				
2. Is a copy of the current approved QA Project Plan maintained at the site? If not, briefly describe how and where quality assurance (QA) and quality control (QC) requirements and procedures are documented at the site.				

AUDIT QUESTIONS	RESPONSE			COMMENT
	Y	N	NA	
3. Is the implementation of the project in accordance with the QA Project Plan?				
4. Are there deviations from the QA Project Plan? Explain.				
5. Do any deviations from the QA Project Plan affect data quality?				
6. Are written and approved current standard operating procedures (SOP's) used in the project? If so, list them and note whether they are available at the field site. If not, briefly describe how and where the project procedures are documented.				
7. Is the anticipated use of the data known and documented in the QA Project Plan?				
8. What are the critical measurements? (List under Comments)				
9. Have performance goals for each critical measurement been documented clearly and explicitly in the QA Project Plan?				
10. Do the above performance goals appear to be based on documented performance criteria or on actual QC data compiled for the measured parameter?				
11. Are there established procedures for corrective or response actions when performance goals (e.g., out-of- control calibration data) are not met? If yes, briefly describe them.				

AUDIT QUESTIONS	RESPONSE			COMMENT
	Y	N	NA	
12. Are corrective action procedures consistent with the QA Project Plan?				
13. Have any such corrective actions been taken during the project?				
14. Has the performance of each of the critical measurements been assessed and documented during the project?				
15. For each critical measurement, does the QA Project Plan specify the frequency of calibration, the acceptance criteria for the calibration, and the process for calibration data reduction and review?				
16. Briefly describe how calibration and other QC data are documented.				
17. Does the calibration documentation show that calibrations are being performed at the required frequency and in the required manner?				
18. Are there standard paper or electronic forms to record QC data and operational data?				
19. Are the standard forms dated?				
20. Is the person who recorded the data identified on the form?				
21. Are paper records written in indelible ink?				
22. Are the QC data reviewed by another				

AUDIT QUESTIONS	RESPONSE			COMMENT
	Y	N	NA	
qualified person such as the QA manager or the project manager? Who is this individual?				
23. Is the project team adhering to the planned schedule? If not, explain the new schedule. Verify that all schedule changes have been authorized.				

B. ORGANIZATION AND RESPONSIBILITIES

Identify the following personnel and determine whether they have the listed responsibilities.

PERSONNEL	COMMENT
1. **Task Manager:** ______________________________ (name) • Responsible for overall performance of the project, and Communicates with EPA.	
2. **Project Quality Assurance Manager (QAM):** ______________________________ (name) • Reviews instrumentation and QC data, and Performs QC activities.	
3. **EPA QA Representative:** ______________________________ (name) • Assists with and will be responsible for review and monitoring of all QA and QC activities.	
4. **Field Team Leader at Site**: ______________________________ (name) • Coordinates with project manager and Plans and schedules the project.	
5. **Analytical Instrumentation Operator(s)**: ______________________________ (name) ______________________________ (name) • Operate the instrumentation, Calibrate the instrumentation, and Record operational parameters.	

PERSONNEL	COMMENT
6. Who is authorized to halt the project in the event of a health or safety hazard? _________________________________ (name)	
7. Does the project maintain descriptions of the project organization and personnel responsibilities?	

C. TRAINING AND SAFETY

AUDIT QUESTIONS	RESPONSE			COMMENT
	Y	N	NA	
1. Do the instrument operators have special training or experience for the operation of the instruments?				
2. Do the project files contain current summaries of the training and qualifications of project personnel?				
3. Is there special safety equipment required to ensure the health and safety of project personnel?				
4. Is each project team member appropriately outfitted with safety gear?				
5. Are project personnel adequately trained for their safety during the performance of the project?				
6. Is there evidence of conditions that present a clear danger to the health and safety of project personnel? If so, take appropriate steps to stop work or to inform the appropriate responsible parties of the danger.				

Additional Questions or Comments:

D. ANALYTICAL INSTRUMENTATION

AUDIT QUESTIONS	RESPONSE			COMMENT
	Y	N	NA	
1. Describe the analytical instrumentation. List the brand, model number, serial number, and range for each instrument. Do the instruments use EPA standard methods?				
2. Describe the sampling probe for the instrumentation.				
3. Describe the sampling lines for the instrumentation.				
4. Does the sample probe have a calibration valve assembly for sampling system bias tests?				
5. Is the sampling system maintained according to the prescribed schedule?				
6. Describe the sampling system filter. Is the filter changed according to the prescribed schedule?				
7. Describe the sample pump.				
8. Describe the sample flow rate control system. List the sample flow rate.				
9. Describe the sample distribution manifold.				
10. How are data recorded (e.g., the data acquisition system)? Briefly describe the system, giving its brand, model, and serial number.				

AUDIT QUESTIONS	RESPONSE			COMMENT
	Y	N	NA	
11. Does the data recording system have a provision for documenting changes in operating parameters? If not, are changes in operating parameters documented in some other manner?				
12. Is there a hardcopy backup for the data recording system?				
13. Can data be recovered from the hardcopy backup?				
14. Is there a schedule for preventive maintenance for the instrumentation?				
15. Are calibration and maintenance logs kept for the instrumentation?				
16. Review the maintenance and operational records for the instrumentation. Based on your findings, do all instruments appear to be in good operating condition?				
17. Are the manufacturer's operating manuals readily available to the instrumentation operators?				
18. Describe the routine calibration procedure.				
19. Does the calibration documentation show that the calibration procedures are being followed?				
20. Do the calibration standards have the appropriate levels?				

AUDIT QUESTIONS	RESPONSE			COMMENT
	Y	N	NA	
21. Are the calibration standards traceable to standards from the National Institute of Standards and Technology (NIST) or to other accepted standards organizations?				
22. What is the instrumentation calibration error according to the calibration documentation?				
23. What is the instrumentation linearity error according to the calibration documentation?				
24. What are the instrumentation zero and calibration drifts according to the calibration documentation?				
25. What is the sampling system bias according to the calibration documentation?				
26. Do the instruments have any interference? How are the data corrected for interferences?				
27. Are the calibration standards and delivery system properly maintained?				

Additional Questions or Comments:

ATTACHMENT B.3
LABORATORY DOCUMENTATION REQUIREMENTS
FOR DATA VALIDATION

ATTACHMENT 13B

LABORATORY DOCUMENTATION REQUIREMENTS FOR DATA VALIDATION

LABORATORY DOCUMENTATION REQUIREMENTS FOR DATA VALIDATION

DRAFT

Document Control Number 9QA-07-97

(Supersedes 9QA-07-90)

JULY 1997

Quality Assurance Program

USEPA Region 9

San Francisco, California

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INTRODUCTION

In all hazardous site investigations, it is essential to know the quality of the data used for decision-making purposes. The process of generating data of known quality begins in the planning stages when data quality objectives (DQOs) are established (EPA 1993 and 1994); continues during sample collection activities and laboratory analysis; is re-evaluated when validating the analytical data (EPA 1994a, 1994b); and is finalized as part of the data quality assessment process (EPA 1996). This document has been revised to be consistent with the deliverable specifications defined in revisions to contract laboratory program (CLP) inorganic and organic statements of work (EPA 1992, 1994c), and to identify the specific laboratory documentation requirements that are generally necessary as part of the DQO process.

Validation of data requires that appropriate quality assurance and quality control (QA/QC) procedures be followed, and that adequate documentation be included for all data generated both in the laboratory and in the field. Professionals trained in data validation procedures review this information, "flag" data with qualifiers when QA/QC criteria are not met, and prepare the data validation report. The validation reports are then used as sources of data quality indicators, which are used to conduct a data quality assessment relative to the pre-established DQOs.

The QA/QC documentation provided by any laboratory, in conjunction with the sample results, allows for the evaluation of the following indicators of data quality:

- Integrity and stability of the samples;
- Instrument performance during sample analysis;
- Possibility of sample contamination;
- Identification and quantitation of analytes;
- Analytical precision; and
- Analytical accuracy.

The general laboratory documentation requirements discussed in this document are formatted into two (2) sections, pertaining to the organic and inorganic analyses. In addition to the general documentation requirements discussed in this document, several new appendices have been added to provide specific details regarding data deliverables for selected non-CLP analytical methods. The summary of deliverable specifications presented in the appendices were derived for the non-CLP methods commonly used by the EPA Region 9 Analytical Program. The deliverable specifications are not intended to be a prescriptive list that is always required, but rather, they are intended to show what EPA Region 9 has done to establish general analytical documentation requirements in response to the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

It is hoped that this document will help clarify some of the confusion that exists between the various analytical levels of data quality that were included in the outdated guidance document *Data Quality Objectives fore Remedial Response Activities*. The more recent DQO guidance, *Guidance for the Data Quality Objectives Process* (EPA 1994) requires the use of definitive data for decision making.

Accordingly, any data used to make decisions should be appropriately documented. This document should be used as a menu of quality control parameters, naming conventions, and formatting examples for a specific group of analytical procedures. The fundamental objective is to produce documentation that substantiates data quality.

I. ORGANIC ANALYSES

I.A. Documentation

The data package submitted for EPA data validation will consist of five (5) sections:

- Case narrative;
- Chain-of-Custody documentation;
- Summary of results for environmental samples (including quantitation limits);
- Summary of QA/QC results; and
- Raw data.

I.B. Case Narrative

The case narrative will be written on laboratory letterhead and the release of data will be authorized by the laboratory manager or his/her designee. The Case Narrative will consist of the following information:

- Client's sample identification and the corresponding laboratory identification;
- Parameters analyzed for each sample and the methodology used. EPA method numbers should be cited when applicable.
- Whether the holding times were met or exceeded;
- Detailed description of all problems encountered;
- Discussion of possible reasons for any QA/QC sample results outside acceptance limits; and
- Observations regarding any occurrences which may adversely affect sample integrity or data quality.

I.C. Chain-of-Custody Documentation

Legible copies of Chain-of-Custody forms for each sample shall be submitted in the data package. The date of receipt and the observed sample condition at the time of receipt must be described on the Chain-of-Custody form. Copies of any internal laboratory tracking documents should be included.

I.D. Summary of Environmental Sample Results (CLP Form I Equivalent)

The following information is to be included in the summary of sample results for each environmental sample. The summary form should follow the CLP format if possible, but other formats are acceptable provided that all necessary information is included.

- Form Title;
- Client's sample identification and the corresponding laboratory identification;

- Sample collection date;
- Sample matrix;
- Date of sample (or sub-sample) extraction and quantity of sample subjected to extraction, as applicable;
- Date and time of analysis;
- Identification of the instrument used for analysis;
- Gas Chromatography (GC) column and detector specifications;
- Weight or volume of sample used for analysis/extraction;
- Dilution or concentration factor for the sample;
- Percentage of moisture in soil sample (optional);
- Method detection limits (MDL) or sample quantitation limits;
- Analytical results and associated units; and
- Definitions for any laboratory data qualifiers used.

I.E. Summary of QA/QC Sample Results

The following QA/QC sample results must be presented on QC summary forms to facilitate data validation and data quality assessment activities. The summaries should follow the CLP format, if possible. Other formats may be acceptable provided that all necessary information is included and the summary is easy to follow. These summaries must have all the information outlined in Section I.D (a detailed summary is presented in Appendix D).

I.E.1. Instrument Calibration (for each instrument used)

Initial Calibration (CLP Form VI equivalent)

Report the analyte concentrations of the initial calibration standards and the date and time of analysis. List the response factor (RF), the average RF, percent relative standard deviation (%RSD), and retention time (for GC analyses) for each analyte. The initial calibration (IC) report must also include a sample identifier (ID), associated injection volume or quantity of sample analyzed, and the acceptance criteria, such as minimum RF values, and associated maximum %RSD values.

Continuing Calibration (CLP Form VI equivalent)

Report the concentration of the calibration standard used for the continuing calibration and for the mid-level standard, and the date and time of analysis. List the RF, percent difference (%D), and retention time (for GC analyses) for each analyte.

I.E.2. Method Blank Analysis (CLP Form IV equivalent)

List the environmental samples and QC analyses associated with each method blank. Report the concentrations of any analytes found in the method blanks.

I.E.3. Surrogate Standard Recovery (CLP Form II equivalent)

Report the name and concentration of each surrogate compound added. List the percent recoveries of all surrogates in the samples, method blanks, matrix spike/matrix spike duplicates and other QC analyses.

I.E.4. Precision and Accuracy (CLP Form III equivalent)

- Matrix spike/matrix spike duplicate (MS/MSD) analysis.

Report the name and concentration of each spiking compound. Samples are to be spiked with all specified compounds of potential concern. List the sample results, spiked sample results (concentration and %R), percent recovery and the relative percent difference (RPD). The acceptance criteria must also be presented to facilitate evaluation of both spike and duplicate results.

- Laboratory duplicate analysis, as applicable.

Report the RPD between duplicate analyses, along with the associated acceptance criteria.

- Laboratory QC check sample analysis.

Report the percent recovery for each analyte in the laboratory QC check sample. List the associated acceptance limits.

I.E.5. Other QC Criteria

- GC Retention time windows determination (CLP Form X equivalent)

Report the retention time window for each analyte, for both primary and confirmation analyses.

Retention time windows are established by performing 3 analyses of standards for all analytes being measured throughout the course of a 72-hour period. The retention time window is defined as plus or minus 3 times the standard deviation of the absolute retention time. Retention time windows are to be updated daily.

- Compound identification (GC).

Report the retention times and the concentrations of each analyte detected in the samples for both primary and confirmation analyses.

- MDL determination.

List the method detection limits.

Method detection limits are determined by performing at least 7 analyses of standards for all analytes measured at 2-5 times the required detection limit concentrations. The method detection limits are calculated as 3.143 times the standard deviation of the measured values. Refer to 40 CFR Part 136 Appendix B.

I.F. Raw Data

I.F.1. GC Analyses

This section shall include **legible copies** of the raw data for the following:

- Environmental samples (arranged in sequential order by client sample number);
- Instrument calibrations; and
- QC analyses.

The raw data for both the primary and confirmation analyses are to be included.

The raw data for each analysis shall include the following:

- Chromatograms (label all analyte peaks, internal standards and surrogate standards with chemical names);
- Area print-outs or quantitation reports;
- Sample extraction and clean-up logs;
- Instrument analysis logs for each instrument used; and
- GC/MS confirmation, as applicable.

I.F.2. GC/MS Analyses

This section shall include **legible copies** of the raw data for the following:

- Environmental samples (arranged in increasing client's sample number order);
- Mass spectrometer tuning and mass calibration (BFB, DFTPP);
- Initial and continuing instrument calibrations;
- QC analyses;
- Sample extraction and clean-up logs; and
- Instrument analysis logs for each instrument used.

The raw data for each analysis shall include the following:

- Chromatograms (label all analyte peaks, internal standards and surrogate standards with chemical names);
- Enhanced spectra of target analytes and tentatively identified compounds (TICs), with the associated best-match spectra; and
- Quantitation reports.

Legible copies of the raw data shall be organized systematically, each page shall be numbered, and a table of contents must be included with each package. The raw data for compound identification and quantitation must be sufficient to verify each result presented in Sections I.D. and I.E.

I.G. SUMMARY OF DOCUMENTATION REQUIREMENTS

Organic Data

Section I. Case Narrative

Section II. Chain-of-Custody Documentation

1. Original Chain-of-Custody forms with ID numbers and laboratory receipt signatures

2. Copies of internal tracking documents, as applicable

Section III. Sample Analysis Results

1. Environmental samples, with quantitation limits (include dilutions and re-analyses)

Section IV. QC Summary Forms

1. Initial calibration summary
2. Continuing calibration summary
3. Method blank results
4. Surrogate percent recoveries
5. Matrix spike percent recoveries
6. Laboratory duplicate relative percent differences
7. Laboratory QC check sample, if applicable
8. Retention times and acceptance windows
9. Method detection limits (MDLs)

Section V. Raw Data, chromatograms and area/quantitation reports

1. Environmental samples (include dilutions and re-analyses)
2. Instrument tuning, for analyses gas chromatography/mass spectrometry (GC/MS)
3. Initial calibration
4. Continuing calibration
5. Method blanks
6. Surrogate recoveries
7. Matrix spike (MS)
8. Laboratory duplicate or matrix spike duplicate (MSD)
9. Laboratory QC check sample, as applicable

10. Retention time windows

11. Percent moisture for soil samples

12. Sample extraction and clean-up logs

13. Instrument analysis log for each instrument used

II. INORGANIC ANALYSES

II.A. Documentation

The data package submitted for EPA data validation will consist of five (5) sections:

- Case narrative;
- Chain-of-Custody documentation;
- Summary of results for environmental samples (including quantitation limits);
- Summary of QA/QC results; and
- Raw data.

II.B. Case Narrative

The case narrative will be written on laboratory letterhead and the release of data will be authorized by the laboratory manager or his/her designee. The Case Narrative will consist of the following information:

- Client's sample identification and the corresponding laboratory identification;
- Parameters analyzed for each sample and the methodology used. When applicable, cite EPA method numbers;
- Whether the holding times were met or exceeded;
- Detailed description of all problems encountered;
- Discussion of possible reasons for any QA/QC sample results outside acceptance limits; and
- Observations regarding any occurrences which may affect sample integrity or data quality.

II.C. Chain-of-Custody Documentation

Legible copies of Chain-of-Custody forms for each sample shall be submitted in the data package. The date of receipt and the observed sample condition at the time of receipt must be described on the Chain-of-Custody form.

II.D. Summary of Environmental Results

The following information is to be included in the summary of results for each environmental sample. The summary should follow the CLP format if possible, but other formats are acceptable provided that all necessary information is included.

- Form Title;
- Client's sample identification and the corresponding laboratory identification;

- Sample collection date;
- Sample matrix;
- Date of sample digestion and quantity of sample subjected to digestion, as applicable;
- Date and time of analysis;
- Identification of the instrument used for analysis;
- Instrument specifications;
- Weight or volume of sample used for analysis/digestion;
- Dilution or concentration factor for the sample;
- Percentage of moisture in the soil sample;
- Instrument detection limits (IDL) or MDL;
- Analytical results; and
- Definitions for any data qualifiers used.

II.E. Summary of QA/QC Results

The following QA/QC sample results must be presented on summary forms to facilitate data validation and data quality assessment activities. These summaries should follow the CLP format, if possible. Other formats are acceptable provided that all necessary information is included and the summary is easy to follow. These summaries must have all information stated in Section II.D.

II.E.1. Instrument Calibration (CLP Form II equivalent)

The order for reporting of calibrations for each analyte must follow the chronological order in which the standards were analyzed.

Initial Calibration Verification

Report the source for the calibrations standards. Report the concentration for the true value, the concentration found, the percent recovery, and the control limits for each element analyzed. The date and time of analysis must also be reported.

Continuing Calibration Verification

Report the source for the calibrations standards. Report the concentration for the true value, the concentration found, the percent recovery, and the control limits for each element analyzed. The date and time analysis must also be reported.

Report results for (low-level) standards used to verify instrument sensitivity (that the reported detection limits can be achieved) in the manner described for continuing calibration verification. This should accompany data packages when modified analytical procedures result in lower reporting (i.e., quantitation) limits.

II.E.2. Method Blank Analysis (CLP Form III equivalent)

Report analyte concentrations found in the initial calibration blank (ICB), the continuing calibration blank (CCB), and in the preparation blank. The date and time of analysis must also be reported.

The order for reporting ICB and CCB results for each analyte must follow the chronological order in which the blanks were analyzed.

II.E.3. ICP Interference Check Sample (CLP Form V equivalent)

Identify the source for the interference check sample. Report the true value, the initial and final results and the calculated percent recovery, and the control limits for each analyte.

II.E.4. Precision and Accuracy

- MS analysis (CLP Form V equivalent)

Report the concentration of the spiked sample result, the sample result and the quantity of spiking solution added to the predigestion spike for each analyte. Calculate and report the %R and list the control limits.

- Post Digest Spike (CLP Form V equivalent)

In addition to matrix spikes, post-digestion spikes are sometimes analyzed during furnace analysis. Report the concentration of the spiked sample result, the sample result, and the spiking solution added for each element when sample matrix conditions require post digestion spikes. Calculate and report the %R and list the control limits.

- Laboratory Duplicate Analysis

Report the original concentration, duplicate concentration and RPD. List the control limits.

- Laboratory Control Sample (CLP Form VII equivalent)

Identify the source for the laboratory control sample. Report the concentration of the spiked sample result, the sample results and the spiking solution added for each element analyzed. Calculate and report the percent recovery and list the control limits.

The laboratory control check sample is prepared following the identical procedure that was used for preparing the analytical samples.

II.E.5. Other QC Criteria

- Method of Standard Additions (MSA)

This summary must be included when MSA analyses are required. Report the absorbance values with corresponding concentration values. Report the final analyte concentration and list the associated correlation coefficient, and the control limits.

- Inductively Coupled Plasma (ICP) Serial Dilution

Report the initial and serial dilution results, the associated %D, and the control limits.

- ICP Linear Ranges

For each instrument and wavelength used, report the date on which the linear ranges were established, the integration time, and the upper limit concentration.

- ICP Inter--element Correction Factors

For each instrument and wavelength used, report the date on which the correction factors were determined. List the inter--element correction factors for Al, Ca, Fe, Mg and any other element and the analytes to which they are applied.

- IDL determination

List the IDLs.

IDLs are determined by multiplying by 3.143, the average of the standard deviations obtained on three nonconsecutive days from the analysis of a standard solution at a concentration 3-5 times the estimated detection limit concentrations, with 7 consecutive measurements per day. Refer to the 40 CFR Part 136 Appendix B.

II.F. Raw data

This section shall include **legible copies** of the raw data for the following:

- Environmental sample results (arranged in increasing client's sample number order);
- Instrument calibrations; and
- QC sample analysis data.

The raw data for each analysis shall include the following:

- Measurement print-outs and quantitation reports for each instrument used;
- Absorbance, titrimetric, or other measurements for wet chemical analysis;
- Sample preparation and digestion logs;
- Instrument analysis logs for each instrument used; and
- Percent moisture in the soil samples (when applicable).

Legible copies of the raw data shall be organized systematically, and each page shall be numbered, and a table of contents must be included in each package. The raw data for compound identification and quantitation must be sufficient to verify each result presented in Sections II.D. and II.E.

II.G. SUMMARY OF DOCUMENTATION REQUIREMENTS

Inorganic Data

Section I. Case Narrative

Section II. Chain-of-Custody Documentation

1. Original Chain-of-Custody forms with laboratory ID numbers and sample receipt signatures.

2. Copies of internal tracking documents, as applicable

Section III. Sample Analysis Results

1. Environmental samples, with quantitation limits (include dilutions and re-analyses)

Section IV. QC Sample Result Summary Forms

1. Initial and continuing calibrations

2. Method blanks, continuing calibration blanks, and prep blanks

3. ICP interference check sample

4. Matrix spike

5. Laboratory duplicate

6. Laboratory control sample

7. Method of standard additions

8. ICP serial dilution

9. Instrument detection limits

10. ICP linear range

Section V. Raw Data - sequential measurement readout records for ICP, graphite furnace atomic absorption (AA), flame AA, cold vapor mercury, cyanide, and/or other inorganic analyses.

1. Environmental samples (including dilutions and reanalyses)

2. Initial and continuing calibrations

3. Continuing calibration and Preparation blanks

4. Matrix spikes

5. Post digest spikes

6. Method of standard additions, when applicable

7. Laboratory duplicate or matrix spike duplicates

8. ICP Serial Dilution

9. Laboratory control samples, when applicable

10. Percent moisture for soil samples

11. Sample digestion and/or sample preparation logs

12. Instrument analysis log, for each instrument used

13. Instrument tuning for ICP-MS, when applicable

III. QC REQUIREMENTS SUMMARY

III.A. GC/MS Organic Analyses

QC limits, unless specified below, shall be determined according to the analytical methods and must be consistent with the associated DQOs. When QC limits are not specified in the methods, good laboratory practices (GLP) are to be followed. Re-analyses may be necessary when QC limits are not met.

Presented below is a summary of most analytical requirements for the various QC parameters. In order to document the quality of QC sample results, associated information must also be presented on the QC summary forms (see Appendix B)

1. **Instrument Tuning**

- At the beginning of each day that samples are analyzed.

2. **Initial Calibration**

- At the beginning of the analytical sequence;
- Whenever %D between the continuing and initial calibration response factors exceeds $\pm$25%. This applies to specified compounds of interest, or calibration check compounds (CCCs);
- Whenever the response factors for specified compounds of interest or system performance check compounds (SPCC) are less than 0.300 (0.250 for bromoform) for volatiles or less than 0.050 for semi-volatiles analyses; and
- After installation of a new column or after maintenance service/repair of the GC/MS.

3. **Continuing Calibration**

- Prior to the analysis of environmental samples, on each 12-hour shift that samples are analyzed.

4. **Method Blank**

- Purgeables (Volatiles): After each continuing calibration analysis and after the analyses of unusually concentrated samples, to demonstrate that the system is free of contamination;
- Extractables (Semivolatiles): One for each extraction batch of 20 or fewer samples, for each sample matrix. Analyze method blanks on all instruments used for sample analysis; and

- Method blanks should not contain any analytes of interest and are to be free of interfering peaks.

5. **Calibration Range**

- For samples containing one or more analytes at concentrations above the initial calibration range, the samples are to be diluted and re-analyzed.

6. **Surrogate Standard**

- Surrogate standards (3 for volatiles; 3 phenolic and 3 neutral compounds for semi-volatiles) are to be added to the calibration standards, method blanks, environmental samples and QC samples.

7. **Internal Standard**

- Internal standards (3 for volatiles and 6 for semi-volatiles) are to be added to the calibration standards, method blanks, environmental samples and QC samples; and
- If the extracted ion chromatogram profile (EICP) area for any of the internal standards changes by a factor of two (-50% to +100%) from the last continuing calibration, re-analysis of the samples is required after corrective action.

8. **Matrix Spike (MS) Analysis**

- For each extraction/analysis batch of 20 or fewer samples, for each sample matrix; and
- MS solutions are to contain all specified compounds of interest.

9. **Sample Duplicate or Matrix Spike Duplicate (MSD) Analysis**

- For each extraction/analysis batch of 20 or fewer samples, for each sample matrix.

10. **Laboratory QC Check Sample**

- At the beginning of the QC program and as needed.

11. **Method Detection Limits Determination**

- At the beginning of the QC program and as needed.

III. QC REQUIREMENTS SUMMARY

III.B. Pesticides/PCBs

QC limits, unless specified below, shall be according to the analytical methods. When QC limits are not specified in the methods, good laboratory practices (GLP) are to be followed. Re-analyses may be necessary when QC limits are not met.

1. **Initial Calibration**

- At beginning of the QC program;;

- Whenever the %D in calibration factors (CF) between continuing calibration and initial calibration exceeds ±15%; and
- After installation of a new column or after maintenance service/repair of the GC.

2. **Daily Calibration**

- Prior to the analysis of environmental samples, on each day that samples are analyzed.

3. **Mid-level Standard**

- After each group of 10 samples; and
- Report the percent breakdown for 4,4'-DDT and for endrin.

4. **Method Blank**

- For each extraction batch of 20 or fewer samples, for each sample matrix. Analyze method blanks on all instruments used for sample analysis; and
- Method blanks must demonstrate that the analytical system is free of contaminants and interfering peaks.

5. **Calibration Range**

- For samples containing one or more analytes at concentrations above the initial calibration range, the samples are to be diluted and re-analyzed.

6. **Surrogate Standard**

- Surrogate standards are to be added to the calibration standards, method blanks, environmental samples and QC samples.

7. **Matrix Spike (MS) Analysis**

- For each extraction batch of 20 or fewer samples, for each sample matrix; and
- MS solutions are to contain all specified compounds of interest.

8. **Sample Duplicate or Matrix Spike Duplicate (MSD) Analysis**

- For each extraction batch of 20 or fewer samples, for each sample matrix.

9. **Laboratory QC Check Sample**

- At beginning of the QC program and as needed.

10. **Retention Time Windows Determination**

- For each GC column, to be updated daily.

11. **Method Detection Limits Determination**

- At beginning of the QC program and as needed

III. QC REQUIREMENTS SUMMARY

III.C. Purgeable Organics by GC

QC limits, unless specified below, shall be according to the analytical methods. When QC limits are not specified in the methods, good laboratory practices (GLP) are to be followed. Re-analyses may be necessary when QC limits are not met.

1. **Initial Calibration**

- At beginning of the QC program;
- Whenever the %D in the CF between continuing calibration and initial calibration exceeds $\pm$15%; and
- After installation of a new column or after maintenance service/repair of the GC.

2. **Daily Calibration**

- Prior to the analysis of environmental samples, on each day that samples are analyzed.

3. **Mid-level Standard**

- After each group of 10 samples.

4. **Method Blank**

- After each daily calibration and mid-level standard analysis and after the analyses of unusually concentrated samples, to demonstrate that the system is free of contamination; and
- Method blanks should not contain any analytes of interest and are to be free of interfering peaks.

5. **Calibration Range**

- For samples containing one or more analytes at concentrations above the initial calibration range, the samples are to be diluted and re-analyzed.

6. **Surrogate Standard**

- Surrogate standards are to be added to the calibration standards, method blanks, environmental samples and QC samples.

7. **Matrix Spike (MS) Analysis**

- For each analysis batch of 20 or fewer samples, for each sample matrix; and
- MS solutions are to contain all specified compounds of interest.

8. **Sample Duplicate or Matrix Spike Duplicate (MSD) Analysis**

- For each analysis batch of 20 or fewer samples, for each sample matrix.

9. **Laboratory QC Check Sample**

- At beginning of the QC program and as needed.

10. **Retention Time Windows Determination**

- For each GC column, to be updated daily.

11. **Method Detection Limits Determination**

- At beginning of the QC program and as needed.

III. QC REQUIREMENTS SUMMARY

III.D. Metals Analyses

QC limits, unless specified below, shall be according to the analytical methods. When QC limits are not specified in the methods, good laboratory practices (GLP) are to be followed. Re-analyses may be necessary when QC limits are not met.

1. **Initial Calibration**

- Daily and each time the instrument is set up;
- Whenever the %D between the initial calibration and the continuing calibration exceeds 10% (20% for mercury and graphite furnace atomic absorption [GFAA] analyses);
- Whenever the %D between either of the ICP interference check samples and the true value exceeds 20%; and
- Blank standard required as part of initial calibration.

2. **Continuing Calibration Verification Standard**

- After every ten or fewer samples; and
- Analyses are required to have calibrations with acceptable recoveries (the %D between the initial calibration and the continuing calibration less than 10% [20% for mercury]) before and after the sample analysis.

3. **Blanks**

- Continuing calibration blank run immediately following continuing calibration verification standard; and
- Method blank for each preparation batch of 20 or fewer samples, for each sample matrix.

4. **ICP Interference Check Sample**

- At the beginning and at the end of the analytical run; and

- ICP analyses are required to have both ICP interference check samples with acceptable recoveries (the %D between the true value and the ICP interference check sample less than 20%).

5. **Calibration Range**

- For samples containing one or more analytes at concentrations above the initial calibration range, the samples are to be diluted and re-analyzed.

6. **Matrix Spike (MS) Analysis**

- For each preparation batch of 20 or fewer samples, for each sample matrix; and
- MS solutions are to contain all specified compounds of interest.

7. **Sample Duplicate Analysis**

- For each preparation batch of 20 or fewer samples, for each sample matrix.

8. **Laboratory Control Sample (LCS)**

- For each preparation batch of 20 or fewer samples, for each sample matrix;
- Analyses are required to have the LCS results within acceptable recoveries. The %R should be within the range of 80-120% for all metals.
- LCSs are not usually required for mercury or cyanide determinations, but should these data be deemed to be critical to decision making, it would be reasonable to require the mercury %R to be within the range of 90-110%,cyanide &R to be within the range of 85-115%.

9. **Graphite Furnace Post Digest QC**

- A post digest spike at approximately 10 to 20 μg/L is required for all furnace analyses. If the result is greater than or equal to 10 μg/L in the digestate and the recovery of the spike is not within 85% to 115%, the method of standard additions is required for analyte quantification; and
- If the method of standard additions correlation coefficient is less than 0.995, the method of standard additions analysis is required to be repeated once.

10. **ICP Serial Dilution**

- For each preparation batch of 20 or fewer samples, for each sample matrix, dilute the digestate by five and re-analyze.

IV. REFERENCES

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EPA, 1993. Data Quality Objectives Process for Superfund, Interim Final Guidance. EPA/540/G-93/071, Publication 9355.9-01, September, 1993.

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APPENDIX A

DATA DELIVERABLE SPECIFICATIONS FOR NON-CLP METHODS IN THE REGION 9 ANALYTICAL PROGRAM

ATTACHMENT B.4

DATA VERIFICATION AND VALIDATION CHECKLISTS

TABLE 1

LABORATORY REPORT GOAL: DATA VERIFICATION

Perform data verification on all samples collected to characterize the site, including quarterly groundwater monitoring samples and soil investigation samples. A chemist or other professional with data validation or analytical laboratory experience who is approved by ADEQ will perform data verification. The professional should be familiar with the QC requirements specified for the analytical methods being reviewed. Data verification precedes data validation and is a systematic process for evaluating whether data has been generated with acceptable quality control.

Review only the items listed below, as well as completeness of supporting documentation. This is a cursory review of the laboratory's quality control and may suggest that a more thorough validation is needed.

COMPLETED	REVIEW ITEM
	1. Case Narrative Have any anomalies, deficiencies, and QC problems been identified in the case narrative? What corrective action, if any, was taken?
	2. Chain-of-Custody Documentation Are the original Chain-of-Custody forms with ID numbers and laboratory receipt signatures present?
	Are there copies of internal tracking documents, as applicable?
	3. Sample Analysis Results Are sample analysis results included for environmental samples, with quantitation limits (include dilutions and reanalyses)?
	4. QC Summary Is the following information included? Initial and continuing calibrations
	Method blanks, continuing calibration blanks, and preparation blanks
	Surrogate percent recoveries
	Internal standard percent recoveries
	Matrix spike percent recoveries
	Laboratory duplicate relative percent differences

COMPLETED	REVIEW ITEM
	Laboratory QC check sample, laboratory control sample recoveries
	Field duplicates, if identified, reproducibility will be evaluated
	Acceptance criteria, if not already established by the method/DQO
	Definitions for any laboratory data qualifiers used
	Method of standard additions (INORGANIC)
	ICP serial dilution (INORGANIC)
	5. Specifically review the following: Was a check for timeliness and errors conducted, including requested deliverables, preservation, holding times, and Chain-of-Custody?
	Was a duplicate sample/matrix spike/matrix spike duplicate/postdigest spike reviewed against precision and accuracy criteria specified by the method or by project DQOs?
	6. Does the Verification Report include the following information? Case narrative including, but not limited to, an overall summary of data acceptability and comparison to DQOs and DQIs (PARCC), a list of recommended changes, a summary of all laboratory contacts, in which communications with the laboratory, if any, would be identified, and any other problems associated with the actual analysis which might impact the sample integrity or data quality
	Were compound quantitation and reported detection limits reviewed, checking reporting limits against contract required limits, verifying dry weights, calculations, and dilutions?
	Marking of recommended changes directly on copies of the laboratory reports for the client's ease in performing data entry
	Tabulated summary of all data results supplied electronically by email or on 3.5-inch floppy disks in a commonly used software format

TABLE 2

LABORATORY REPORT GOAL: DATA VALIDATION

Experienced chemists will perform full data validation on a data package(s) selected by the ESSC Task Manager at the beginning of the project. The package(s) should be a full sample batch (approximately 20 samples), consisting of samples collected for groundwater monitoring and/or soil investigation, and should be typical of the type of samples expected for the project. Each analytical method used in the project should be initially validated prior to proceeding with performing data verification on the bulk of the laboratory results. Additionally, during each six-month period that the project is ongoing, the Project Manager will select additional data packages for validation, which are representative of the matrix and analyses being performed.

Data validation will consist of a review of sample and QC results, and the accompanying raw data. The ADEQ Project Manager will identify the compounds of concern, and the data validation will include a review of 100% of the QC data and sample data for these compounds in the laboratory report for a sample delivery group. Compounds not identified as contaminants of interest will not be validated unless requested by ADEQ's Project Manager. The ESSC's QA officer or an independent data validation contractor will conduct data validation. The ADEQ QA Unit will validate data at the ADEQ Project Manager's request. Validation includes all of the following items listed as validation deliverables.

The percentage of data that undergoes full validation may be increased if substantial data quality issues are raised during the initial or subsequent assessments. Or, ADEQ may require that a larger percent of the data be fully validated for various reasons including, but not limited to, determining the extent of the issue and/or if the issue has been corrected in subsequent analyses, or that additional data be made available for review, besides the validation deliverables mentioned below.

COMPLETED	REVIEW ITEM
	1. Case Narrative Have any anomalies, deficiencies, and QC problems been identified in the case narrative? What corrective action, if any, was taken?
	2. Chain-of-Custody Documentation Are the original Chain-of-Custody forms with ID numbers and laboratory receipt signatures present?
	Are there copies of internal tracking documents, as applicable?

COMPLETED	REVIEW ITEM
	3. Sample Analysis Results Are sample analysis results included for environmental samples, with quantitation limits (include dilutions and reanalyses)?
	4. QC Summary Is the following information included? Initial and continuing calibrations
	Method blanks, continuing calibration blanks, and preparation blanks
	Surrogate percent recoveries
	Internal standard percent recoveries
	Matrix spike percent recoveries
	Laboratory duplicate relative percent differences
	Laboratory QC check sample, laboratory control sample recoveries
	Field duplicates, if identified, reproducibility will be evaluated
	Acceptance criteria, if not already established by the method/DQO
	Definitions for any laboratory data qualifiers used
	Gas chromatograph breakdown products
	Retention times and acceptance windows (ORGANIC)
	ICP interference check sample (INORGANIC)
	Method of standard additions (INORGANIC)
	ICP serial dilution (INORGANIC)
	5. Raw data, chromatograms, and area quantitation reports (ORGANIC), sequential measurement readout records for ICP, graphite furnace atomic absorption (AA), flame AA, cold vapor mercury, cyanide, and/or other inorganic analyses (INORGANIC), including but not limited to the following: Environmental samples (include dilutions and reanalyses)

COMPLETED	REVIEW ITEM
	Instrument tuning, for analyses of gas chromatography/mass spectrometry (GC/MS)
	Initial calibration and continuing calibrations
	Method blanks, continuing calibration, and preparation blanks
	Surrogate recoveries and internal standard recoveries, where applicable
	Matrix spike (MS)
	Laboratory duplicate or matrix spike duplicate (MSD)
	Laboratory QC check sample, or laboratory control samples, as applicable
	Retention time windows
	Percent moisture for soil samples
	Sample extraction and cleanup logs (ORGANIC)
	Enhanced spectra of target analytes and tentatively identified compounds (TICs) with the associated best match spectra for MS data
	Sample digestion and/or sample preparation logs (INORGANIC)
	Instrument analysis log for each instrument used (INORGANIC)
	Postdigest spikes (INORGANIC)
	Method of standard additions when applicable (INORGANIC)
	ICP serial dilution (INORGANIC)
	Instrument tuning for ICP/MS, when applicable (INORGANIC)
	6. Specifically review the following: Was a check for timeliness and errors conducted, including requested deliverables, preservation, holding times, and Chain-of-Custody?
	Was a duplicate sample/matrix spike/matrix spike duplicate/post-digest spike reviewed against precision and accuracy criteria specified by the method or by project DQOs?

COMPLETED	REVIEW ITEM
	Was compound quantitation and reported detection limits reviewed, checking reporting limits against contract-required limits, verifying dry weights, calculations, and dilutions?
	Was target list compounds identified, indicating proper identification of analytes?
	Was sample result verification conducted, in which the final reports are reviewed against all raw instrumental data and logs and all applicable worksheets to check anomalies, data reduction/calculations, transcription, linear ranges, and dilutions?
	7. OPTIONAL (as requested by ADEQ for data validation on a case-by-case basis) Method detection limits (MDLs)
	Instrument detection limits (IDLs)
	ICP linear range (INORGANIC)
	8. Does the Validation Report include the following information? Case narrative including, but not limited to, an overall summary of data acceptability and comparison to DQOs (PARCC), a list of recommended changes, a summary of all laboratory contacts, in which communications with the laboratory, if any, would be identified, and any other problems associated with the actual analysis which might impact the sample integrity or data quality
	Marking of recommended changes directly on copies of the laboratory reports for the client's ease in performing data entry
	Tabulated summary of all data results supplied electronically by email or on 3.5-inch floppy disks in a commonly used software format

ATTACHMENT B.5

ADEQ POLICY 0154

0154.000 ADDRESSING SPIKE AND SURROGATE RECOVERY AS THEY RELATE TO MATRIX EFFECTS IN WATER, AIR, SLUDGE AND SOIL MATRICES POLICY

Level One **Arizona Department of Environmental Quality**

Originator: **Kenyon C. Carlson, Manager**
Quality Assurance/Quality Control (QA\QC) Unit

Contact for Information **Kenyon C. Carlson, Manager**
Quality Assurance/Quality Control (QA\QC) Unit

Issue Date: **October 23, 1998**

PURPOSE

The Arizona Department of Health Services (ADHS) has not established a comprehensive policy on the issue of matrix spike or surrogate recoveries because they do not have the authority to establish criteria by which ADEQ will either accept or reject data.

This policy will assure that all data submitted to ADEQ meets regulatory requirements and are legally defensible by establishing alternative criteria for when the established method recovery acceptance criteria for matrix spikes and/or surrogates are exceeded.

ADEQ is concerned with the assumption that if spike and/or surrogate recoveries exceed method acceptance criteria and that if those results can be duplicated without re-extracting the sample, the failure of that quality control criteria is a result of matrix effects. Duplication of out-of-range results can be the result of influences other than matrix effects and could be indicative of the method or instrument being out-of-control.

The ADEQ QA/QC Unit believes a more accurate and reliable assessment of possible matrix effects can be established using either a (1) dilution technique, (2) the method of standard additions, or (3) analyzing a laboratory fortified blank (LFB) or a laboratory control sample (LCS). Because ADEQ is a regulatory agency, compliance results must be able to meet all legal constraints and uphold all analytical method requirements.

AUTHORITY

A.A.C. R18-4-106 and R9-14-608.

DEFINITIONS

Data: For the purposes of this policy, data is defined as >raw data= (examples include but are Not limited to calibration curves, chromatograms, spectras, sample preparation and injection logs etc.) and does not include laboratory reports. (Contact the QA unit for further information.)

Laboratory Fortified Blank (LFB): (aka blank spike) an aliquot of organic free reagent water to which known quantities of the method analytes are added in the laboratory. The LFB is analyzed exactly like a sample, and its purpose is to determine whether the methodology (analytical process) is in control, and whether the laboratory is capable of making accurate and precise measurements at the required method detection limit.

Laboratory Fortified Blank Duplicate (LFBD): (aka blank spike duplicate) a duplicate sample of the aliquot of reagent water to which known quantities of the method analytes are added in the laboratory. The LFBD is analyzed exactly like a sample, and its purpose is to determine whether the methodology (analytical process) is in control, and whether the laboratory is capable of making accurate and precise measurements at the required method detection limit.

Laboratory Control Sample (LCS): A sample of clean dirt or sand to which known quantities of the method analytes are added in the laboratory. The LCS is extracted and analyzed exactly like a sample, and its purpose is to determine whether the methodology (sample preparation and analytical process) is in control, and whether the laboratory is capable of making accurate and precise measurements at the required method detection limit.

Laboratory Control Sample Duplicate (LCSD): A duplicate sample of clean dirt or sand to which known quantities of the method analytes are added in the laboratory. The LCSD is extracted and analyzed exactly like a sample, and its purpose is to determine whether the methodology (sample preparation and analytical process) is in control, and whether the laboratory is capable of making accurate and precise measurements at the required method detection limit.

Laboratory Fortified Sample Matrix (LFM): (aka matrix spike) an aliquot of an environmental sample to which known quantities of the method analytes are added in the laboratory. The LFM is analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results and therefore determines to what degree the method is successful in analyzing the target analytes. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the LFM corrected for background concentrations.

Laboratory Fortified Sample Matrix Duplicate (LFMD): (aka matrix spike duplicate) A duplicate sample of the aliquot of an environmental sample to which known quantities of the method analytes are added in the laboratory. The LFMD is analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results and therefore determines to what degree the method is successful in analyzing the target analytes. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the LFMD corrected for background concentrations.

Matrix: The predominant material, component or substrate, which contains the analyte of interest.

Matrix is not necessarily synonymous with phase (liquid or solid).

Matrix Interference: Also referred to as matrix effects. Matrix spike interference are those chemical and/or physical interferences that impede the analytical instrumentation in detecting the true value concentration of a target analyte in a sample. One possible source of matrix interferences may be caused by contaminants that are co-extracted from the sample and result in a positive or negative bias. The extent of matrix interferences will vary considerably from source to source, depending upon the nature and diversity of the sample matrix.

Method of Standard Additions: A technique used most commonly in metals analysis by atomic absorption; however, it can be applied in many areas of the laboratory. It serves to correct for matrix effects in the sample. Aliquots of a sample are spiked with at least three different concentrations of a standard.

Surrogate: A pure analyte, which is extremely unlikely to be found in any sample, and which is added to a sample aliquot in known amounts before extraction and is measured with the same procedures used to measure other sample components. A surrogate behaves similarly to the target analyte and its use is most often used with organic analytical procedures. The purpose of a surrogate analyte is to monitor method performance with each sample.

POLICY

ADEQ will not accept test results for regulatory purposes when the LFM and/or surrogate recovery exceed the acceptance criteria unless the laboratory has demonstrated that the sample itself is responsible for the QC results exceeding the methods acceptance criteria.

RESPONSIBILITY

The ADEQ Program staff will be responsible for reviewing the final report or the quality control summary sheets, which accompany the final results of the laboratory analysis to verify that matrix spikes and/or surrogate recoveries were within the acceptance criteria. If the program staff is uncertain as to how to evaluate the final report, or if required information is missing, it shall be the responsibility of the program staff to forward the information to the ADEQ QA/QC Unit for review and recommendations.

The ADEQ QA/QC Unit will review data referred by program staff to ensure that the procedures outlined in Attachment A of this policy were followed by the laboratory and to report their findings to the appropriate ADEQ program staff.

APPLICABILITY

This policy is applicable to all types of water, air, sludge, and soil matrices regardless of the method of analysis.

PROCEDURES

The ADEQ program staff shall review the final report or the quality control (QC) summary sheet, which accompanies the final report. ADEQ program staff shall assess the results of the LFM and LFMB on the QC Summary sheet to determine if the recoveries are within the acceptance range. If the LFM or LFMB results exceed the established recovery criteria, ADEQ program staff will assess the recovery criteria for those out of range analytes in either the LFB/LFBD or LCS/LCSD. If the required information is not included with the final report or program staff are uncertain as to how to evaluate the final report, they shall notify the QA/QC Unit so the QA/QC staff can perform a more thorough evaluation of the results.

The ADEQ QA/QC staff, if necessary, shall request a laboratory data package to review the raw data, determine the validity of the results and compliance with the ADEQ data reporting policy. The QA/QC Unit shall also submit in writing, to the program staff, the data validation findings and the ADEQ QA/QC Unit's recommendations.

Attachment A
Laboratory Procedures

The ADEQ policy for addressing spike and surrogate recovery as they relate to matrix effects in water, air, sludge, and soil matrices suggests three different techniques (analysis of an LFB/LFBD or LCS/LCSD pair, dilution procedure, or the standard additions technique), which may adequately explain the out-of-range QC results of samples. These three techniques do not represent an all-inclusive list for demonstrating matrix effects within a sample, and laboratories may have alternate and valid techniques to demonstrate matrix interference. These alternate techniques should be discussed with and approved by the ADEQ QA Unit prior to analysis to avoid the rejection of data.

ADEQ also requires the analysis of an LFB/LFBD, LCS/LCSD or LFM/LFMD pair to satisfy the precision requirements for drinking water methods. More useful information can be obtained regarding precision when comparing samples containing target analytes. Very little useful precision information is obtained when comparing the instrument precision using two samples that are non detect. Whenever included in the analytical batch, the laboratory must report the results of the LFB/LFBD or LCS/LCSD in addition to the LFM/LFMD to ADEQ and shall include the numerical values established by the laboratory for the QC acceptance criteria whenever the method has not provided any.

While the method would require a re-extraction of that sample to confirm matrix interference if the LFM and/or the LFMB fall outside the method’s acceptance criteria, ADEQ will accept the results of the LFB/LFBD or LCS/LCSD, which demonstrate that the analytical process is in control. The LFB/LFBD and LCS/LCSD provide an interference-free matrix so that if the surrogates and/or matrix spike analytes are within the method’s acceptance criteria, there is compelling data that an instrument is operating properly, the extraction procedure provided no bias, and the method is in control. The LFB/LFBD must be analyzed with the same batch as the LFM/LFMD for ADEQ to accept the LFB/LFBD results. The LCS/LCSD samples must be extracted and analyzed with the same batch as the LFM/LFMD samples for ADEQ to accept the results of the LCS/LCSD samples. The laboratory shall include the numerical values established by the laboratory for the QC acceptance criteria whenever the method has not provided any.

Another option is the dilution technique. The dilution technique is particularly well suited for demonstrating matrix effects in the LFM samples for analyses that don’t require extraction procedures. Laboratories performing analytical work for ADEQ that suspect matrix interference in LFM samples may dilute that sample so that all suspected matrix effects are diluted out as well prior to spiking. Once the matrix effects have been diluted out, recovery of the matrix spikes and surrogates should fall within the acceptable recovery criteria established by the method, or the lab if none are given in the method.

The dilution of samples suspected of having matrix interference so that interference is no longer a factor strongly suggests that there may have been matrix effects in the sample, and the recovery of the spiked analytes within the acceptance range demonstrates the instrumentation and method are in control. ADEQ will accept use of the dilution technique to demonstrate matrix effects in LFM and LFMD samples because not every sample is matrix spiked and it cannot be assumed that the matrix effects observed in one sample are representative of the entire sample batch.

Because the dilution technique raises the reporting level of an analyte, it may not be a suitable technique to demonstrate matrix interference if the resulting reporting level exceeds the regulatory (trigger) or action level. The method of standard additions would be a preferred technique to help correct for positive or negative bias in the samples because this technique is unlikely to raise the reporting level of regulated contaminants that may be present in the sample. The method of standard additions usually employs aliquots of a digested or extracted sample, which are spiked with at least three different concentrations of a standard. The standard additions are chosen to bracket the unknown sample concentration and the response of the instrument must be linear.

Samples whose matrix spikes or surrogate recoveries continue to fall outside the acceptance criteria after any of the above three techniques or an alternate method pre-approved by the ADEQ QA Unit have been employed shall be reviewed by ADEQ on a case-by-case basis. Any results reported which are affected by matrix interference shall be flagged as an estimated quantitation.

Though groundwater protection levels (GPLs) are shown in Table 1 (where available), the primary concern with respect to the groundwater samples collected under this SAP is whether there are any detectable levels of OB/OD-related constituents present. Additional consideration in the final report will be made for the Arizona Aquifer Water Quality Standards. These standards were not included in Table 1 for brevity. That is, or course, excluding any such constituents that can be shown to be due to natural conditions. If contamination is present at detectable levels in these production wells, additional evaluations will likely be necessary to determine their potential significance and source. The groundwater sampling described by this plan is associated with the evaluation of conditions at the MTF. However, based solely on the distance from the Facility to the area of Wells H and J, it is highly unlikely that any contamination detected in these wells could be attributed to OB/OD actions. In addition, testing and training activities involving the same materials, as are managed at the MTF, are performed throughout the area. Detection of OB/OD-type hazardous contaminants in the production wells (should it occur) presents a problem whether or not the levels detected represent a risk to human health. In such a case, follow-on evaluations would be needed to determine the next steps necessary to locate the source of the contamination.

ATTACHMENT B.6
ADEQ POLICY 0155

0155.000 ANALYTICAL METHODS HAVING PROVISIONS FOR A ONE-POINT CALIBRATION AND CONTINUING CALIBRATION VERIFICATION CONSTRAINTS POLICY

Level One **Arizona Department of Environmental Quality**

Originator: **Kenyon C. Carlson, Manager**
Quality Assurance\Quality Control (QA\QC) Unit

Contact for Information: **Kenyon C. Carlson, Manager**
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Issue Date: **October 23, 1998**

PURPOSE

Most analytical methods have established upper and lower control limits for CCV's, and when the recovery exceeds those limits the method is considered "out-of-control". ADEQ is concerned with the assumption that the 'data is not impacted', as reported by laboratories when the upper control limit of a CCV has been exceeded in a non-detect result. Currently, there is no way to differentiate between an instrument that has gained sensitivity and one that has drifted out of control when the upper control limit of a CCV is ignored.

Adherence to this policy will assure that all laboratory-generated data submitted to ADEQ meets regulatory requirements and are legally defensible.

Because ADEQ is a regulatory agency, compliance results must be able to meet all legal requirements. Where CCV requirements are part of the test method and where test methods are part of the regulatory requirements, then the CCV requirements as dictated by the analytical method must be followed.

AUTHORITY

A.A.C. R18-4-106 and R9-14-608.

The EPA methods continue to be written such that upper and lower control limits for the CCV are established and there is no documentation, which permits one to ignore the violation of an upper control limit in light of certain conditions.

DEFINITIONS

Continuing Calibration Verification Standard (CCV)--Consists of an aliquot of reagent water to which known quantities of the method analytes are added by the laboratory. The CCV's purpose is to determine whether the methodology is 'in control' by verifying the linearity of the calibration curve and to assure that the sample results reflect accurate and precise measurements.

Data--For the purposes of this policy, data is defined as raw data (examples include but are not limited to calibration curves, chromatograms, spectras, injection logs, etc.) and does not include laboratory reports. (Contact the QA unit for further information).

POLICY

From a regulator's perspective, a laboratory must follow the method as written to ensure the analytical data generated is defensible and can survive the scrutiny of litigation. ADEQ will not accept test results for regulatory purposes when the CCV's acceptance criteria have been exceeded. This includes sample results where the upper control limit of the CCV has been exceeded and the result is reported as non-detect.

However, in the event a CCV exceeds its control limits for a detect sample, ADEQ allows the laboratory to either 1) recalibrate the entire multi-point curve and reanalyze the samples or 2) perform a one-point calibration as the method permits.

RESPONSIBILITY

The ADEQ QA/QC staff will be responsible, when reviewing data for the purpose of recommending to ADEQ program staff to either accept or reject such data, to ensure that the procedures outlined in this policy are followed.

APPLICABILITY

This policy is only applicable to those methods which provide for a one-point calibration and those water matrices for the analysis of volatile organic compounds (VOCs), synthetic organic compounds (SOCs), and inorganic compounds (IOCs) analyzed using 40 CFR methods (ex. 200, 500, and 600 series). This policy does not apply to those samples analyzed using SW-846 methods.

LABORATORY PROCEDURES

EPA and the ADEQ QA/QC Unit require that laboratories, which elect to recalibrate using a one-point calibration, must demonstrate there is adequate instrument sensitivity to detect a peak at the method reporting level for those contaminants. Therefore, to justify reporting sample results as non-detect when the control limits of a CCV have been exceeded, the laboratory must recalibrate using a standard at the method reporting level and re-run all the samples or extracts after that CCV.

The laboratory must detect a significant peak for each analyte reported in the method reporting level standard. A significant peak is considered to be one in which the peak is at least 3 to 5 times the signal to noise ratio (40 CFR, Part 136, Appendix B, Procedure Section 1a).

This ADEQ policy provides a means for laboratories to demonstrate that sample results are, in fact, non-detect for target analytes. The method reporting level standard must be analyzed (and determined to be acceptable) before reanalyzing any samples in a run.

Non-Detects:

To report a non-detect result using a one-point calibration, the laboratory must meet the following requirement: Establish the absence of a significant peak at the retention time of the target analyte. The absence of a significant peak at the retention time of the target analyte is defined as one whose response is less than that of the analyte present in the low level standard (which must be prepared at the reporting limit) used for the one-point calibration.

Detects:

To report a detect result using a one-point calibration, a laboratory must meet the following requirement: a one-point calibration must be performed so that the concentration of the one-point calibration standard is within ±20% of the concentration of analyte detected in a sample.

Attachment
Statement of Position

There has been some debate among the laboratory community concerning continuing calibration verification (CCVs) standards and non detect samples. Most analytical methods have established upper and lower control limits for CCVs, and when the recovery exceeds those limits, the method is considered "out of control." Recently, there has been a growing consensus among some laboratories that an analytical method is ***not*** out of control if the upper control limit of the CCV is exceeded providing the sample is a non-detect. The reasoning here is that the instrument has somehow "gained" sensitivity and if there were anything in the sample, it would surely have been detected.

The ADEQ QA/QC Unit understands this logic and recognizes that it may be true in some cases. However, this is only one of several possibilities. Another possibility is that the analytical method is now out of control. ADEQ is concerned with the assumption that the "data are not impacted," as reported by laboratories when the upper control limit of a CCV has been exceeded in a non-detect result. Currently, there is no way to differentiate between an instrument that has gained sensitivity and one that has drifted out of control when the upper control limit of a CCV is ignored.

As a regulatory agency, ADEQ cannot assume that each time the upper control limit is exceeded; it is the result of increased instrument sensitivity. Such an assumption can result in the court or the hearing officer invalidating or dismissing the analytical results because an integral portion of the method's quality control has been omitted. The ADEQ Quality Assurance\Quality Control Unit has discussed this subject at length with EPA Region IX's Quality Assurance Management Section. Region IX concurs with the ADEQ's QA\QC Unit's interpretation. They have further expressed their concern that ignoring established upper control limits for the CCV is not in line with good laboratory science and may invite abuse and even laboratory fraud.

ATTACHMENT B.7

OPERATING PROCEDURES

OPERATING PROCEDURES (OPs) INCLUDED IN THIS ATTACHMENT

OP[a/] No.	Title	Revision	Date
EOP001[b/]	Sample Labels	Revision 1.0	October 2003
EOP 002	Chain-of-Custody Form	Revision 1.0	October 2003
EOP 003	Field Logbook	Revision 1.0	October 2003
EOP 004	Sample Packaging and Shipping	Revision 1.0	October 2003
SOP 5.0[c/]	Sampling Equipment Decontamination	Revision 0	March 2009
EOP 007	Investigation-Derived Waste	Revision 1.0	October 2003
EOP 013	Collecting Samples from Groundwater Monitoring Wells with Dedicated Pumps	Revision 1.0	April 2008
EOP 039	Sample Preservation and Container Requirement	Revision 1.0	October 2003

[a/] OP = Operating procedure

[b/] EOP = USAGYPG environmental operating procedure

[c/] SOP = Parsons standard operating procedure

TABLE B.7.1

OPERATING PROCEDURES

U.S. ARMY GARRISON YUMA PROVING GROUND, YUMA, ARIZONA

Operating Procedure	Number	Comments or Exceptions to Existing Procedures
Sample Labels	USAGYPG EOP-001	Using existing USAGYPG EOP with the following exceptions for field work: • The following text replaces the "Note" regarding duplicate samples in Section 7c: "Each duplicate sample will be given a suffix of FD to indicate that the sample is a duplicate."
Chain of Custody Forms	USAGYPG EOP-002	Using existing USAGYPG EOP.
Field Logbook	USAGYPG EOP-003	Using existing USAGYPG EOP with the following exceptions: • The following text replaces the first paragraph of Section 1: "The purpose of this environmental operating procedure (EOP) is to delineate protocols for the use of a field logbook. Every operation performed on-site that involves data collection will be recorded in a field logbook and/or on data collection field forms (such as field activity reports and boring logs or other sampling forms) to establish field and legal documentation of each condition, activity, or involved personnel that may impact the project outcome or conclusions." • The following text has been inserted as a new bullet in Section 5: "Field forms" • The following text replaces Item v in Section 7:

Operating Procedure	Number	Comments or Exceptions to Existing Procedures
		"v. Field observations (e.g., oily sheen on groundwater sample, odors, etc.), including any unusual or unexpected field conditions encountered." • The following text replaces the first paragraph of Section 7: "All information pertinent to a field survey or sampling effort will be recorded in a bound logbook and/or on data collection forms (e.g., field activity reports, boring logs). Each logbook page will be consecutively numbered, dated, and signed. All entries will be made in indelible ink, and all corrections will consist of single line-out deletions that are initialed and dated. There should be no blank lines on a logbook page, and blank portions of the page should be lined-out with an "X" and then initialed and dated. Where relevant, logbook entries may include but are not limited to the following:" • The following text replaces the last paragraph of Section 7: "Sampling situations vary widely; however, information recorded in field logbooks and/or field forms should be sufficient to permit reconstruction of the event without reliance on the collector's memory." • Section 9 does not apply to work conducted under this program and will not be implemented.
Sample Packaging and Shipping	USAGYPG EOP-004	Using existing USAGYPG EOP. Note that Blue Ice will not be used in sample coolers, since it is typically not sufficient to maintain sample temperatures below the required limit (<4°C±2).
Field Equipment Decontamination	Parsons SOP 5.0	Field equipment decontamination activities will be conducted per Parsons SOP 5.0 rather than existing USAGYPG EOP-005 for Sampling Equipment Decontamination. The Parsons SOP supersedes the USAGYPG EOP for sampling equipment decontamination because metals or organics are not expected in samples to be collected under this sampling program at

Operating Procedure	Number	Comments or Exceptions to Existing Procedures
		concentrations that require dilute acid or solvent decontamination rinses. Therefore, use of these hazardous materials is not necessary, thereby eliminating the potential for accidental release. Otherwise, the Parsons SOP for field equipment decontamination generally follows the corresponding existing USAGYPG EOP.
Investigation-Derived Waste	USAGYPG EOP-007	Using existing USAGYPG EOP with the following exceptions: • The reference to EOP-005 has been eliminated in Item b of the "Equipment Disposition" subsection of Section 7. • Decontamination solutions are referenced in this EOP. Note that the use of dilute acid or solvent for decontamination is not required for sampling to be conducted under this program, as discussed above in the "Field Equipment Decontamination" row of this table.
Collecting Samples from Groundwater Monitoring Wells with Dedicated Pumps	USAGYPG EOP-013	Using existing USAGYPG EOP with the following exceptions: • The following text replaces Item j in Section 2: "Field parameter logbook and/or field forms" • The following text replaces Section 3.2.1: "Use the logbook and field forms to record appropriate information regarding the sampling event." • In Section 3.3.1 under "Groundwater Sampling General Rules," "EOPs" has been changed to "operating procedures." • The following text replaces Section 3.3.7.3: "Place cap on vial and check for air bubbles in the sample. If air bubbles larger than 6 mm are present, dispose of that sample and recollect the sample. Use a new vial for recollection if pre-preserved vials are provided from the laboratory."

Operating Procedure	Number	Comments or Exceptions to Existing Procedures
Sample Preservation and Container Requirements	USAGYPG EOP-039	Using existing USAGYPG EOP with the following exceptions: • The following text replaces the last sentence in the "Preserving Samples" subsection of Section 3: "The sampler must immediately cool all samples between 2^0C and 6^0C except for EnCore™ samplers that must remain frozen from collection to time of analysis."

EOP = Environmental Operating Procedure

IAW = In Accordance With

SOP = Standard Operating Procedure

QA = Quality Assurance

QC = Quality Control

USAGYPG = United States Army Garrison Yuma Proving Ground

UXO = Unexploded Ordnance

WAP = Waste Analysis Plan

YUMA PROVING GROUND
ENVIRONMENTAL OPERATING PROCEDURE
FOR SAMPLE LABELS
EOP-001
Revision 1.0

Prepared by: ______________________________ **Date:** __________

Reviewed by: ______________________________ **Date:** __________
YPG Quality Assurance Officer

Approved by: ______________________________ **Date:** __________
YPG Environmental Sciences Chief

Questions and comments on this EOP may be submitted to the YPG Quality Assurance Officer (QAO), or designee.

U.S. Army Yuma Proving Ground
Environmental Sciences Division

1. SCOPE AND APPLICATION

The purpose of this environmental operating procedure (EOP) is to establish procedures for using sample labels. Every sample will have a sample label uniquely identifying the sampling point and analysis parameters. An example label is included as Attachment A. Other formats with similar levels of detail are acceptable. It must be noted that software production of labels from packages such as FORMS II Lite® are acceptable.

These are standard (i.e. typically applicable) operating procedures that may be vary or change, as required, depending on site conditions, equipment limitation, or limitations imposed by the procedure. In all instances, the ultimate procedures employed in the field should be documented in the field logbook and presented in the final report.

2. METHOD SUMMARY

This method delineates the proper standardized procedures for sample labeling.

3. SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

This section is not applicable to this EOP.

4. INTERFERENCES AND POTENTIAL PROBLEMS

- Sample labels will not be placed over septum caps on volatile samples.

5. EQUIPMENT/APPARATUS

The following standard materials and equipment are recommended for sample labeling activities:

- Sample labels
- Clear tape
- Indelible marker
- Field logbook
- Chain of custody form

6. REAGENTS

This section is not applicable to this EOP.

7. PROCEDURES

The following steps describe how to use the sample labeling system:

a. Pre-printed labels may be prepared prior to entering the field, or filled out in the field during sample collection. Enter the following information on each label:

(1) Project name and number

(2) Unique Sample I.D. – this may include the monitoring well #, surface water sampling location #, soil boring or soil sampling location #, and other pertinent information including reference to site, location on site, and collection dates.

(3) Date of sample collection (mm/dd/yy)

(4) Time of sample collection (24-hour clock)

(5) Type of analyses requested (Note: due to number of analytes, details of analysis should be arranged with lab *a priori)*

(6) If filtered or unfiltered (water samples only)

(7) Preservatives used, if any

(8) Number of containers per sample (*e.g.* 1 of 2, 2 of 2)

(9) Sample type (i.e., discrete or composite)

(10) Sampler's names and signature or initials, or field team leader's name

Note: Some of the information specified above should not be entered until the sample is collected (i.e., date and time of sample collection). Double-check the label information to make sure it is correct. Detach the label, remove the backing, and apply the label to the sample container. Cover the label with clear tape and ensure the tape completely encircles the container.

c. Record the Unique Sample ID and designated sampling point in the field logbook, along with the following sample information:

(1) Time of sample collection (each logbook page should be dated)

(2) The site and location of the sample, as applicable

(3) Organic vapor meter or photo-ionization meter readings for the sample (where appropriate)

(4) Any unusual or pertinent observations (oily sheen on water sample, incidental odors, soil color, grain size, plasticity, etc.)

(5) Number of containers required for each sample

(6) Whether the sample is a QA sample (split, duplicate, or blank)

A typical logbook entry might look like this:

0730 Sample No. MW-3. PID = 35 ppm
Petroleum odor present. Sample ID MW-3-001.

Note: Duplicate samples will be given a non-existent number (sample site or well) rather than simply using the actual number with an added prefix or suffix. This will prevent any indication to the lab that the sample is a duplicate. This fictitious well number will be listed in the logbook as a duplicate along with the actual location of the sample.

d. See EOP-002 for chain of custody entries.

e. Place the sample upright in the designated sample cooler. Make sure there is plenty of ice in the cooler at all times.

8. CALCULATIONS

This section is not applicable to this EOP.

9. QUALITY ASSURANCE/QUALITY CONTROL

All sample labels will be cross-checked against the chain of custody (COC) and the field logbook prior to shipment. This verification will be performed by another member of the sampling team (other than the individual originally labeling the samples, and/or filled out the logbook or COC. The verification shall be noted in the logbook as being performed and by whom.

10. DATA VALIDATION

This section is not applicable to this EOP.

11. HEALTH AND SAFETY

When working with potentially hazardous materials, follow Occupational Safety and Health Administration (OSHA), U.S. Army, corporate, and other applicable health and safety procedures. Decontamination can pose hazards under certain circumstances. Hazardous substances may be incompatible with decontamination materials. For example, the decontamination solution may react with contaminants to produce heat, explosion, or toxic products. Also, vapors from decontamination solutions may pose a direct health hazard to workers by inhalation, contact, fire, or explosion.

12. REFERENCES

U.S. Army Corps of Engineers, *Requirements for the Preparation of Sampling and Analysis Plans*, EM 200-1-3, February 2001.

Appendix A
Example of Information Provided on Sample Labels

Project Name / Number	
Unique Sample ID.	
Sample Date / Time	
Number of Containers	
Sample Type (i.e., discrete or composite)	
Requested Analysis	
Preservatives	
Matrix	
Filtered / Unfiltered	
Sampler Name(s) / Initial(s)	

YUMA PROVING GROUND
ENVIRONMENTAL OPERATING PROCEDURE
FOR CHAIN OF CUSTODY FORMS
EOP-002
Revision 1.0

Prepared by: ______________________________ **Date:** ____________

Reviewed by: ______________________________ **Date:** ____________
Quality Assurance Officer

Approved by: ______________________________ **Date:** ____________
Environmental Sciences Chief

Questions and comments on this EOP may be submitted to the YPG Quality Assurance Officer (QAO), or designee.

U.S. Army Yuma Proving Ground
Environmental Sciences Division

1. SCOPE AND APPLICATION

The purpose of this environmental operating procedure (EOP) is to establish procedures for the use of chain of custody (COC) forms. These forms are written documentation of sample collection and transfer between involved personnel, and sample shipping and receipt by the laboratory for analysis of samples. They also serve as a laboratory analysis request form. Every sample will have an associated COC entry that uniquely identifies the sample and analysis parameters. The COC serves as a legal record of possession of the sample. An example COC is provided in Attachment A. Other formats with similar levels of detail are acceptable. It must be noted that software production of COC forms from packages such as FORMS II Lite® are acceptable.

These are standard (i.e. typically applicable) operating procedures that may be modified, as necessary, dependant upon site conditions and equipment limitation(s) imposed by the procedure. Any procedural modifications should be documented in the field logbook and presented in the final report, when necessary.

2. METHOD SUMMARY

This method delineates the proper standardized procedures for documentation of the chain of custody for samples in the field, field laboratories, and transportation to fixed laboratories.

3. SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

This section is not applicable to this EOP.

4. INTERFERENCES AND POTENTIAL PROBLEMS

Potential problems include:

- Wrong number of samples, or sample containers
- Laboratory Identification incorrect on CoC
- Missing sample data such as date and time
- Ordering wrong analysis or individual analytes

5. EQUIPMENT/APPARATUS

The following standard materials and equipment are recommended for COC activities:

- Indelible marker
- Field logbook
- Chain of custody form

- Zip Lock™ bags

6. REAGENTS

This section is not applicable to this EOP.

7. PROCEDURES

The following steps describe how to use the COC system:

a. Identify the site name and project name/number.

b. Enter the unique sample identification number.

c. Specify sampling dates and times (24-hour clock) for all samples.

e. Indicate whether each sample is a "grab" or "composite" with an "X."

f. Specify sample media for each sample, i.e., soil, water, etc.

g. Enter the number of sample containers per sample and per analyte, and the total number of containers per cooler.

h. List the analyses requested, including method number.

i. Specify types of preservatives used, if any, including temperature

j. Include report requirements, turnaround times, and any special instructions/comments to the laboratory, if applicable.

k. State the carrier service and airbill number, analytical laboratory, and custody seal numbers (where applicable).

k. Sign, date, and time the "relinquished by" section.

l. Obtain the signature of sample team leader

n. Upon completion of the form, retain the shipper copy, and affix the other copies to the inside of the sample cooler, in a zip seal bag to protect from moisture, to be sent to the designated laboratory.

o. Each time control of the samples is given to another individual, the COC must be signed and dated by the accepting entity (i.e. laboratory, other employees).

8. CALCULATIONS

This section is not applicable to this EOP.

9. QUALITY ASSURANCE/QUALITY CONTROL

All COC forms will be verified by at least one other member of the sampling team. Both signatures will be present on the chain of custody.

10. DATA VALIDATION

The chain of custody will be validated within 1 day of receipt by the laboratory receiving to ensure proper receipt. This will be accomplished by requesting a fax copy of the received CoC upon complete check in of samples. This validation is required by the sample team leader and is required to be noted in the project field logbook, with a copy of the CoC in the project files.

11. HEALTH AND SAFETY

When working with potentially hazardous materials, follow Occupational Safety and Health Administration OSHA), U.S. Army, corporate, and other applicable health and safety procedures.

12. REFERENCES

U.S. Army Corps of Engineers, *Requirements for the Preparation of Sampling and Analysis Plans*, EM 200-1-3, February 2001.

YUMA PROVING GROUND
ENVIRONMENTAL OPERATING PROCEDURE
FOR FIELD LOGBOOK
EOP-003
Revision 1.0

Prepared by: ______________________________ **Date:** ____________

Reviewed by: ______________________________ **Date:** ____________
Quality Assurance Officer

Approved by: ______________________________ **Date:** ____________
Environmental Sciences Chief

Questions and comments on this EOP may be submitted to the YPG Quality Assurance Officer (QAO), or designee.

U.S. Army Yuma Proving Ground
Environmental Sciences Division

1. SCOPE AND APPLICATION

The purpose of this environmental operating procedure (EOP) is to delineate protocols for the use of a field logbook. Every operation performed on-site that involves data collection will be noted in a field logbook to establish field and legal documentation of each condition, activity, or involved personnel that may impact the project outcome or conclusions.

These are standard (i.e. typically applicable) operating procedures, which may be varied or changed as required, dependent upon site conditions, equipment limitation, or limitations imposed by the procedure. In all instances, the ultimate procedures employed will be documented in the logbook and provided in the final report.

2. METHOD SUMMARY

This method delineates the proper standardized procedures for documentation of the field activities performed during the sample collection process.

3. SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

This section is not applicable to this EOP.

4. INTERFERENCES AND POTENTIAL PROBLEMS

This section is not applicable to this EOP.

5. EQUIPMENT/APPARATUS'

The following standard materials and equipment are recommended for logbook activities:

- Indelible marker
- Field logbook

6. REAGENTS

This section is not applicable to this EOP.

7. PROCEDURES

All information pertinent to a field survey or sampling effort will be recorded in a bound logbook. Each page/form will be consecutively numbered, dated, and signed. All entries will be made in indelible ink and all corrections will consist of single line-out deletions that are initialed and dated. The person making the correction will provide a brief explanation for the change. There should be no blank lines on a page. A single blank line or a partial blank line (such as at the end of a paragraph) should be lined to the end of the page. If only part of a page is used, the remainder of the page should have an "X" drawn across it. Where relevant, entries in the logbook will include but not be limited to the following:

a. Project number / project name

b. Date and time of arrival

c. Unique field sample number

d. Purpose of sampling

e. Location, description, and log of photographs of each sampling point

f. Details of the sample site (for example, the elevation of the casing, casing diameter and depth, integrity of the casing, etc.)

g. Name and address sampling team leader

h. Documentation of procedures for preparation of reagents or supplies that become an integral part of the sample (e.g., filters and absorbing reagents)

i. Identification of sample field crew members

j. Names, affiliations, and purpose of all site visitors

k. Type of sample (e.g., groundwater or surface water)

l. Level of PPE worn at the site

m. Suspected media/waste composition

n. Weather conditions on day of sampling and any additional environmental conditions or observations pertinent to the field activities

o. Number and volume of sample taken

p. Sampling methodology, including distinction between grab and composite sample

q. Sample preservation (if none, state none)

r. Time of collection (24-hour clock)

s. Collector's sample identification number(s)

t. Sample shipment data (e.g.,: number of containers, COC numbers, name of the laboratory, and cartage agent with tracking numbers: Federal Express, United Parcel Service, etc.)

u. References such as maps of the sampling site and global positioning system (GPS) readings to describe sample location

v. Field observations (e.g., oily sheen on groundwater sample, incidental odors, soil color, grain size, plasticity, moisture content, layering, U.S.C.S. classification, etc.)

w. Record information on scheduling modifications, change orders, sampling or drilling decisions/changes

x. Any field measurements made (for example, pH, conductivity, explosivity, water depth, organic vapor analyzer (OVA) readings, etc.)

y. Signature and date by the personnel responsible for observations

z. Decontamination procedures

Sampling situations vary widely. However, records should contain sufficient information so that someone may reconstruct the sampling activity without relying on the collector's memory. The Project Manager will maintain a master index of all field logbooks assigned to specific projects. One logbook kept by the Project Manager will include a master site log of daily activities and will include an index of field logbooks assigned to specific activities or projects.

8. CALCULATIONS

This section is not applicable to this EOP.

9. QUALITY ASSURANCE/QUALITY CONTROL

All field logbooks will be verified by at least one other member of the sampling team. This verification will be evidenced by signature daily.

10. DATA VALIDATION

This section is not applicable to this EOP.

11. HEALTH AND SAFETY

When working with potentially hazardous materials, follow OSHA, U.S. Army, corporate, and other applicable health and safety procedures.

12. REFERENCES

U.S. Army Corps of Engineers, *Requirements for the Preparation of Sampling and Analysis Plans*, EM 200-1-3, February 2001.

YUMA PROVING GROUND
ENVIRONMENTAL OPERATING PROCEDURE FOR SAMPLE PACKAGING AND SHIPPING
EOP-004
Revision 1.0

Prepared by: ______________________________ **Date:** ____________

Reviewed by: ______________________________ **Date:** ____________
Quality Assurance Officer

Approved by: ______________________________ **Date:** ____________
Environmental Sciences Chief

Questions and comments on this EOP may be submitted to the YPG Quality Assurance Officer (QAO), or designee.

U.S. Army Yuma Proving Ground
Environmental Sciences Division

1. SCOPE AND APPLICATION

The purpose of this environmental operating procedure (EOP) is to delineate protocols for the packaging and shipping of samples to a laboratory.

This procedure must be used in conjunction with the appropriate sections of 49 CFR and the Dangerous Goods Regulations. These regulations only apply to materials meeting specific criteria for the definition of hazardous materials for shipping purposes.

These are standard (i.e. typically applicable) operating procedures, which may be varied or changed as required, dependent upon site conditions, equipment limitation, or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented in the field logbook and the final report, where necessary.

2. METHOD SUMMARY

This method delineates the proper standardized procedures for shipment of samples.

3. SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

This section is not applicable to this EOP.

4. INTERFERENCES AND POTENTIAL PROBLEMS

Any samples suspected to be of medium/high contaminant concentration or containing dioxin must be enclosed in a metal can with a clipped or sealable lid (e.g., paint cans). Label the outer metal container with the sample number of the sample contained inside.

5. EQUIPMENT/APPARATUS

The following standard materials and equipment are recommended for sample packaging and shipment activities:

- Indelible marker
- Field logbook
- Waterproof coolers (hard plastic or metal)
- Metal cans with friction-seal lids (e.g. paint cans)
- Custody seals
- Packing material (e.g., bubble wrap or vermiculite
- Ice (cubed, shaved, crushed, packed, and, if required, blocks)

- Plastic garbage bags
- Clear tape
- Zip-seal plastic bags (waterproof)
- Sample documentation

6. REAGENTS

This section is not applicable to this EOP.

7. PROCEDURES

a. Check sample temperature <4°C and bottle lids for tightness. Also, verify that sample label is complete.

b. Wrap each sample container in bubble wrap, snakeskin bottle protectors, or closed cell foam sheets. (Steps b & c may be interchanged as required)

c. Enclose each sample in a clear zip-seal plastic bag. Squeeze as much air as possible from bag and seal the bag. (Steps b & c may be interchanged as required)

d. For commercial coolers, tape drain plugs inside and out and line the cooler with a large plastic garbage bag. Place at least 1-in of cushioning on the bottom of the cooler. Place the sample containers upright in the cooler in a manner that containers will not touch each other during shipment.

e. Double-bag and seal loose ice to prevent melting ice from soaking the packing material. All environmental sample containers should be shipped to the laboratory on ice and chilled to 4°C±2°C. Place the ice outside the garbage bags containing the samples. Also, include a vial filled with water for use as a temperature blank for the receiving laboratory and note on the COC.

f. Pack shipping containers with packing material (e.g., closed-cell foam, vermiculite, or bubble wrap) taking care to minimize void space. Place the packing material around the sample bottles or metal cans to avoid breakage during shipment.

g. Enclose all sample documentation (e.g., field parameter forms, COCs) in a waterproof plastic bag, and tape the bag to the underside of the cooler lid. If more than one cooler is being used, each cooler will have its own documentation.

h. Seal the coolers with signed and dated custody seals so that if the cooler were opened, the custody seal would be broken (one on the front and one on the back). Place clear tape over the custody seal to prevent damage to the seal.

   Refer to EOPs-001 (Sample Labels), -002 (Chain of Custody), -003 (Field Logbook), and -039 (Sample Preservation and Container Requirements).

i. Tape the cooler shut with packing tape over the hinges and place tape over the cooler drain.

j. Ship all samples, whenever possible, via overnight delivery on the same day they are collected (as required by sampling plan and/or sample holding times).

8. CALCULATIONS

This section is not applicable to this EOP.

9. QUALITY ASSURANCE/QUALITY CONTROL

Project sample shipments and documentation will be verified by at least one other member of the sampling team prior to sealing the cooler.

10. DATA VALIDATION

This section is not applicable to this EOP.

11. HEALTH AND SAFETY

When working with potentially hazardous materials, follow Occupational Safety and Health Administration (OSHA), U.S. Army, Corporate, and other applicable health and safety procedures.

12. REFERENCES

Arizona Administrative Code R-18-8-261.A (40 CFR § 261.4(d))

U.S. Army Corps of Engineers, *Requirements for the Preparation of Sampling and Analysis Plans*, EM 200-1-3, February 2001.

U.S. Department of Transportation, *Title 49 Code of Federal Regulations, sections 101 to 200*, Current Revision.

International Air Transport Association, *Dangerous Goods Regulations*, Current Edition.

STANDARD OPERATING PROCEDURE

5.0

FIELD EQUIPMENT DECONTAMINATION

Revision: 0

Date Effective: March 2009

US ARMY GARRISON YUMA PROVING GROUND

Yuma, Arizona

1.0 OBJECTIVE

The objective of this procedure is to describe the requirements for decontamination of field environmental sampling equipment.

2.0 BACKGROUND

Decontamination of field equipment is necessary to ensure the quality of samples by preventing cross-contamination. Further, decontamination reduces health hazards and prevents the spread of contaminants off-site.

3.0 RESPONSIBILITY

Field Operations Manager: The Field Operations Manager is responsible for ensuring that field personnel are trained in the use of this procedure and that decontamination is conducted in accordance with this procedure.

QC Field Coordinator: The QC Field Coordinator is responsible for verifying that this procedure is correctly implemented. The QC Field Coordinator (or other qualified field personnel) may also be required to collect and document rinsate samples to provide quantitative verification that these procedures have been correctly implemented.

4.0 REQUIRED EQUIPMENT

4.1 Large Equipment

Large equipment includes:

- Drilling rigs, backhoes, augers, drill pipe, bits, casing, and screen
- High-pressure or steam-spray unit
- 2- to 5-gallon manual-pump sprayer (pump sprayer material must be compatible with the solution used)
- Plastic sheeting
- Potable water
- Stiff-bristle brushes
- Gloves, goggles, boots, and other protective clothing as specified in the project Health and Safety Plan

4.2 Small Equipment

Small equipment includes:

- Split spoons or other samplers, bailers, compositing bowls, spatulas, spoons, trowels, filtration equipment, and other reusable utensils or items that directly contact samples
- Plastic sheeting
- 5-gallon plastic buckets
- Phosphate-free detergent
- Stiff-bristle brushes
- Nalgene or Teflon sprayers or wash bottles, or 2- to 5-gallon manual-pump sprayer (pump sprayer material must be compatible with the solution used)
- Disposable wipes, paper towels, or clean rags
- Potable water
- Distilled water
- Disposable wipes, paper towels, or clean rags
- Gloves, goggles, and other protective clothing as specified in the project Health and Safety Plan

4.3 Pumps and Pump Assemblies

The required equipment for decontamination of pumps and pump assemblies include:

- Applicable sized containers (5-gallon or 30-40 gallon)
- Plastic sheeting
- 5-gallon (or larger) containers of potable water
- Stiff-bristle brushes
- Disposable wipes, paper towels, or clean rags
- Gloves, goggles, and other protective clothing as specified in the project Health and Safety Plan

5.0 PROCEDURES

5.1 Heavy Equipment Decontamination

Heavy equipment includes drilling rigs and backhoes. The following steps must be followed when decontaminating this equipment:

1. Set up a decontamination pad that is large enough to fully contain the equipment to be cleaned. Use one or more layers of heavy plastic sheeting to cover the ground surface. Raise the edges of the pad using wood or other material such that a berm is created to contain rinse water. Slope the pad towards one corner which will act as a sump to facilitate collection of liquids generated during decontamination.
2. Don gloves, boots, goggles, and any other personal protective equipment as specified in the project Health and Safety Plan.
3. With heavy equipment in place, spray areas and surfaces (e.g., rear of rig, backhoe bucket, etc.) exposed to contaminated soils using a steam unit or high-pressure sprayer. Use steam units and sprayers in accordance with the project Health and Safety Plan.
4. If soapy water was used for the washdown step, rinse the equipment with potable water.
5. Remove equipment from the decontamination pad and allow to air dry before returning it to the work site.
6. Record equipment type, date, time, and method of decontamination in the appropriate logbook.
7. After each use, properly collect all contaminated waters, sludge, and disposable gloves, boots, and clothing, and dispose in accordance with Section 5.5 below.

5.2 Downhole Equipment Decontamination

Downhole equipment includes hollow-stem augers, drill pipe, bits, casing, and screen. The following steps must be followed when decontaminating this equipment:

1. If possible, use heavy equipment decontamination pad or create a centralized decontamination area set up to contain contaminated rinse water and minimize the spread of airborne spray.
2. Set up a "clean" area upwind of the decontamination area to receive cleaned equipment for air drying. At a minimum, clean plastic sheeting must be used to cover the ground, tables, or other surfaces on which decontaminated equipment is to be placed.
3. Don gloves, boots, goggles, and any other personal protective equipment as specified in the project Health and Safety Plan.
4. Place object to be cleaned on metal or wooden sawhorses or other supports.
5. Using a high-pressure sprayer or steam unit, spray the contaminated equipment. Use steam units and sprayers in accordance with the project Health and Safety Plan. Aim downward to avoid spraying outside the decontamination area. Be sure to spray inside the piping or augers, corners, and gaps. Use a brush, if necessary, to dislodge dirt.
6. If using soapy water, rinse the equipment using clean water.

7. Remove the equipment from the decontamination area and place in the clean area to air-dry.
8. If necessary, wrap clean downhole equipment in plastic or use other protective material, as feasible, to ensure that it does not become dirty prior to next use.
9. Record the equipment type, date, time, and method of decontamination in the appropriate logbook.
10. After decontamination activities are completed, properly collect all contaminated waters, sludge, plastic sheeting (unless it will be reused at the decontamination pad), and disposable gloves, boots, and clothing and dispose in accordance with Section 5.5 below.

5.3 Sampling Equipment Decontamination

Sampling equipment includes split spoons or other samplers, spatulas, spoons, trowels, compositing bowls, filtration equipment, and other reusable utensils or items that directly contact samples. The following steps must be followed when decontaminating this equipment:

1. Set up a decontamination line on plastic sheeting. The decontamination line should progress from dirty to clean and end with an area for drying decontaminated equipment. At a minimum, clean plastic sheeting must be used to cover the ground, tables, or other surfaces on which decontaminated equipment is to be placed.
2. Don gloves, boots, goggles, and any other personal protective equipment as specified in the project Health and Safety Plan.
3. Wash the item thoroughly in a 5-gallon bucket of soapy water. Use a stiff-bristle brush to dislodge any clinging dirt. If possible, disassemble any items that might trap contaminants internally before washing. Do not reassemble until decontamination is complete.
4. Rinse the item in a 5-gallon bucket of potable water. Rinse water should be replaced as needed, generally when cloudy.
5. Rinse with distilled/ deionized water.
6. If necessary, wrap clean sampling equipment in plastic or use other protective material, as feasible, to ensure that it does not become dirty prior to next use.
7. Record the decontamination protocol, equipment, or description together with the date and time of decontamination in the appropriate logbook.
8. After decontamination activities are completed, properly collect all contaminated waters, plastic sheeting, and disposable gloves, boots, and clothing and dispose in accordance with Section 5.5 below.

5.4 Groundwater Sampling Pump Decontamination

The following steps must be followed when decontaminating pumps, if required:

1. Set up decontamination area and separate clean storage area using plastic sheeting to cover the ground, tables, and other porous surfaces. Set up three containers in a triangle. The two containers at the base of the triangle will be used to contain dilute (non-foaming) soapy water and the other potable water. The drum at the apex will receive wastewater. Place 5-gallon cans of potable water adjacent to the water container on the same side as the potable water container.
2. Don gloves, boots, goggles, and any other personal protective equipment as specified in the project Health and Safety Plan.
3. Pump should be set up in the same configuration as for sampling. Submerge pump intake and all downhole wetted parts (tubing, piping, foot valve, etc.) in soapy water of the first container. Place the discharge outlet in the waste container above the level of wastewater. Pump soapy water through the pump assembly until it discharges to the waste container.
4. Move pump assembly to the potable water container while leaving discharge outlet in the waste container. All downhole wetted parts must be immersed in the potable water rinse. Pump potable water through the pump assembly until it runs clear.
5. Decontaminate the discharge outlet by hand following the steps outlined in Section 5.3, Item 3 of this SOP.
6. Remove the decontaminated pump assembly to the clean area and allow to air-dry. Intake and outlet orifices should be covered to prevent the entry of airborne contaminants and particles.
7. Record the equipment type and identification, date, time, and method of decontamination in the appropriate logbook.
8. After decontamination activities are completed, properly collect all contaminated waters, plastic sheeting, and disposable gloves, boots, and clothing and dispose in accordance with Section 5.5 below.

5.5 Waste Disposal

The following steps must be followed when disposing of wastes:

1. All wash water and rinse water that have come in contact with contaminated equipment are to be handled, packaged, labeled, marked, documented, stored, and disposed of as investigation-derived waste unless other arrangements are approved in advance.
2. Place contaminated items in properly labeled drums for disposal. Liquids and solids must be drummed separately.

3. If large quantities of used decontamination solutions are generated, segregate each type of waste in separate containers. This may permit the disposal of wash water and rinse water in a sanitary sewage treatment plant rather than as a hazardous waste.
4. Unless required, plastic sheeting and disposable protective clothing may be treated as a solid non-hazardous waste, and disposed accordingly.

5.6 Documentation

- Record decontamination process in the field log book as described above in this SOP.

6.0 RESTRICTIONS/LIMITATIONS

The following restrictions/limitations apply to these field equipment decontamination procedures:

- When feasible, use of disposable equipment is recommended to minimize the extent of decontamination required.
- Sensitive, non-waterproof, or other equipment that cannot be extensively decontaminated should be used in a manner that prevents contamination to the greatest possible extent (e.g., wrapping delicate instruments in plastic bags during use on-site). If decontamination is necessary despite these efforts, a damp cloth should be used to wipe any potential contaminated portions of such equipment.
- Equipment rinsate blank quality control samples will be collected in accordance with the Quality Assurance Project Plan to determine the effectiveness of field equipment decontamination. Equipment rinsate blanks will be obtained by pouring distilled/deionized water over decontaminated sampling equipment and collecting it in appropriate sampling containers for analysis, to determine if residual contamination is present. These samples will be handled, packaged, and shipped in a manner identical to that used for environmental samples.

YUMA PROVING GROUND
ENVIRONMENTAL OPERATING PROCEDURE FOR INVESTIGATION-DERIVED WASTE
EOP-007
Revision 1.0

Prepared by: ______________________________ **Date:** ____________

Reviewed by: ______________________________ **Date:** ____________
Quality Assurance Officer

Approved by: ______________________________ **Date:** ____________
Environmental Sciences Chief

Questions and comments on this EOP may be submitted to the YPG Quality Assurance Officer (QAO), or designee.

U.S. Army Yuma Proving Ground
Environmental Sciences Division

1. SCOPE AND APPLICATION

The purpose of this environmental operating procedure (EOP) is to provide guidance regarding the management of potentially-contaminated materials generated during environmental site investigations.

Investigation-derived waste (IDW) is waste generated during the process of sampling/investigating a site to determine if hazardous constituents are present. Examples of investigation-derived waste include soil cuttings, drilling muds, purgewater, decontamination fluids, personal protective equipment (PPE), and disposable sampling equipment.

Yuma Proving Ground (YPG) intends that the management of IDW be performed:

- To conform to State and Federal Regulations
- To protect human health and the environment, and accordingly result in no additional site related risks than existed prior to investigation activities;
- In a cost effective manner , considering the likely site remedy (if known) and waste minimization techniques; and
- In a manner consistent with all applicable or relevant and appropriate requirements to the extent practicable.

These are standard (i.e. typically applicable) operating procedures, which may be varied or changed as required, dependent upon site conditions, equipment limitation, or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented in the field logbook and the final report.

2. METHOD SUMMARY

Field investigation activities (e.g., Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI), Comprehensive Environmental, Response, Compensation, and Liability Act (CERCLA) remedial investigation/feasibility studies (RI/FS) and remedial designs) may result in the generation of waste materials that must be properly managed. This IDW may include drilling muds, cuttings, and purge water from test pit and well installation; purgewater, soil, and other materials from collection of samples; residues (e.g., ash, spent carbon, well development purge water) from testing of treatment technologies and pump and treat systems; contaminated personal protective equipment (PPE); and solutions (aqueous or otherwise) used to decontaminate non-disposable protective clothing and equipment. The management of IDW must ensure protection of human health and the environment and comply with (or waive) regulatory requirements.

3. SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

This section is not applicable to this EOP.

4. INTERFERENCES AND POTENTIAL PROBLEMS

Evaluating disposal options for RCRA is important because it includes land disposal restriction (LDR) regulations that prohibit the placement of hazardous wastes into or onto the ground unless specific treatment standards are met.

LDRs are not applicable unless the answer to all three of the following questions is yes:

- Does the anticipated management practice constitute land disposal?
- Is the IDW a RCRA hazardous waste?
- Is the RCRA hazardous waste regulated under the land disposal restrictions?

Unexploded ordinance encountered and/or extracted from a site must be managed on a site-specific basis under the direction of personnel from the YPG Ammunition Management Branch.

5. EQUIPMENT/APPARATUS

The following standard materials and equipment are recommended for IDW container labeling activities:

- Drum labels
- Clear tape
- Indelible marker
- Field logbook
- 55-gallon drums or smaller, as needed
- Low-permeability synthetic sheeting of thickness no less than 4 mils
- Department of Transportation (DOT)-approved shipping containers
- Shipping manifests or bills of lading, as applicable

6. REAGENTS

This section is not applicable to this EOP.

7. PROCEDURES

The sub-paragraphs in this Section provide a general discussion of the waste (soil, liquid, solid, personal protective equipment (PPE), and equipment), characterization of the waste and disposal options. See Table 1 (Appendix A) for specifics.

Best Management Practices (BMPs) developed for the treatment, storage, and disposal of special wastes should be followed for IDW. Petroleum Contaminated Soil (PCS) must be handled as special waste and treated, stored, or disposed at an Arizona Departmental of Environmental Quality (ADEQ)-approved PCS facility.

In many cases, environmental media (e.g., soil, purgewater) may be left at the site since is may not be defined as hazardous waste.

SOIL.

a. Soil. Soil may be generated during a project in the form of environmental samples, drill cuttings, or excavated soil. Characterization of soil generated during a project is required whenever there is historical, visual, or other detectable evidence that contamination may be present. If monitoring indicates an airborne hazard, soil should be containerized to prevent exposure to the contamination. If monitoring does not indicate an airborne hazard, soil may be stockpiled in a way to minimize spread of contamination until characterization is complete (i.e., on a tarp and covered).

b. Characterization. Large volumes of soil are generally characterized by analyzing composite samples. The number of composite samples required to characterize a given volume of soil is generally site-specific based on environmental laws and regulations. When multiple types of contaminants are suspected, characterization should be prioritized based on hazard level, beginning with the greatest hazard level. Soil with contamination exceeding the concentrations specified under RCRA will be classified as hazardous waste and managed accordingly. Soil determined to be "clean" will be disposed of on-site.

c. Decontamination and Disposal. Hazardous waste (HW) soil found during investigations will be segregated, protected, and disposed of in accordance with RCRA regulations defined for characteristically-hazardous waste.

LIQUID WASTE

a. Liquid waste may be generated during a project in the form of environmental samples, drilling fluids, and/or decontamination water. Liquid waste will be containerized and managed as IDW until characterization is complete.

b. Characterization. Liquid waste will be characterized by analyzing representative samples of the generated waste for any suspected contamination.

c. Disposal. Liquid waste which is determined to have contamination levels above the site specific action levels will be classified as hazardous waste and managed in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Recovery and Conservation Act (RCRA), and other environmental laws and regulations, as appropriate.

NON-LIQUID WASTE.

a. Non-liquid waste may be generated during a project in the form of recovered debris (e.g., metal, glass, wood) resulting from former site activities. All recovered scrap will be managed as IDW if determined to be a waste. However, scrap should be segregated and managed based on possible contamination until it has been characterized.

b. Characterization.

(1) Ordinance and explosive (OE)-related scrap. OE-related scrap must be visually inspected to determine if an explosive hazard is present. If present, the explosive hazard must be mitigated

prior to disposal. Ammunition Management Branch must certify all OE-related scrap to be free of an explosive hazard prior to disposal.

(2) Scrap that has other indications that it may be contaminated (e.g., biological waste, visual contamination, air monitoring indicators) will be managed as a hazardous waste.

c. Disposal. Contaminated scrap classified as hazardous waste will be managed in accordance with RCRA, and other environmental laws and regulations as appropriate. Scrap that is determined to be free of contamination may be disposed of in a sanitary or industrial landfill. Whenever possible, scrap that is uncontaminated will be recycled.

PERSONAL PROTECTIVE EQUIPMENT (PPE).

a. PPE is a generated waste when it is consumable, requiring disposal after its use is finished or when it becomes contaminated with HTRW and decontamination of the PPE is not possible or cost effective.

b. Decontamination and Disposal. Contaminated PPE will be classified as hazardous waste and managed in accordance with RCRA, and other environmental laws and regulations as appropriate. PPE that has not been in contact with agent liquid or vapor may be disposed of in a sanitary or industrial landfill. Unusable equipment will be deemed waste and disposed of in accordance with RCRA regulations if determined to be RCRA characteristically-hazardous.

EQUIPMENT DISPOSITION.

a. Equipment is classified as either consumable or durable goods. Some examples of consumable goods are PPE and sampling equipment. Heavy equipment is an example of durable goods.

b. Decontamination and Disposal. Contaminated reusable equipment shall be decontaminated where practicable following guidance provided under EOP-005. An evaluation of the cost effectiveness of decontamination versus disposal may be necessary for certain durable items contaminated with particular classes of chemicals.

8. CALCULATIONS

This section is not applicable to this EOP.

9. QUALITY ASSURANCE/QUALITY CONTROL

This section is not applicable to this EOP.

10. DATA VALIDATION

This section is not applicable to this EOP.

11. HEALTH AND SAFETY

When working with potentially hazardous materials, follow Occupational and Health Administration (OSHA), U.S. Army, corporate, and other applicable health and safety procedures. Decontamination can pose hazards under certain circumstances. Hazardous substances may be incompatible with decontamination materials. For example, the decontamination solution may react with contaminants to produce heat, explosion, or toxic products. Also, vapors from decontamination solutions may pose a direct health hazard to workers by inhalation, contact, fire, or explosion.

12. REFERENCES

Arizona Department of Environmental Quality, *Investigation Derived-Wastes (IDW) Policy*, May 1997.

Colorado Department of Health, *Interim Final Policy and Guidance on Management of Investigation Derived Wastes (IDW) at RCRA Facilities*, Undated.

Rhode Island Department of Environmental Management, Office of Waste Management, *Guidelines for the Management of Investigation Derived Wastes*, January 1995.

U.S. Army Corps of Engineers, *Management of Investigation-Derived Waste from Site Inspections,* Environmental Regulatory, Fact Sheet 92-02.

U.S. Environmental Protection Agency, *Guide to Management of Investigation–Derived Wastes*, Fact Sheet 9345.3-03FS

APPENDIX A

Table 1: IDW MANAGEMENT OPTIONS

Type of IDW	Generation Processes[1]	Management Options
Soil	• Well/test pit installation • Borehole drilling • Soil sampling	• Return to boring, pit, or source immediately after generation • Spread around boring, pit, or source Consolidate in a pit • Send to on-site TDU[2] • Send to off-site TDU • Store for future treatment and/or disposal
Sludges/sediment	• Sludge pit/sediment sampling	• Return to boring, pit, or source immediately after generation • Send to on-non-hazardous waste disposal • Send to off-site TDU • Store for future treatment and/or disposal
Aqueous liquids (ground water, surface water, drilling fluids, other wastewaters)	• Well installation/development • Well purging during sampling • Ground water discharge during pump tests • Surface water sampling	• Pour onto ground close to well (non-hazardous waste) • Send to on-site non-hazardous waste disposal • Send to off-site TDU unit • Send to on-site POTW[2] • Store for future treatment and/or disposal
Decontamination fluids	• Decontamination of PPE[2] and equipment	• Send to on-site TDU • Evaporate (for small amounts of low contamination organic fluids) • Send to TDU off site immediately • Store for future treatment and/or disposal
Disposable PPE	• Sampling procedures or other onsite activities	• Send to on-site TDU • Place in on-site industrial dumpster • Send to TDU off site immediately • Store for future treatment and/or disposal

1) The generation processes listed here are provided as examples. IDW may also be produced as a result of activities not listed here.

2) AOC: Area of Contamination (AOCs at a site may not yet have been identified at the time of the RI/FS).
TDU: Treatment/disposal Unit; POTW: Publicly Owned Treatment Works; PPE: Personal Protective Equipment

ENVIRONMENTAL OPERATING PROCEDURE FOR COLLECTING SAMPLES FROM GROUNDWATER MONITORING WELLS WITH DEDICATED PUMPS EOP-013

U.S. Army Yuma Proving Ground
Environmental Sciences Division

1. SCOPE AND APPLICATION

The purpose of this Environmental Operating Procedure (EOP) is to delineate protocols for the collection of groundwater samples from monitoring wells.

2. MATERIAL

a. Meter(s) capable of measuring pH, conductivity (specific conductance), temperature, dissolved oxygen (DO), and oxidation/reduction potential (ORP)

b. Water-level indicator

c. Bailers (stainless steel, teflon, or disposable)

d. Dedicated pumps (centrifugal or bladder)

e. Generator(s)

f. Rope

g. 0.45 micron disposable filters and flasks (disposable)

h. Sample bottles and labels (bottles provide by the analytical laboratory)

i. Logbook

j. Field parameter logbook

k. Photoionization detector (PID)

l. Sterile gloves (nitrile or latex)

3. PROCEDURE

3.1 General: Groundwater sampling will follow these general steps:

a. Arrive on site

b. Check well head with PID upon opening protective casing

c. Set up apparatus (generator, etc)

d. Sample non-aqueous phase liquid (NAPL) if necessary

e. Begin purge procedure in accordance with the work plan

f. Collect samples

g. Dispose of waste and move equipment to next monitoring well.

3.2 General Rules for Groundwater Field Parameter Logbook

3.2.1 Use the logbook to record appropriate information for the sampling event.

3.2.2 Blank lines in the middle or at the bottom of a page should be striken through and initialed.

3.2.3 Use indelible ink

3.2.4 Use a logbook with waterproof pages

3.2.5 Record the names of the sampling team for day

3.2.6 Record the weather conditions at the start of the day

3.2.7 Brief description of the tailgate safety topic for the day

3.2.8 Record, at a minimum, time of departure, setup, start of purge, sample collection, and time of return

3.2.9 Record the names and affiliations of any visitors to the site.

3.3 Groundwater Sampling General Rules

3.3.1 Refer to EOPs for logbooks, instrument calibration, sample labels, sample packaging, and decontamination.

3.3.2 Groundwater samples will be collected from the least contaminated well first, progressing to the most contaminated (or presumed least to most during the first sampling event).

3.3.3 Upon arrival at the well site, immediately set up and organize the purging, sampling, and filtration equipment (if required). If needed, use plastic sheeting to protect equipment that is required to be placed on the ground.

3.3.4 When a pump is used, try to keep the generator approximately 15 feet from the sampling point.

3.3.5 Glove. Check well headspace for organic vapor which may pose a health and safety hazard and indicate the presence of NAPL. Measure depth to water and depth and thickness of NAPL, if present. Calculate the equivalent volume of water in the well using appropriate calculations or tables.

3.3.6 Samples will be collected in order of decreasing volatility, i.e. volatile organic compounds will be collected first and should be collected at a rate of about 100 ml/minute.

3.3.7 When collecting sample for volatile analysis care should be taken to prevent loss by volatilization. The following should be followed when collecting these samples:

3.3.7.1 Avoid excessive aeration and agitation of sample.

3.3.7.2 Fill vial so that a meniscus is present by adjusting the flow rate into the sample container.

3.3.7.3 Place the cap on the vial and check for air bubbles in the sample. If air bubbles larger than 6 mm are present, dispose of that sample and recollect the sample in the same vial.

3.3.7.4 Make sure the vial is labeled and immediately transfer the vial to the cooler with ice.

3.3.9 Filtered samples will be taken for some inorganic (metals) analyses. The sample will be filtered using disposable 0.45 micron filters and a hand pump to create a vacuum, or an equivalent method subject to prior approval.

3.3.10 Unfiltered samples will be collected by pouring the sample water in the appropriate sample container, being careful not to agitate or cause bubbles to form. Do not overfill bottles. Make sure sample bottle is labeled and the cap is on tightly. Place samples in the cooler with ice as soon possible.

3.3.11 All samples will be delivered to the laboratory as soon as possible. If possible, samples will be shipped on the same day as they are collected. If samples must be retained due to weekend sampling, the lab shall be notified in advance.

3.3 Sampling of Non-Aqueous Phase Liquids

3.3.1. If NAPLs are found in the well, a sample from all layers may be collected prior to purging activities. NAPL may be indicated by the presence of volatiles in the well headspace, and confirmed by the oil/water interface probe.

3.3.1.1 Collecting Light NAPL (LNAPL) will be accomplished using a transparent bailer with a double check valve. This bailer will be slowly lowered until the bottom of the bailer is 1-2 inches below the LNAPL-water interface. Verify that the interface was sampled by visual inspection of the bailer contents.

3.3.1.2 Collecting dense NAPL (DNAPL) will be accomplished using a transparent bailer with a double check valve. The bailer must be lowered very slowly to the bottom of the well and raised slowly out of the well. Sample for analysis as above.

3.4 Well Purging – General Rules

Water within the casing of a well may stagnate, degas, lose volatiles, possibly precipitate metals due to changes in redox potential, and may react with the screen and/or casing material. It is therefore necessary to purge a sufficient volume of this stagnant water from the well casing and/or sand pack to ensure that a representative sample of formation water can be collected. Traditionally, the volume of water to be purged was arbitrarily set to 3 to 5 equivalent volumes. Advances in sampling technologies have led to changes in this volume and for this reason monitoring of select chemical and physical properties of the sample matrix will be used instead of strict volumes to determine when a representative sample may be collected from a well.

3.4.1 Acceptable purge and sampling devices include but are not limited to: bailers, high discharge pumps, and variable speed, low flow pumps which include both submersible pump and dedicated bladder pumps. Due to the extreme depth to groundwater in many areas of the U.S. Army Yuma Proving Ground (less than 30 feet to greater than 500 feet), high discharge pumps may be the only means for collecting a sample in a timely manner.

3.4.2 Purging will be accomplished with either a dedicated submersible pump, a non-dedicated submersible pump, a low flow (bladder or other) pump, or bailer or other approved device.

3.4.3 Purging be accomplished with as little disturbance to the surrounding formation as possible.

3.4.4 Purge water will be disposed in accordance with the Arizona policy on disposal of Investigation Derived Waste.

3.4.5 Wells with very low recharge rates will be sampled after the well has been purged once to dryness and allowed to recover a sufficient volume to collect the required suite. Wells that have been purged to dryness should be sampled within 24 hours of the purge. Note the time in the logbook.

3.4 Purging and Sampling

3.4.1 Bailers may be used for both purging and sampling wells if: a) the well recharge rate is less than 4 L/min, b) depth to water table is less than 50 feet, and c) less than 20 gallons are to be purged.

3.4.2 When purging with a bailer, PVC, PTFE, or stainless steel may be used. Disposable bailers are preferred. Disposable line should be used. Bailers and line will be disposed in accordance with current regulations.

3.4.3 After each 5 gallons (10 gallons for deep wells or wells greater than 2-inch inner diameter) of water is removed a set of water quality parameter, pH, conductivity, temperature, DO, and ORP, readings should be recorded in the field parameters logbook.

Once three of the five parameters have stabilized, three consecutive readings are within 10%, the well is considered to be purged and ready for sample collection.

3.4.5 If the well goes dry before the field parameters have stabilized, turn off the pump, allow the well to recover, and collect the sample at the earliest opportunity within twenty-four hours.

3.4.4 Immediately upon completion of purging, collect samples for laboratory analysis. Place all samples into coolers with ice as soon as possible after sampling. Make sure all sample bottles are labeled and that all labels are protected by a strip of tape that goes all the way around the bottle to prevent the label from floating or falling off.

4. MAINTENANCE

Refer to manufacturer's recommendations for maintenance of pumps, generators, meters, etc.

5. REFERENCES

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YUMA PROVING GROUND
ENVIRONMENTAL OPERATING PROCEDURE
FOR SAMPLE PRESERVATION AND
CONTAINER REQUIREMENTS
EOP-039
Revision 1.0

Prepared by: ______________________________ **Date:** ____________

Reviewed by: ______________________________ **Date:** ____________
Quality Assurance Officer

Approved by: ______________________________ **Date:** ____________
Environmental Sciences Chief

Questions and comments on this EOP may be submitted to the YPG Quality Assurance Officer (QAO), or designee.

U.S. Army Yuma Proving Ground
Environmental Sciences Division

1. SCOPE AND APPLICATION

The purpose of this environmental operating procedure (EOP) is to define the preservatives and techniques to be employed in preserving environmental samples between collection and analysis. Sample containers should have preservative added by the laboratory prior to sampling, whenever possible.

These are standard (i.e. typically applicable) operating procedures, which may be varied or changed as required, dependent upon site conditions, equipment limitation, or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented in the field logbook and associated final report.

2. METHOD SUMMARY

This method describes sample preservation, container, and holding time requirements.

3. SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Preserving Samples: Degradation or loss of some contaminants from environmental samples may occur naturally (e.g., VOCs). The sampler must chemically preserve some water samples for certain analytes before shipping them to the laboratory. The sampler should preserve and immediately cool all samples to 4°C or less upon collection to time of analysis (do not freeze water samples).

Containers:

Type A

1. Container: 40-mL glass vial, 24-mm neck finish
2. Closure: White polypropylene or black phenolic, open top, screw cap, 15-mm opening, 24-400 size
3. Septum: 24-mm disc of 0.005-in. PTFE bonded to 0.120-in. silicon for total thickness of 0.125-in.

Type B

4. Container: 1-L amber, Boston round, glass bottle, 33-mm pour-out neck finish
5. Closure: White polypropylene or black phenolic, baked polyethylene cap, 33-430 size; 0.015-mm PTFE liner

Type C

6. Container: 1-L high density polyethylene, cylinder-round bottle, 28-mm neck finish
7. Closure: White polyethylene cap, white ribbed, 28-410 size; F217 polyethylene liner

Type D

8. Container: 250-mL Boston round glass bottle
9. Closure: White polypropylene or black phenolic, open top, screw cap

10. Septum: Disc of 0.005-in PTFE bonded to 0.120-in. silicon for total thickness of 0.125-in.

Type E

11. Container: 4-oz, wide-mouth, straight -sided, flint glass jar, 48-mm neck finish
12. Closure: White polypropylene or black phenolic, baked polyethylene cap, 48-400 size; 0.015-mm PTFE liner

Type F

13. Container: 8-oz short, wide mouth, straight -sided, flint glass jar, 70-mm neck finish
14. Closure: White polypropylene or black phenolic, baked polyethylene cap, 48-400 size; 0.030-mm PTFE liner

Sample Volume: Collecting sufficient sample volume is critical. There must be sufficient physical sample volume for the analysis of all required parameters and completion of all QC determinations. The type of analytical procedure(s)to be performed will often dictate the sample volume to collect. It is extremely important that sampling personnel refer to their specific project plans to identify and collect the correct sample volume during each sampling event and discuss sample volumes with laboratory personnel prior to sample collection. When sampling for volatile organics in soil, samplers should use EOP-006.

Sample Holding Times: Sampling personnel should ship samples to scheduled laboratory as soon as possible after collection. Daily shipment of samples to laboratory is preferred since many samples are stable for only a short time period following collection.

The technical holding times are the maximum lengths of time allowed between when a sample is collected and when the extraction and/or analysis is completed.

If sampling personnel are shipping samples after 5:00 PM, they must notify the laboratory Sample Management Office (SMO) by 8:00 AM on the previous business day. When making a Saturday delivery, samplers **must** contact the laboratory SMO by approximately 3:00 on the Friday prior to delivery and preferably much earlier to ensure that laboratory personnel are available to accept delivery.

ATTACHMENT B.8

ANALYTICAL LABORATORY DOCUMENTATION

LABORATORY ACCEPTANCE OF SAP CONDITIONS

Name of Facility:

Contact Person:

Address:

City, State, Zip:

Telephone Number:

ADHS Certification Number / Expiration Date:

I have read and acknowledge all fixed laboratory conditions of this SAP (and all attachments), dated August 2010 for the U.S. Army Garrison Yuma Proving Ground Groundwater Monitoring. I certify that all analyses performed for this project will meet the requirements of this SAP, unless noted in the analytical reports.

Authorized Signature: **Date:**

Printed Name

APPENDIX C

Reserved For Site Safety and Health Plan

*Note: USAGYPG will provide ADEQ with a Site Specific Safety and Health Plan 120 days prior to sampling event.

APPENDIX D

Sampling Data and Statistical Analysis

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Section D.1
Groundwater Measurements, Flow Direction and Gradient Calculations

Groundwater flow direction and gradient at the Kofa Open Burn/Open Detonation (OB/OD) Munitions Treatment Facility (MTF) was determined using depth to groundwater measurements (collected in November, 2011) and surveyed surface elevations from monitoring wells MTF-MW1, MTF-MW3 and the ground surface and static water elevation at well M (as recorded on the original borehole log) located at the heliport north of the MTF. The three-point calculation indicates the groundwater flow direction is S 37.40W. This direction is consistent with the base-wide flow direction as presented in previous documents (Argonne, 2004, Ensearch, 1988).

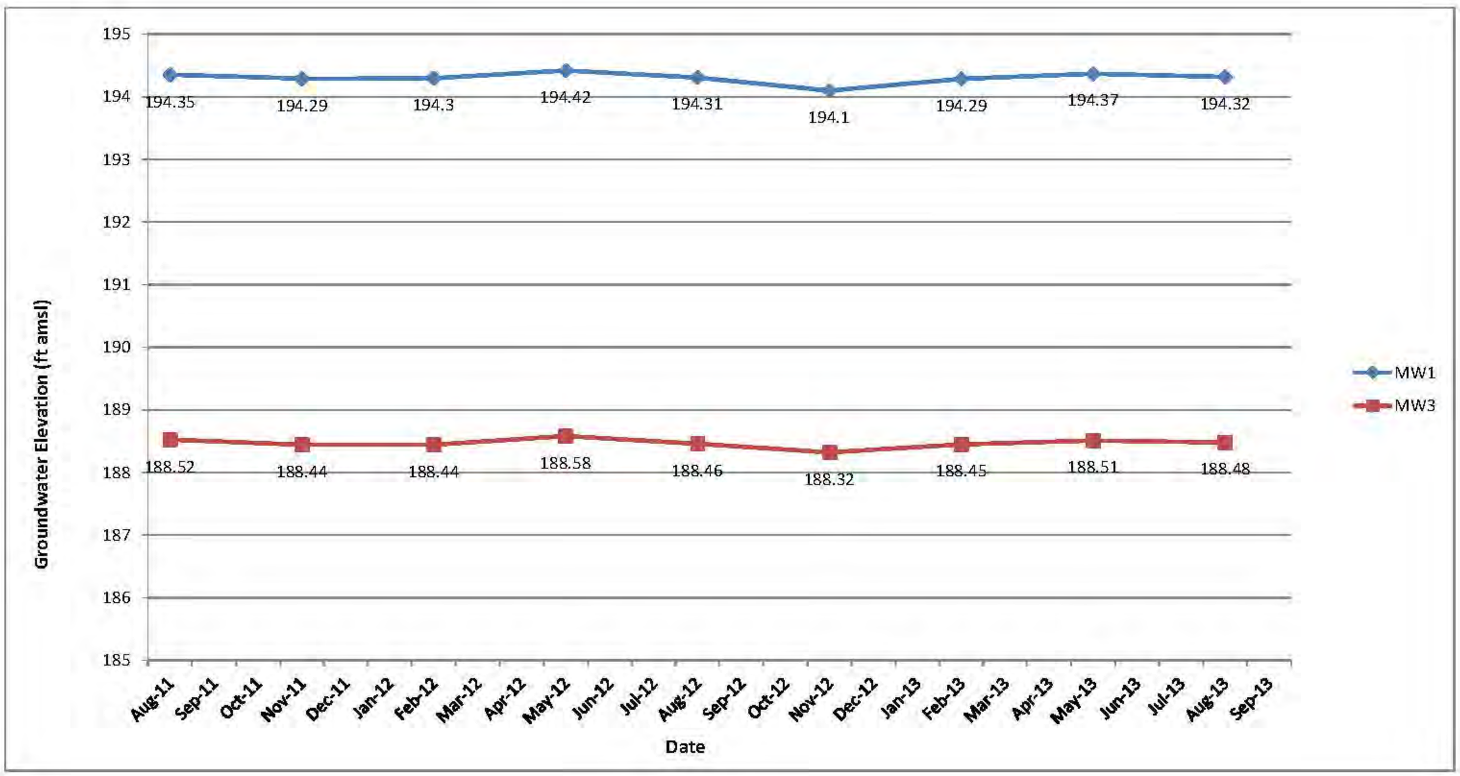
The location of MTF-MW3 is down-gradient of MTF-MW1. These two wells locations provide an up- and down-gradient understanding of the possible impacts resulting from potential releases that may occur as a result of Kofa OB/OD activities. MTF-MW1 provides information on the up-gradient or background condition of the aquifer underlying the Kofa OB/OD site. Depth measurements to the top of the water table (i.e., groundwater) were collected during eight quarterly monitoring rounds between 2011 and 2013. Only slight variations in the depth to groundwater were identified during quarterly sampling events, with the differences between the two monitoring wells only varying by a few hundredths of a foot. Depth to groundwater, water elevations and differences between the depth to groundwater at MTF-MW1 and MTF-MW3 are shown on Table D-1. A potentiometric map illustrating the direction of groundwater flow is presented in Figure 1 and details of the three-point calculation are illustrated on Figure 2. The three-point calculation was developed using USEPA’s online site assessment tools found at the website shown below. In addition to the direction of groundwater flow, the on-line assessment tool calculates the groundwater gradient. The calculated groundwater gradient for the Kofa OB/OD site is 0.0008106 ft/ft.

It is unlikely that groundwater at the Kofa MTF will be impacted by site activities because depth to groundwater at the site is between 550 and 625 ft bgs and there is no vertical driving force to push contamination to the underlying groundwater. Groundwater is not used during demilitarization activities and infiltration resulting from precipitation events is minimal.

The Kofa OB/OD site was designed to manage adequate surface water runoff that is channeled around the site. Any precipitation at the site is not likely to infiltrate to groundwater due to the high evapotranspiration rate. In addition to the depth of the water-bearing zone, the underlying groundwater flow is extremely slow due to a low hydraulic gradient. These factors indicate that vulnerability of the groundwater system at the Kofa OB/OD area is low. It is recommended that future groundwater sampling events be conducted every five years, with groundwater samples being analyzed for metals, explosives and perchlorate.

Table D-1
Kofa OB/OD Water Level Measurements
U.S. Army Garrison Yuma Proving Ground, Yuma, Arizona

Monitoring Well	Measuring Point Elevation (ft amsl)	Aug-11		Nov-11		Feb-12		May-12		Aug-12		Nov-12		Feb-13		May-13		Aug-13	
		Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)
MW 1	818.49	624.14	194.35	624.2	194.29	624.19	194.3	624.07	194.42	624.18	194.31	624.39	194.1	624.2	194.29	624.12	194.37	624.17	194.32
MW 3	741.38	552.86	188.52	552.94	188.44	552.94	188.44	552.8	188.58	552.92	188.46	553.06	188.32	552.93	188.45	552.87	188.51	552.9	188.48



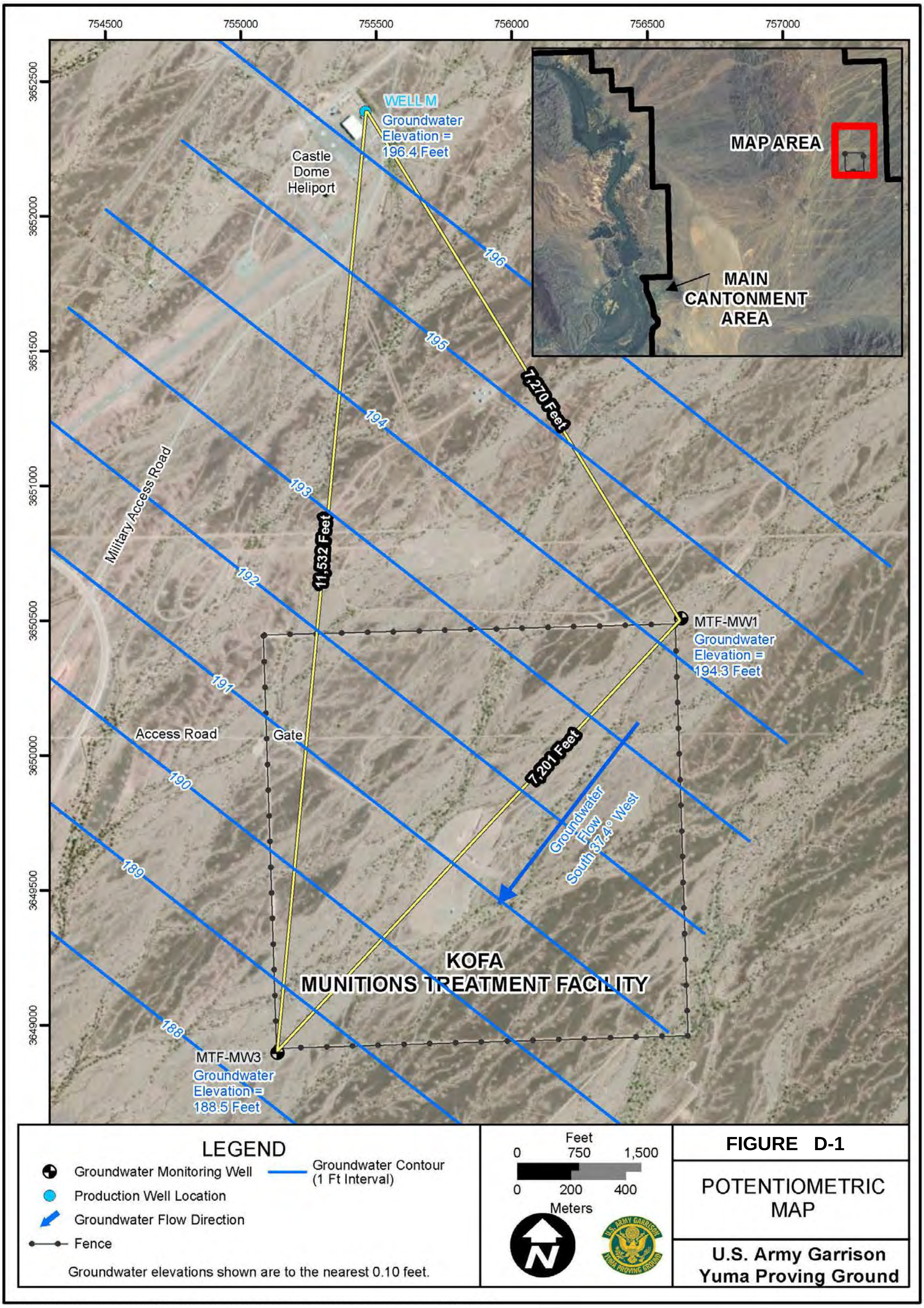


FIGURE D-1 Potentiometric Map; illustrating direction of groundwater flow

http://www.epa.gov/athens/learn2model/part-two/onsite/gradient3ns.html

EPA On-line Tools for Site Assessment Calculation

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Hydraulic Gradient

Gradient Calculation from fitting a plane to three points:

$$a\,x_1 + b\,y_1 + c = h_1$$
$$a\,x_2 + b\,y_2 + c = h_2$$
$$a\,x_3 + b\,y_3 + c = h_3$$

where (x_i, y_i) are the coordinates of the well and h_i is the head

$i = 1,2,3$

The gradient (i) calculated from the square root of $(a^2 + b^2)$ and the angle from the arctangent of a/b or b/a depending on the quadrant.

Example Data Set 1 | Calculate | Clear
Save Data | Recall Data | Go Back

Site Name: Kofa OB/OD
Date: Nov -2011 Current Date
Calculation basis: Head
Coordinates: m

x-coordinate	y-coordinate	head (ft)
3652391.35	755463.29	196.40
3650509.15	756623.48	194.30
3648903.13	755133.71	188.50

Gradient Magnitude (i): 0.0008106
Degrees from North (+ y axis): 232.8

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Figure D-2 Site Assessment Calculations

Section 2
Statistical Analyses of
Detected Groundwater Analytes

2.1 INTRODUCTION

Groundwater samples were collected over nine quarters of sampling at monitoring wells MTF-MW1 (up-gradient well) and MTF-MW3 (down-gradient) located at the Kofa OB/OD MTF. Groundwater samples were analyzed for metals, explosives, volatile organic compounds (VOCs), perchlorate and semivolatile organic compounds (SVOCs). A summary of analytical results for the sampling effort is presented in Table D-2. A statistical analysis was performed on the analytical data. The objective of the statistical analysis was to identify concentration differences between samples collected from the up- and down-gradient monitoring wells, potentially indicating impacts to groundwater from site activities.

2.2 HISTOGRAMS AND BOX PLOTS

The initial step in the statistical analysis was to graphically plot the results of detected groundwater analytes from the two years of monitoring at Kofa OB/OD site using histograms and box plots. Histograms for each detected analyte are presented in Attachment A. Each histogram provides a visual method of identifying the underlying distribution of the data as well as the spread of the data. The histograms presented in Attachment A include the distribution of both the up- and down-gradient monitoring wells for each detected analyte. Visual inspection of each histogram was completed to identify obvious analyte distribution differences between wells. Arsenic, barium, calcium, chromium, magnesium, molybdenum, perchlorate, potassium, sodium, and vanadium are analytes identified as having different concentration distributions between up- and down-gradient locations.

Box plots display the data set divided into four segments based on the distribution represented by the data. Box plots for each detected analyte at the Kofa OB/OD site are presented in Attachment B. The central box of each box plot shows the concentration range of data that represents 25-75 percent of the data. The whiskers extending off on either end of the central box represent the data between the minimum value and 25-percentile and the data between the 75-percentile and the maximum value. The median value is represented by the small box within the central box. A normal distribution of the data is identified when the box and whisker are symmetric around the center of the box. In the case of comparing separate well sets, it is best to show the box plots of the different wells side by side. This allows for a simple comparison of the data. Similar to the histograms, a separate box plot was developed for each detected analyte at Kofa OB/OD. Visual observations of the box plots identified arsenic, molybdenum, and vanadium as having a higher concentration distribution in MTF-MW3 (down-gradient well) than MTF-MW1 (up-gradient) monitoring well. Observations of the box plots also indicated that barium, calcium, chromium, magnesium, nitrate/nitrite, perchlorate, and potassium have a higher concentration distribution in MTF-MW1 (up-gradient) than MTF-MW3 (down-gradient well) monitoring well. Analytes aluminum, cadmium, copper, lead, manganese, nickel, nitrogen (as ammonium), selenium, silver, thallium, and zinc show similar concentration distributions in up- and down-gradient wells.

2.3 WILCOX RANK SUM

Visual observations obtained from the review of histograms and box plots were quantitatively evaluated using statistical software (Statistica®) and the nonparametic Wilcox Rank Sum (WRS) tests to confirm the visual observation conclusions. A nonparametric method was chosen as the statistical method due to the limited number of wells and limited number of samples ($n<10$). Table D-2 presents the results from the WRS test for each detected analyte. The null hypothesis was that the analyte concentration distribution of the up-gradient (MTF-MW1) does not differ from the down-gradient (MTF-MW3) concentration distribution. The WRS tests show similar results to the visual observations obtained from the histograms and box plots presented above. WRS test results for arsenic, molybdenum, sodium, and vanadium were found to reject the null hypothesis and appear to have a higher concentration in MTF-MW3 than the up-gradient well MTF-MW1. Other analytes presented in Table D-2 that rejected the null hypothesis indicate that a higher concentration distribution is present in the up-gradient well and include the munitions constituent (MC) perchlorate. Perchlorate is a naturally occurring salt and has been identified by the United States Geological Survey (USGS) as being commonly detected in groundwater in the arid southwest.

2.4 OUTLIER DETECTIONS

Only three organic compounds were detected above the analyte reporting limit. These three compounds were: acetone, benzene, and RDX, and were each detected once out of fifteen sampling events. Due to inconsistencies of the detections of these compounds, these compounds are considered outliers and do not represent site conditions. Two phthalates and toluene were detected in the initial sampling round (May, 2011) and were not detected in subsequent sampling events. The initial round (May 2011) of sampling was not used in the site evaluation and these compounds were also considered not to represent site conditions.

2.5 CONCLUSION

Analytical results for groundwater samples collected at the Kofa OB/OD facility over nine quarters indicate that only metal analytes were detected consistently above laboratory reporting limits. Multiple statistical methods were used to determine if there is a statistical difference between the up- and down-gradient monitoring wells. A higher concentration distribution of an analyte in the down-gradient well may indicate that groundwater has been impacted by site activities. Graphical statistical methods consisting of histograms and box plots were used to determine the shape and spread of analyte concentration distributions. Visual observations of the plots from these tests were confirmed to having a different concentration distribution using the WRS test. Arsenic, molybdenum, sodium, and vanadium were found to have a higher concentration distribution in the down-gradient well MTF-MW3 than the up-gradient well MTF-MW1. It is likely that the higher concentration distribution of these compounds is a natural occurrence and not site related since these are not common MCs and no MC compounds were detected in the MTF-MW3.

TABLES

TABLE D-2

SUMMARY OF ANALYTICAL LABORATORY DETECTIONS

U.S. ARMY GARRISON YUMA PROVING GROUND, ARIZONA

Group	Analyte	Initial Sampling - May 2011			August 2011 Sampling[2]				November 2011 Sampling[2]		
		MW1 (Upgradient)[1]	MW3 (Downgradient)	RL	MW1 (Upgradient)	MW3 (Downgradient)	MW3-FD (Downgradient)	RL	MW1 (Upgradient)	MW3 (Downgradient)	RL
Metals	Aluminum	150 J	ND	200	ND	ND	ND	200	48	61	200
	Arsenic	11	11	10	18	21	21	10	16	22	10
	Barium	40	160	10	17	18	19	10	15	12	10
	Cadmium	0.4 J	0.2 J	5	0.2	0.3	0.2	5	0.3	0.5	5
	Calcium	51,900	23,500	100	52600	23800	24300	100	52400	24700	100
	Chromium, Total	20	8.9 J	10	25	11	11	10	23	10	10
	Copper	4.2 J	7.3 J	10	ND	ND	ND	10	ND	ND	10
	Iron	ND	550	100	ND	ND	ND	100	ND	ND	100
	Lead	1.7 J	ND	15	ND	1.5	1.9	15	ND	ND	15
	Magnesium	1,680	1,380	100	1520	1210	1220	100	1540	1270	100
	Manganese	130 J	83	15	ND	11	9.7	15	1	2.1	15
	Molybdenum	16 J	25 J	50	7	17	16	50	5.4	15	50
	Nickel	ND	ND	40	1.4	ND	ND	40	1.7	1.6	40
	Potassium	6,770	4620	500	6050	3670	3730	500	5970	3790	500
	Selenium	ND	5.1 J	40	ND	ND	ND	40	ND	ND	40
	Sodium	196,000	210,000	1000	182000	197000	202000	1000	161000	183000	1000
	Thallium	ND	ND	20	ND	1.9	ND	20	ND	ND	20
	Vanadium	14 J	12 J	20	13	15	14	20	14	18	20
	Zinc	360 J	280	20	ND	ND	3.9	20	ND	ND	20
Organics	Acetone	ND	ND	5000	ND	ND	ND	5000	ND	ND	5000
	Benzene	ND	ND	1000	ND	ND	ND	1000	ND	ND	1000
	Toluene	20.4	23.8	5	ND	ND	ND	5	ND	ND	5
	bis(2-Ethylhexyl) Phthalate	ND	1.82 J	10.4	ND	ND	ND	11.8	ND	ND	10.3
	Di-n-Octyl Phthalate	ND	0.599 J	10.4	ND	ND	ND	11.8	ND	ND	10.3
Explosives	Hexahydro-1,3,5-Trinitro-1,3,5-Triazine (RDX)	ND	ND	0.24	0.38	ND	ND	0.28	ND	ND	0.25
	Nitrate-Nitrite	668	414	20	1630	820	837	50	2170	1050	50
	Perchlorate	1.8	1.1	0.5	1.6	1	1	0.5	1.7	1	0.5

Group	Analyte	February 2012 Sampling			May 2012 Sampling			August 2012 Sampling[3]		November 2012 Sampling		
		MW1 (Upgradient)	MW3 (Downgradient)	RL	MW1 (Upgradient)	MW3 (Downgradient)	RL	MW3 (Downgradient)	RL	MW1 (Upgradient)	MW3 (Downgradient)	RL
Metals	Aluminum	34	37	200	ND	ND	200	48	200	ND	ND	200
	Arsenic	19	28	10	16	24	10	34	10	12	22	10
	Barium	14	11	10	12	7.5	10	6.8	10	12	6.2	10
	Cadmium	0.52	0.59	5	0.66	0.71	5	1.3	5	1	1	5
	Calcium	57500	26300	100	49100	22200	100	23200	100	52800	24200	100
	Chromium, Total	30	15	10	28	15	10	15	10	28	16	10
	Copper	1.7	1.7	10	9.6	4.4	10	ND	10	1.2	1.5	10
	Iron	ND	ND	100	ND	ND	100	ND	100	ND	ND	100
	Lead	ND	ND	15	ND	ND	15	ND	15	ND	ND	15
	Magnesium	1680	1370	100	1410	1140	100	1240	100	1530	1300	100
	Manganese	2	1.2	15	1.5	1	15	ND	15	ND	2.4	15
	Molybdenum	7.3	17	50	7	17	50	15	50	6.2	16	50
	Nickel	4	1.8	40	5.4	3.2	40	2.2	40	2.5	2.8	40
	Potassium	7040	4300	500	6160	3790	500	4300	500	6350	3980	500
	Selenium	ND	ND	40	ND	ND	40	ND	40	5	ND	40
	Sodium	188000	204000	1000	178000	190000	1000	183000	1000	174000	193000	1000
	Thallium	ND	ND	20	ND	ND	20	ND	20	ND	3.4	20
	Vanadium	17	22	20	20	23	20	21	20	16	20	20
	Zinc	ND	ND	20	7.7	ND	20	ND	20	5	ND	20
Organics	Acetone	1070	ND	5000	ND	ND	5000	ND		ND	ND	5000
	Benzene	ND	ND	1000	ND	708	1000	ND	1000	ND	ND	1000
	Toluene	ND	ND	5	ND	ND	5	ND	5	ND	ND	5
	bis(2-Ethylhexyl) Phthalate	ND	ND	11.8	ND	ND	11.8	ND	11.8	ND	ND	11.8
	Di-n-Octyl Phthalate	ND	ND	11.8	ND	ND	11.8	ND	11.8	ND	ND	11.8
Explosives	Hexahydro-1,3,5-Trinitro-1,3,5-Triazine (RDX)	ND	ND	0.28	ND	ND	0.28	ND	0.28	ND	ND	0.28
	Nitrate-Nitrite	1930	877	50	1970	939	50	757	50	2170	1010	50
	Perchlorate	1.7	0.98	0.5	1.8	1	0.5	1	0.5	1.7	1	0.5

Group	Analyte	February 2013 Sampling			May 2013 Sampling		
		MW1 (Upgradient)	MW3 (Downgradient)	RL	MW1 (Upgradient)	MW3 (Downgradient)	RL
Metals	Aluminum	56	69	200	91	64	200
	Arsenic	19	30	10	20	26	10
	Barium	13	6.2	10	12	5.9	10
	Cadmium	ND	ND	5	ND	ND	5
	Calcium	53900	26000	100	51700	22900	100
	Chromium, Total	34	18	10	29	16	10
	Copper	ND	ND	10	ND	ND	10
	Iron	ND	ND	100	ND	ND	100
	Lead	ND	ND	15	ND	ND	15
	Magnesium	1610	1380	100	1560	1260	100
	Manganese	ND	ND	15	ND	ND	15
	Molybdenum	ND	16	50	ND	15	50
	Nickel	ND	ND	40	ND	ND	40
	Potassium	6480	4210	500	6530	3740	500
	Selenium	ND	ND	40	ND	ND	40
	Sodium	184000	211000	1000	167000	175000	1000
	Thallium	ND	ND	20	ND	ND	20
	Vanadium	18	25	20	13	17	20
	Zinc	ND	ND	20	ND	6.1	20
Organics	Acetone	ND	ND	5000	ND	ND	5000
	Benzene	ND	ND	1000	ND	ND	1000
	Toluene	ND	ND	5	ND	ND	5
	bis(2-Ethylhexyl) Phthalate	ND	ND	11.8	ND	ND	11.8
	Di-n-Octyl Phthalate	ND	ND	11.8	ND	ND	11.8
Explosives	Hexahydro-1,3,5-Trinitro-1,3,5-Triazine (RDX)	ND	ND	0.28	ND	ND	0.28
	Nitrate-Nitrite	2770	1260	50	2700	1210	50
	Perchlorate	1.7	1	0.5	1.8	1.1	0.5

Notes:

[1] Results are reported in units of micrograms per liter (µg/L).

[2] August and November 2011 confirmation/laboratory results were non-detect for all VOCs.

[3] MW1 was not sampled in August 2012 due to a broken pump.

Definitions:

RL = Laboratory Reporting Limit. ND = Non-Detect. NA = Not Applicable.

TABLE D-3

RESULTS OF WILCOX RANK SUM TEST FOR MTF GROUNDWATER WELLS

U.S. ARMY GARRISON YUMA PROVING GROUND, ARIZONA

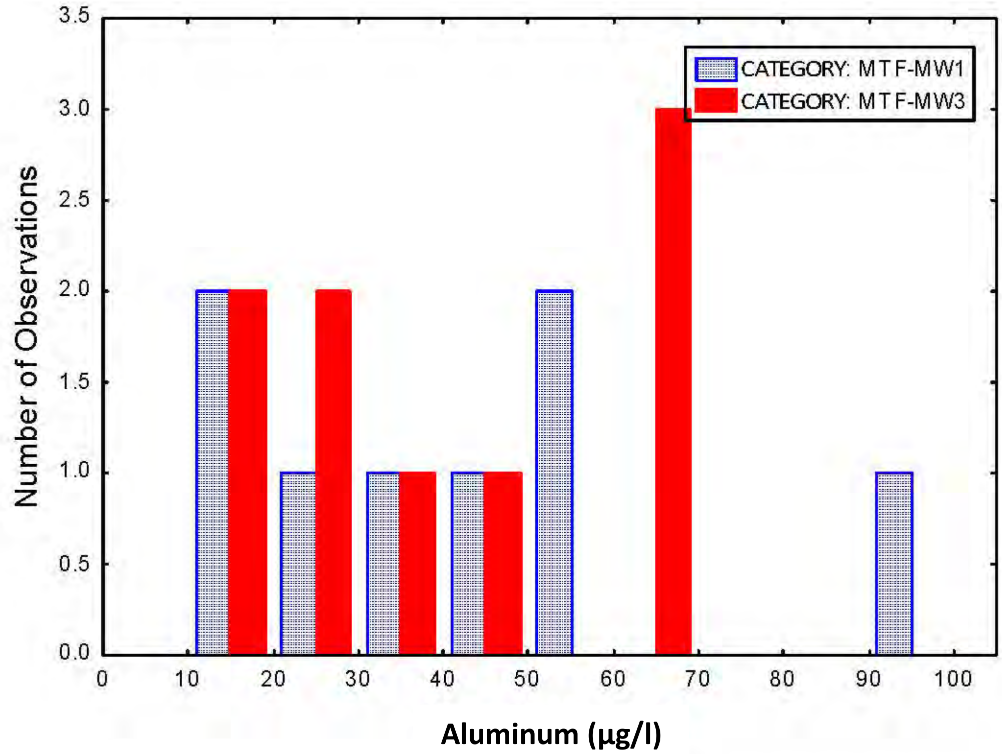
Chemical	Number of Samples		Rank Sum		"Z" Value	Two-Sided P-level	Accept Null Hypothesis? a/
	MTF-MW1	MTF-MW3	MTF-MW1	MTF-MW3			
Aluminum	8	9	71	82	-0.1	9.2E-01	Yes
Arsenic	8	9	36	117	-3.5	5.0E-04	**No**
Barium	8	9	99	55	2.6	1.0E-02	**No**
Cadmium	8	9	66	88	-0.6	5.2E-01	Yes
Calcium	8	9	108	45	3.5	5.3E-04	**No**
Chromium, Total	8	9	108	45	3.5	4.9E-04	**No**
Copper	8	9	75	79	0.2	8.1E-01	Yes
Lead	8	9	68	85	-0.4	6.8E-01	Yes
Magnesium	8	9	108	45	3.5	5.3E-04	**No**
Manganese	8	9	62	91	-1.0	3.3E-01	Yes
Molybdenum	8	9	36	117	-3.5	4.8E-04	**No**
Nickel	8	9	81	73	0.8	4.0E-01	Yes
Nitrogen, Ammonia (as N)	8	9	77	77	0.5	6.4E-01	Yes
Nitrogen, Nitrate-Nitrite	8	9	108	45	3.5	5.3E-04	**No**
Perchlorate	8	9	108	45	3.6	3.5E-04	**No**
Potassium	8	9	108	45	3.5	5.2E-04	**No**
Selenium	8	9	77	77	0.5	6.4E-01	Yes
Silver	8	9	74	79	0.2	8.4E-01	Yes
Sodium	8	9	47	107	-2.5	1.4E-02	**No**
Thallium	8	9	66	88	-0.7	5.1E-01	Yes
Vanadium	8	9	46	107	-2.5	1.2E-02	**No**
Zinc	8	9	75	79	0.2	8.0E-01	Yes

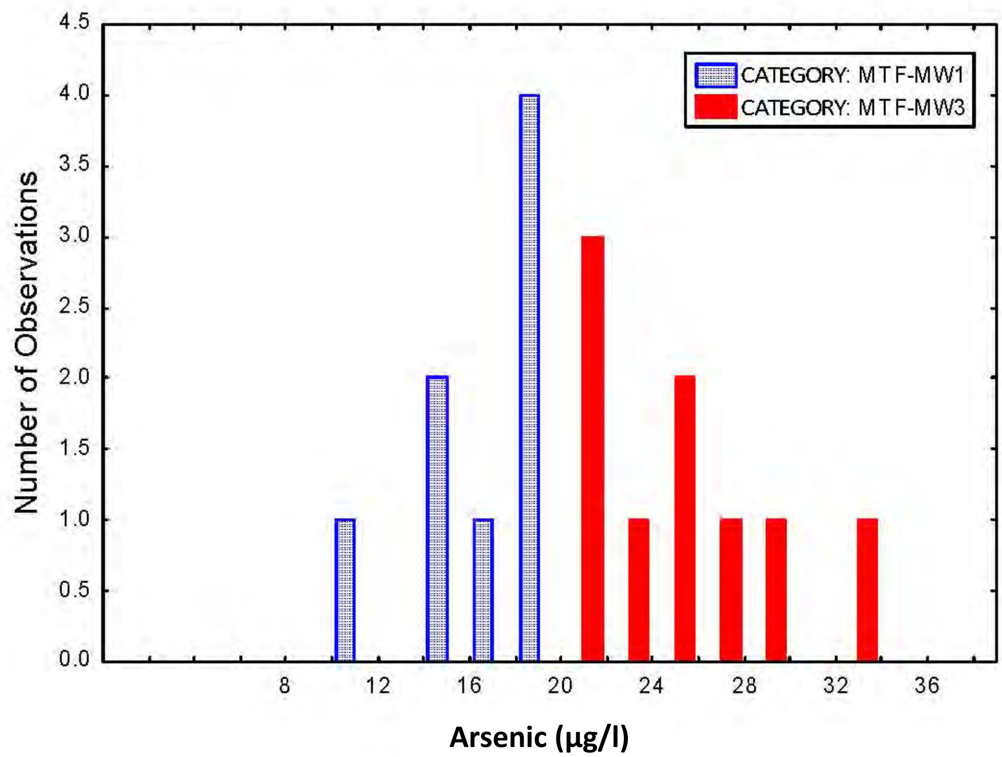
a/ The null hypothesis states that there is no difference between the site and the background concentrations of a given chemical. The null hypothesis was accepted if the two-sided p-level was ≥ 0.05, based on the Type I (alpha) error rate of 0.05.

ATTACHMENT D-A

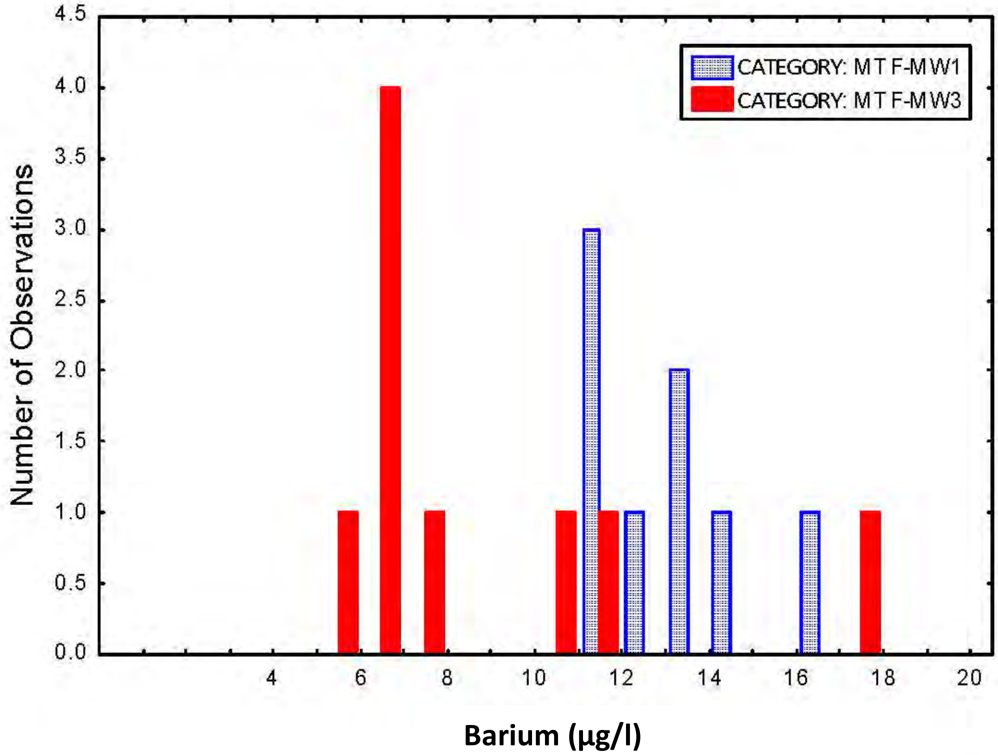
HISTOGRAMS

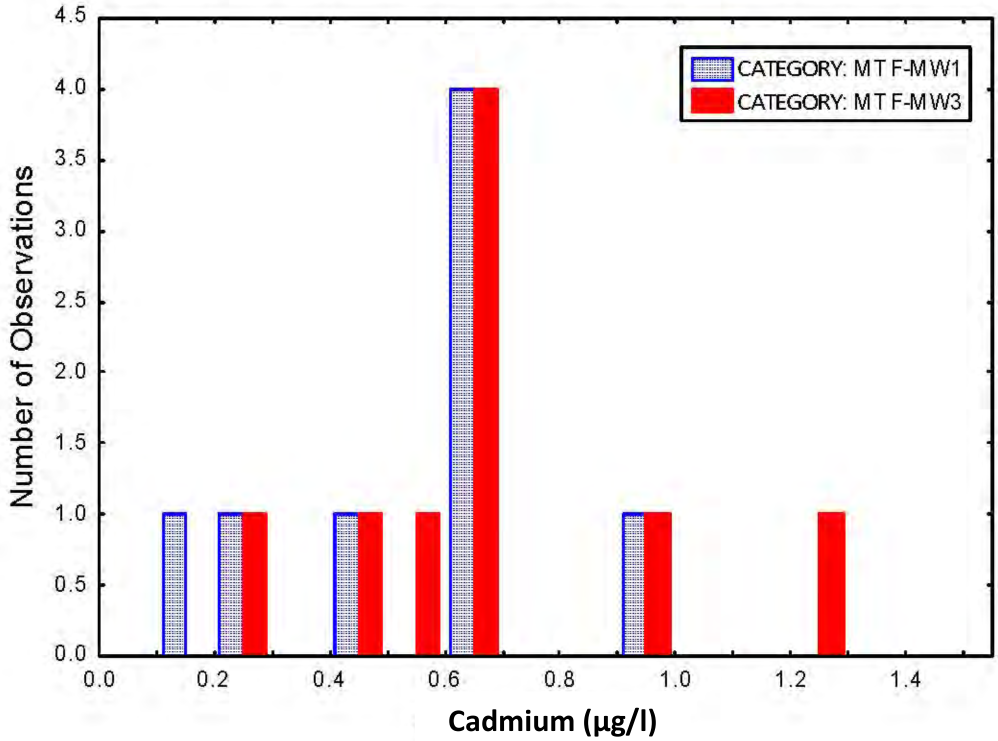
MTF GROUNDWATER HISTOGRAMS





MTF GROUNDWATER HISTOGRAMS





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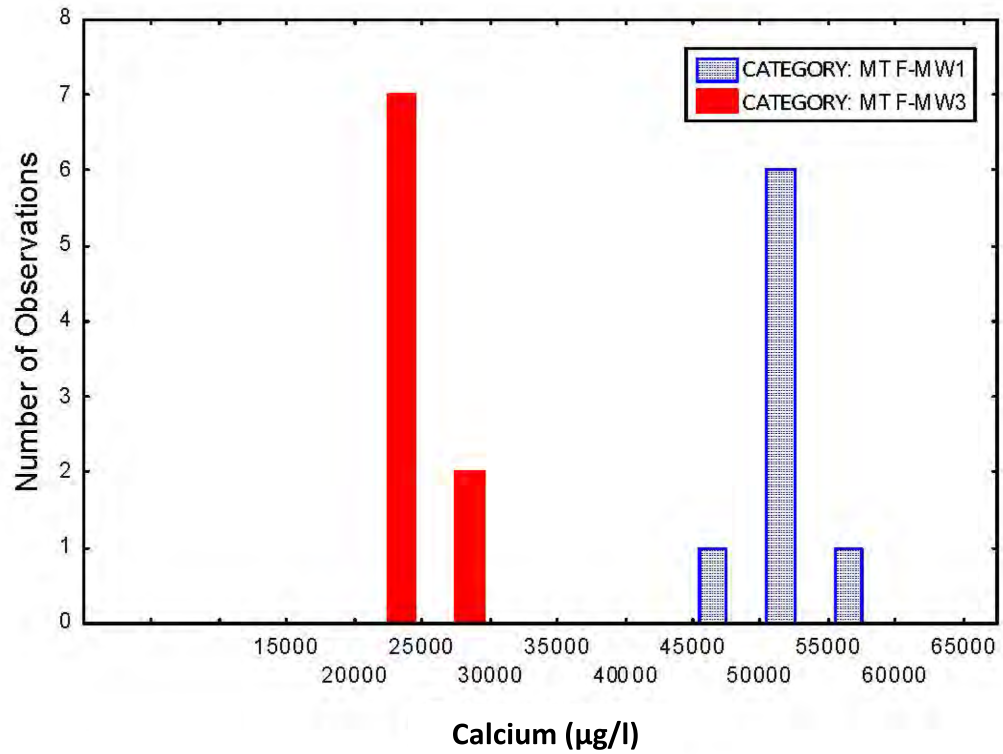

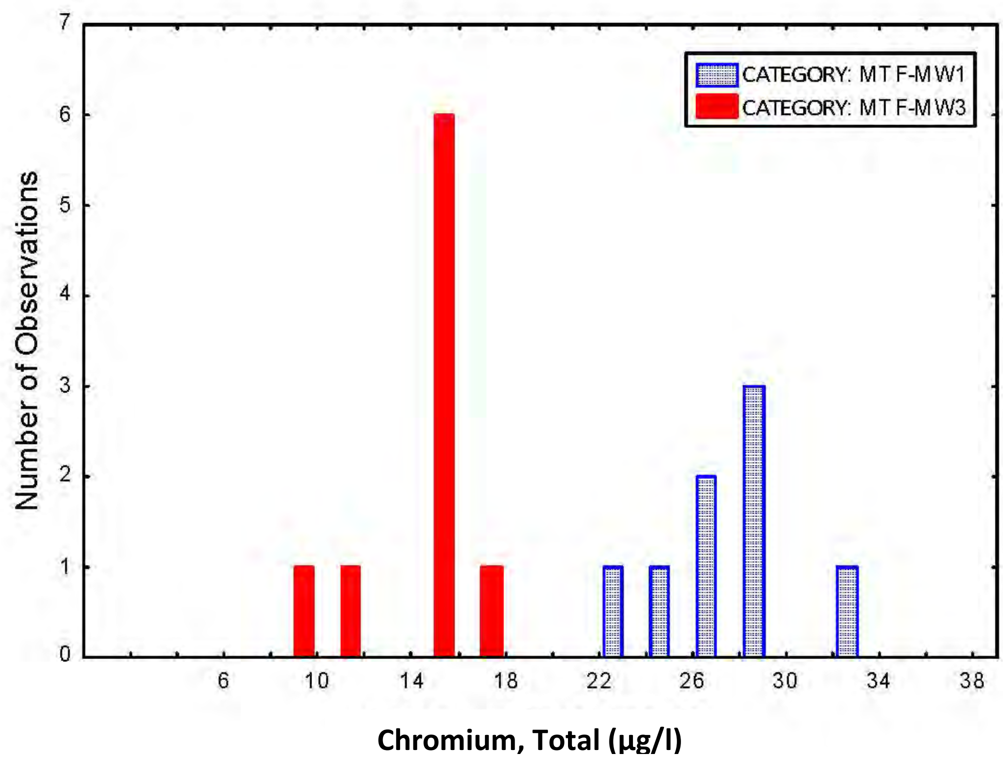

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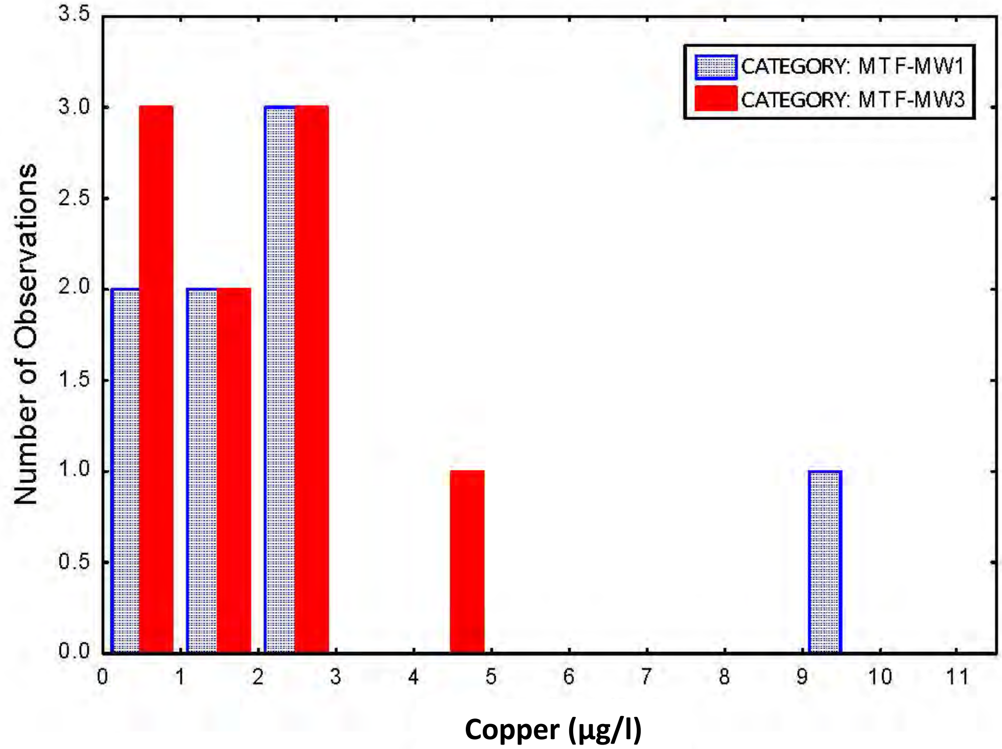
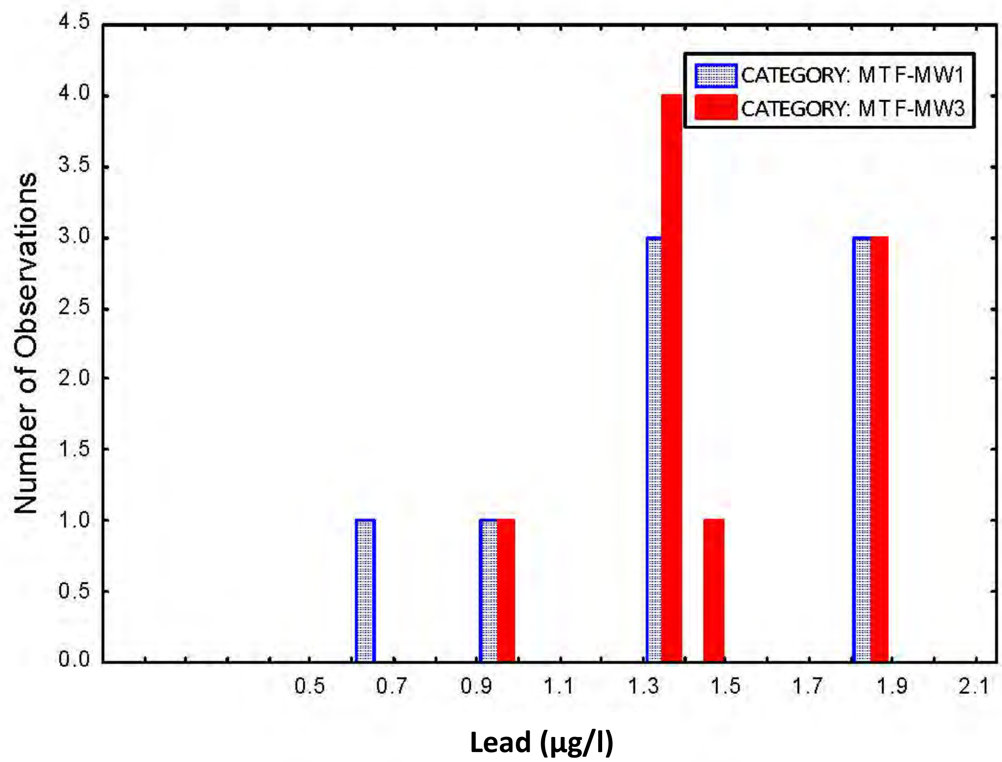
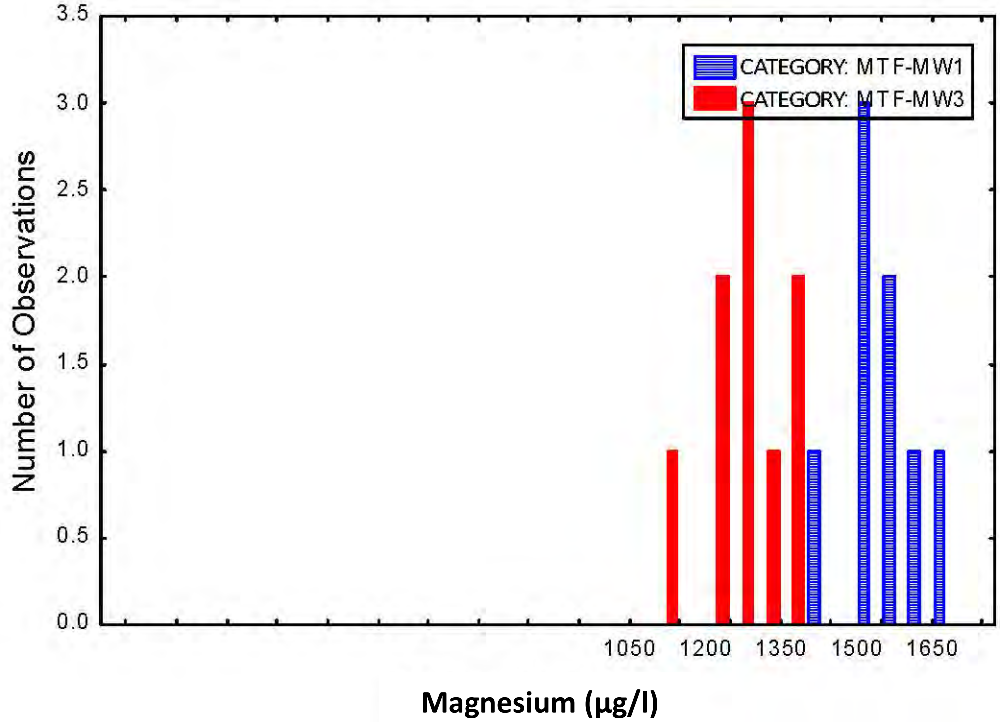
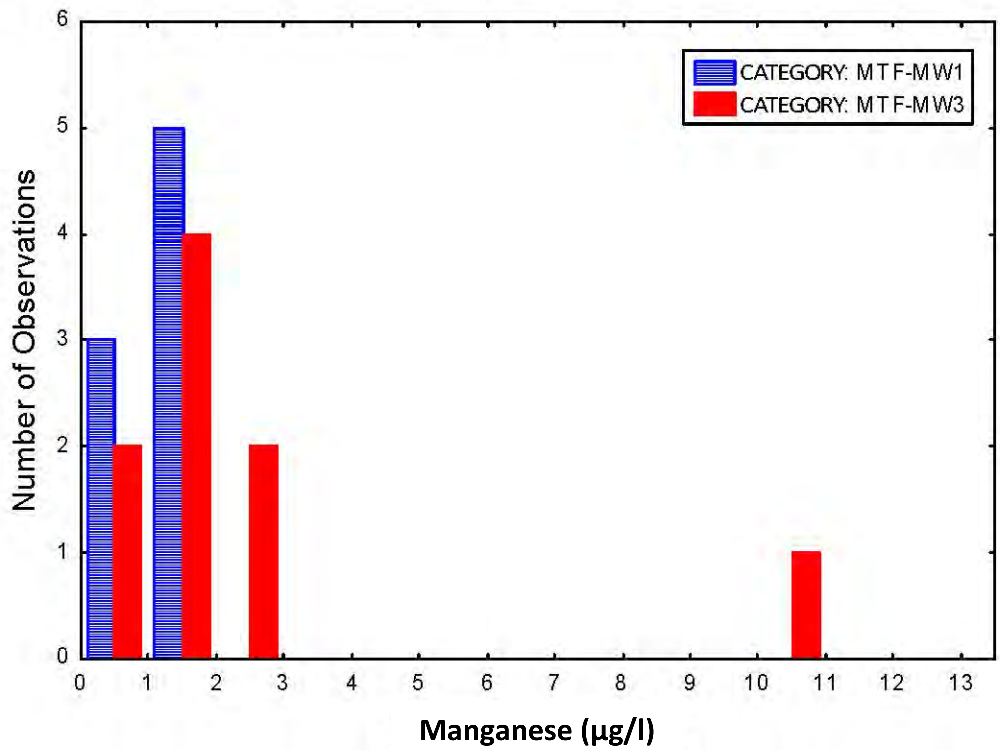


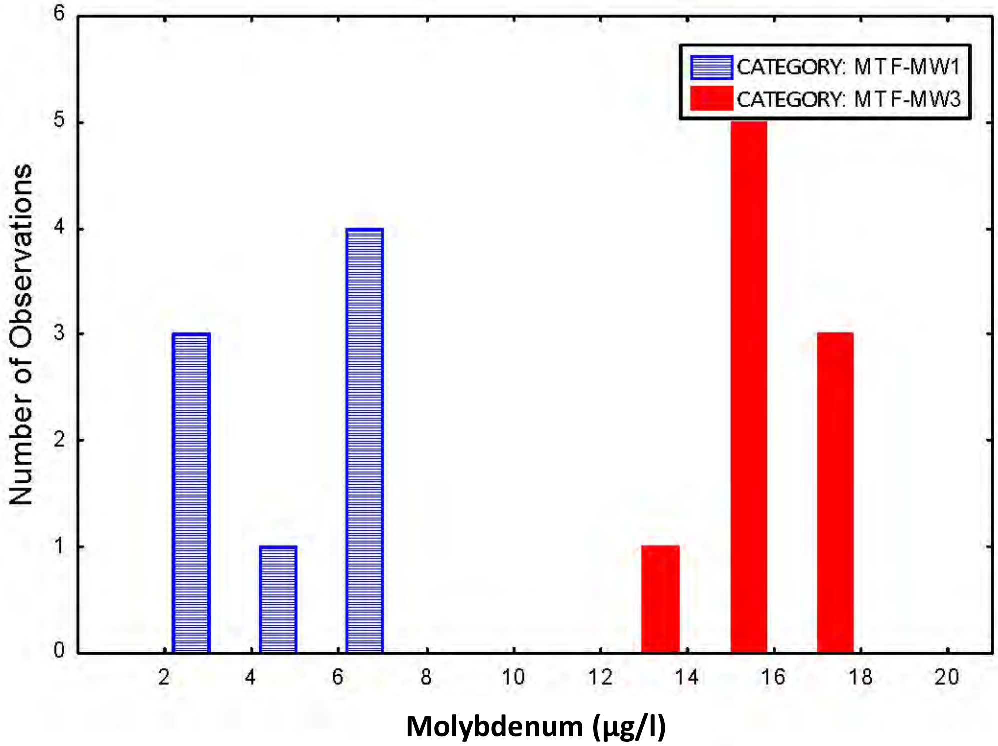


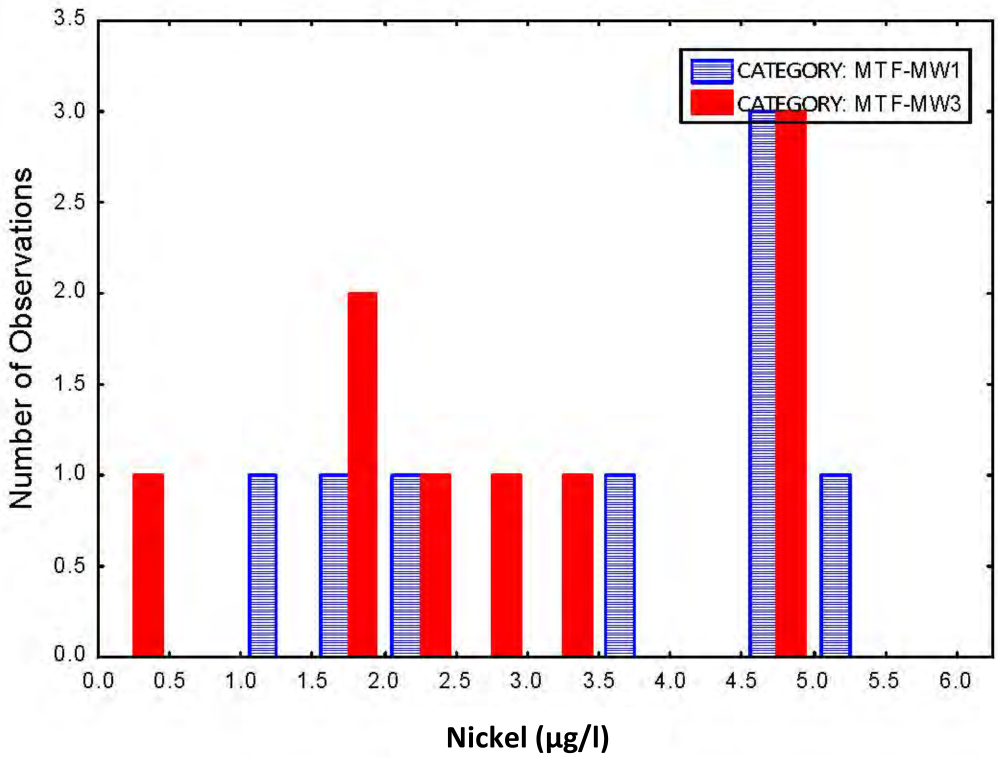
MTF GROUNDWATER HISTOGRAMS



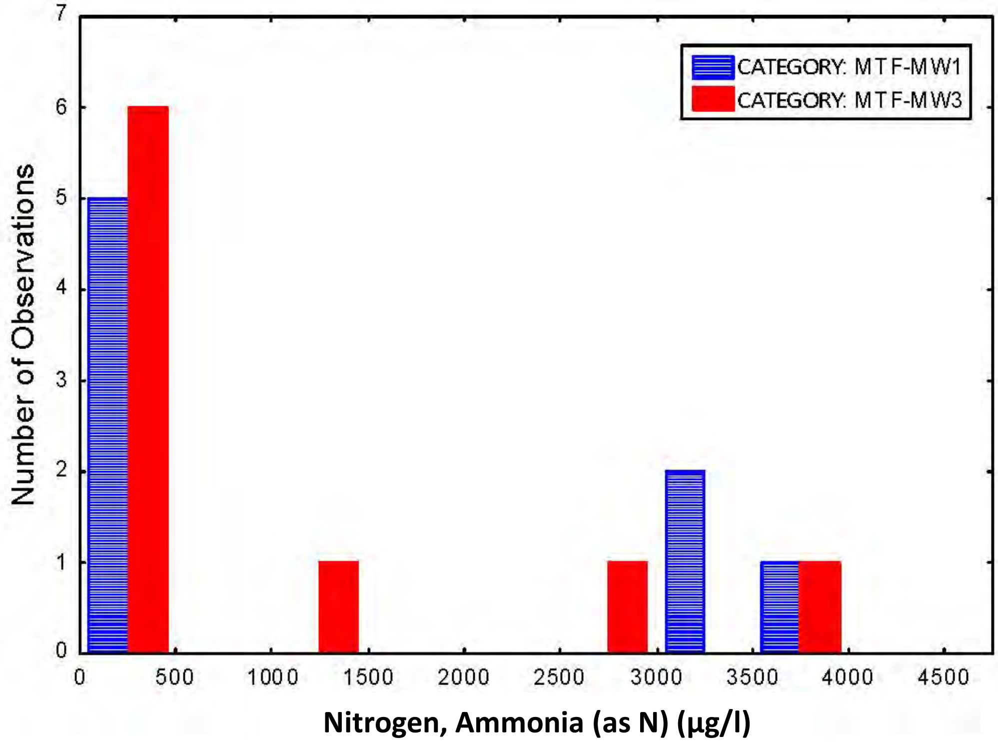


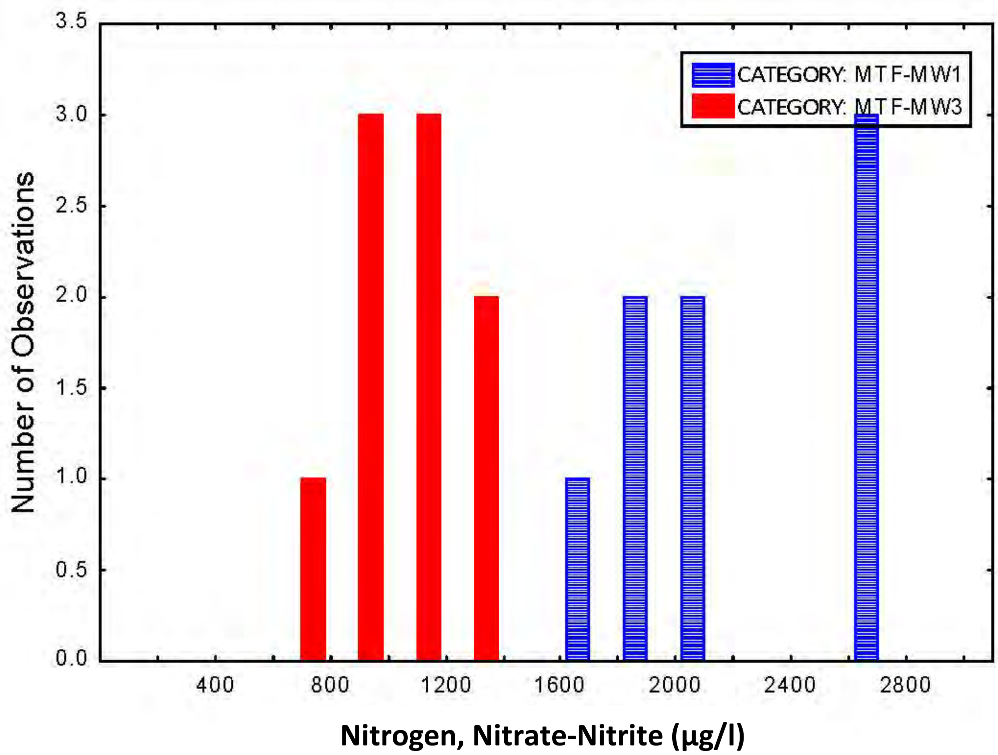
MTF GROUNDWATER HISTOGRAMS



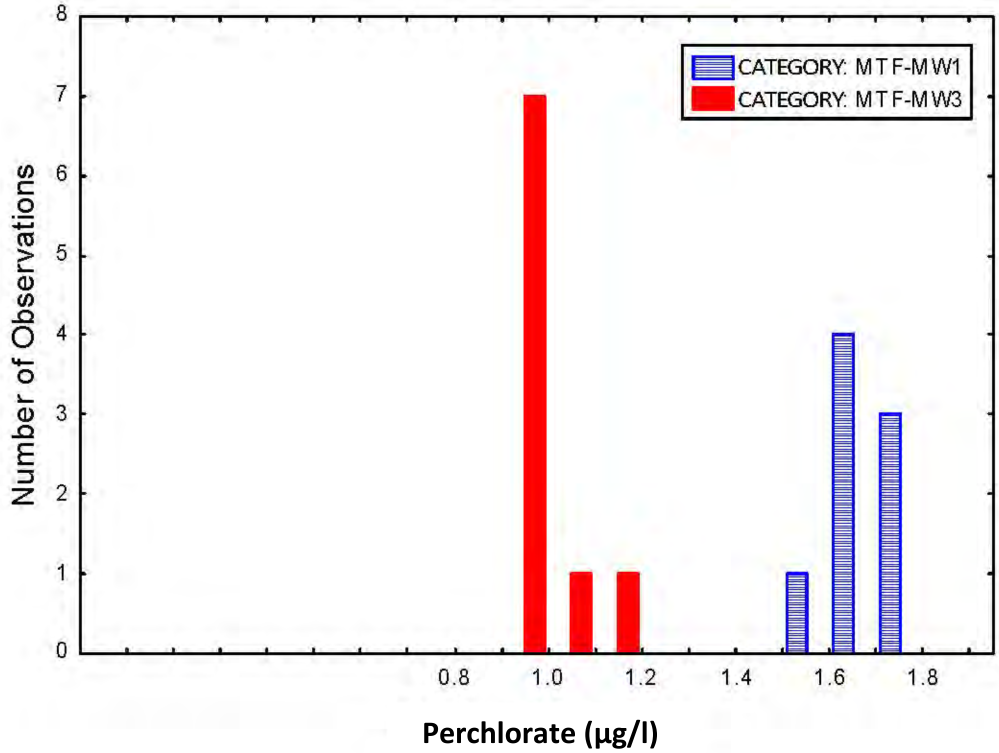


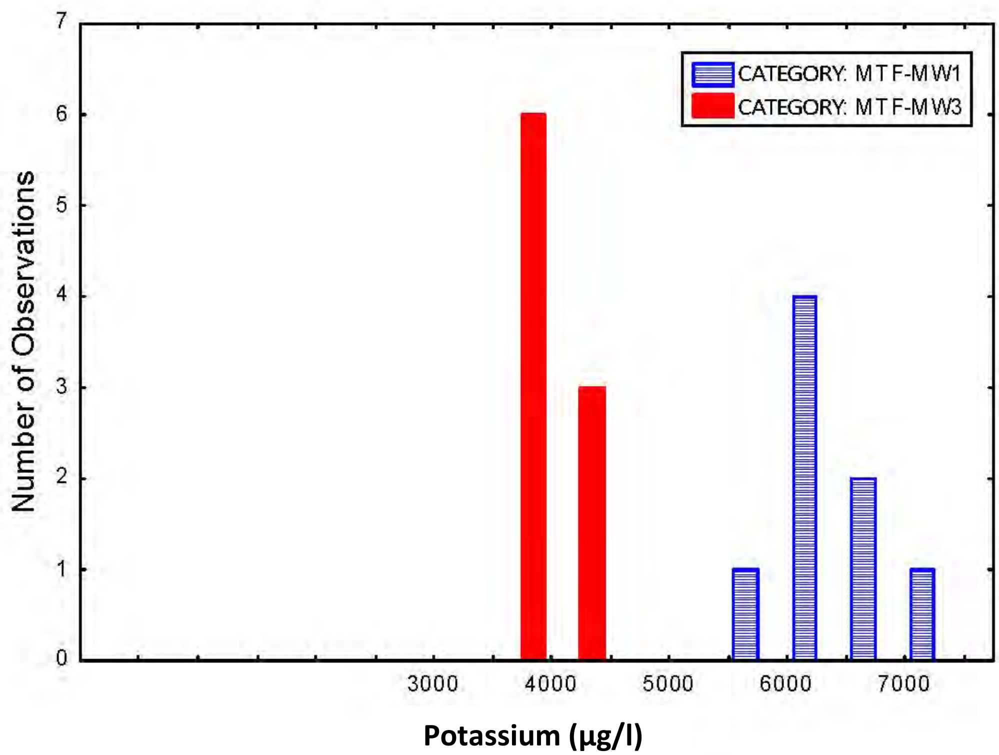
MTF GROUNDWATER HISTOGRAMS



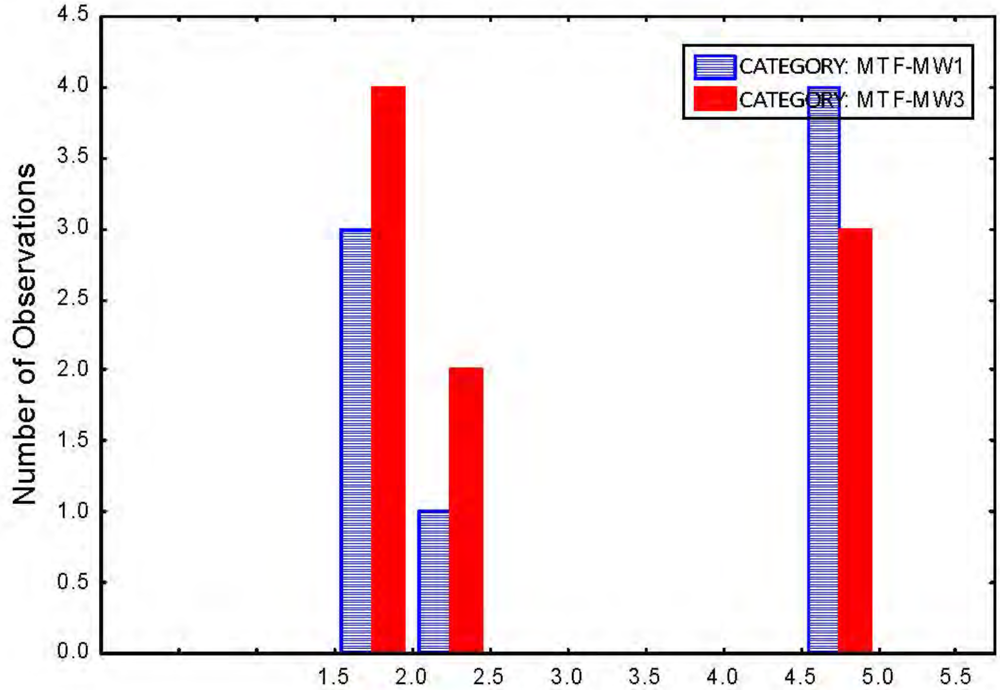


MTF GROUNDWATER HISTOGRAMS

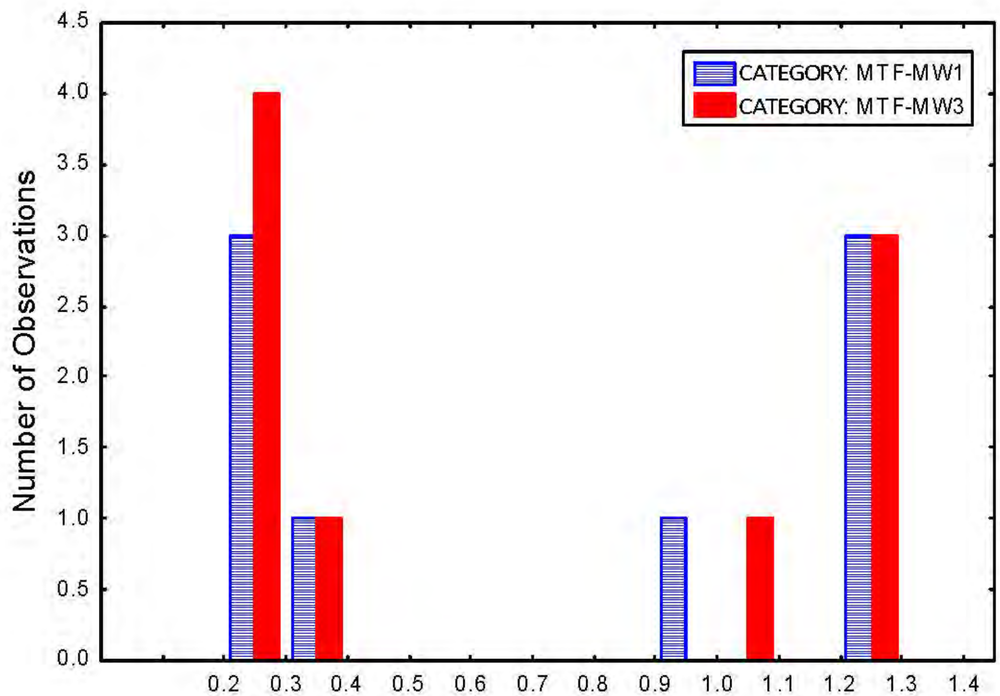




MTF GROUNDWATER HISTOGRAMS

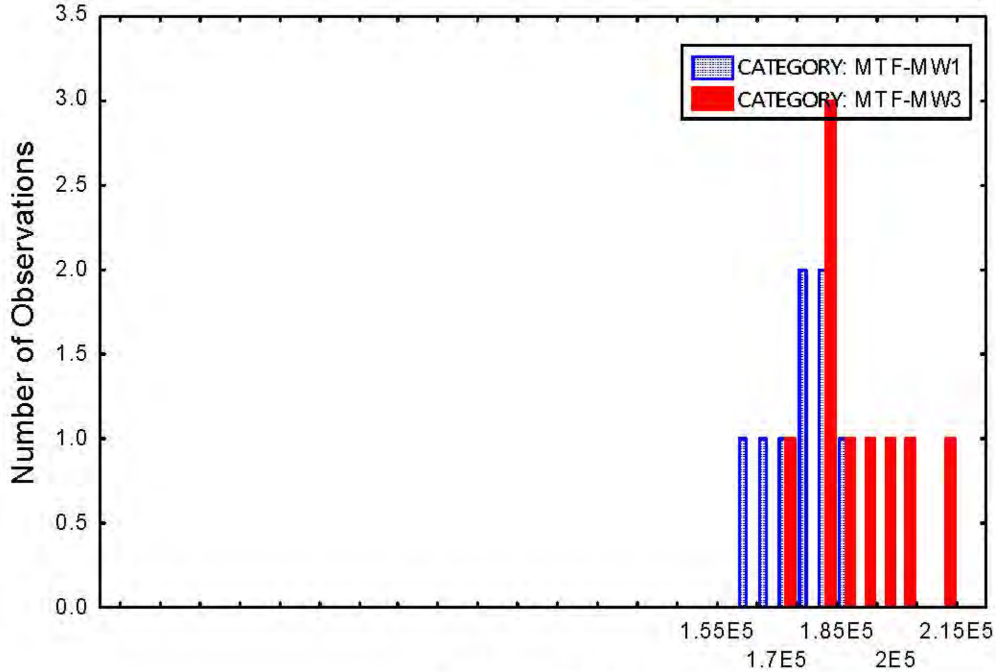


Selenium (µg/l)

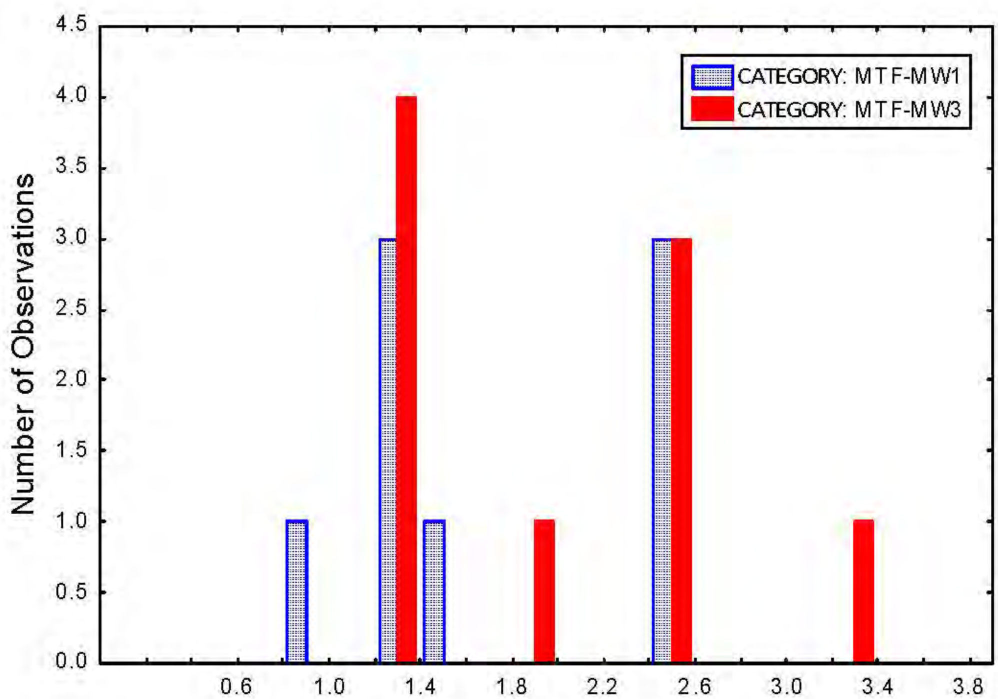


Silver (µg/l)

MTF GROUNDWATER HISTOGRAMS



Sodium (μg/l)



Thallium (μg/l)

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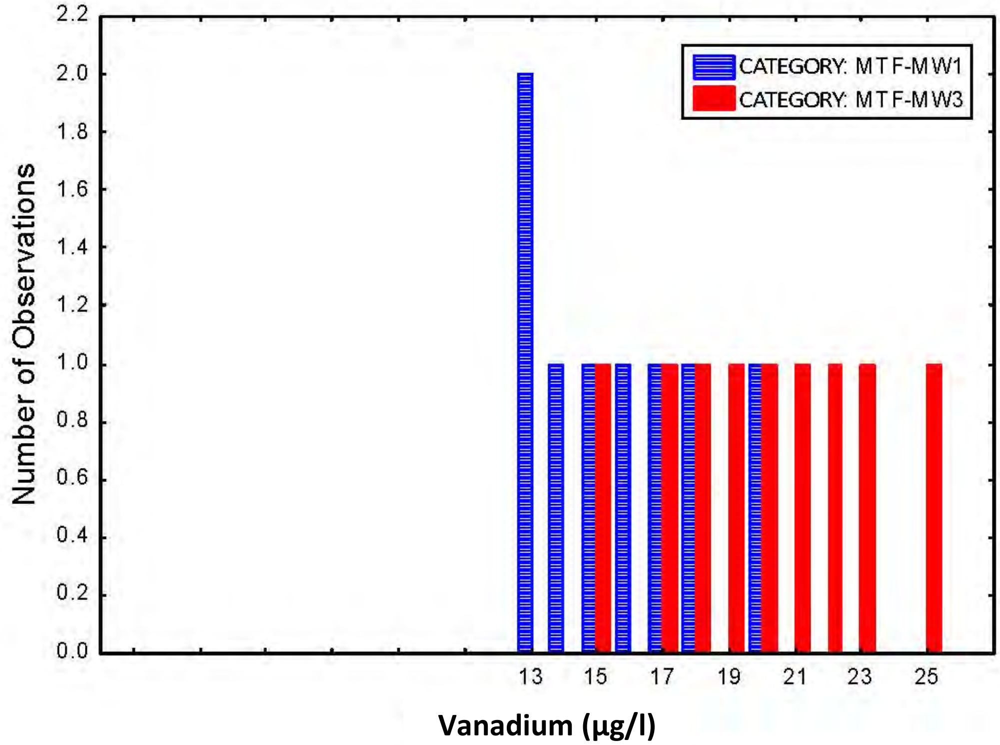
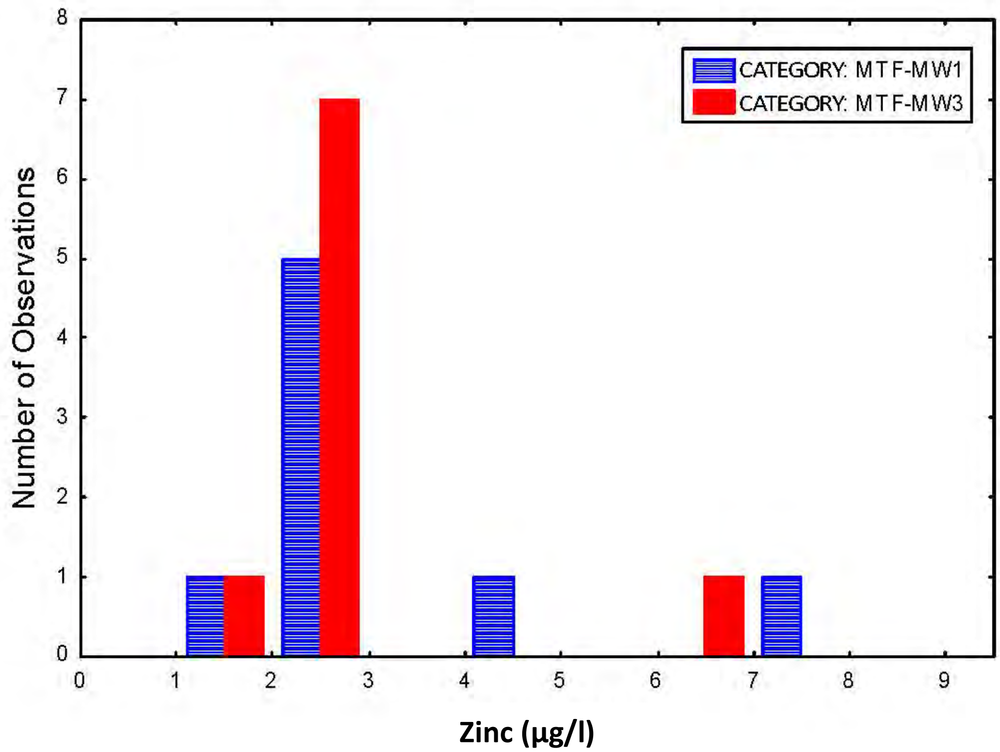
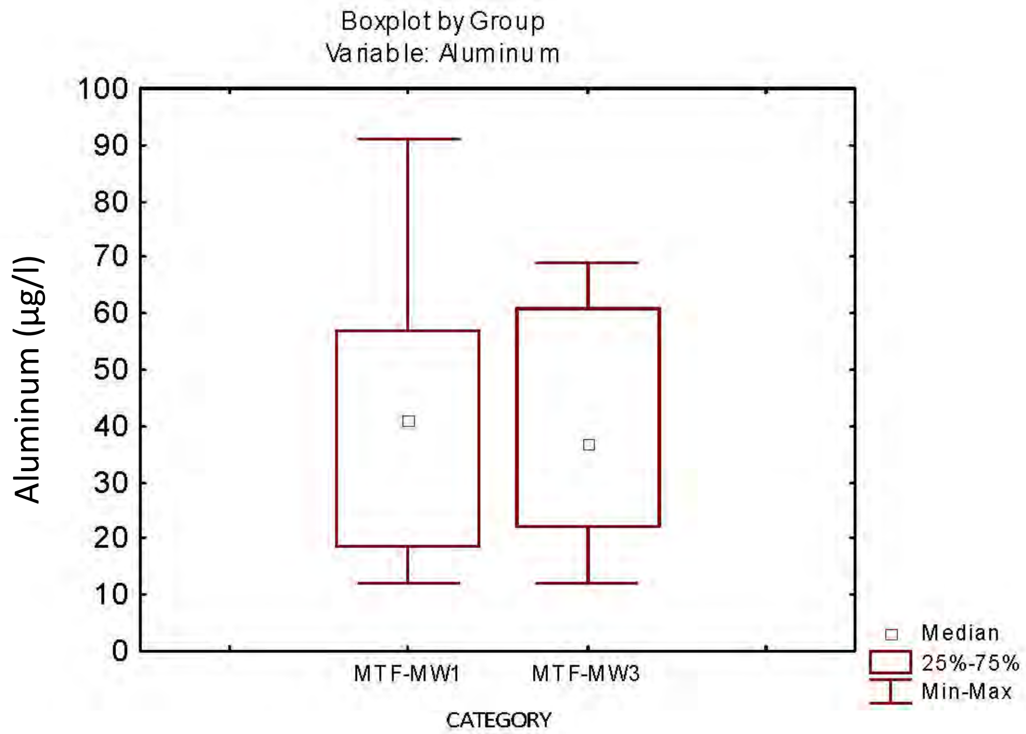


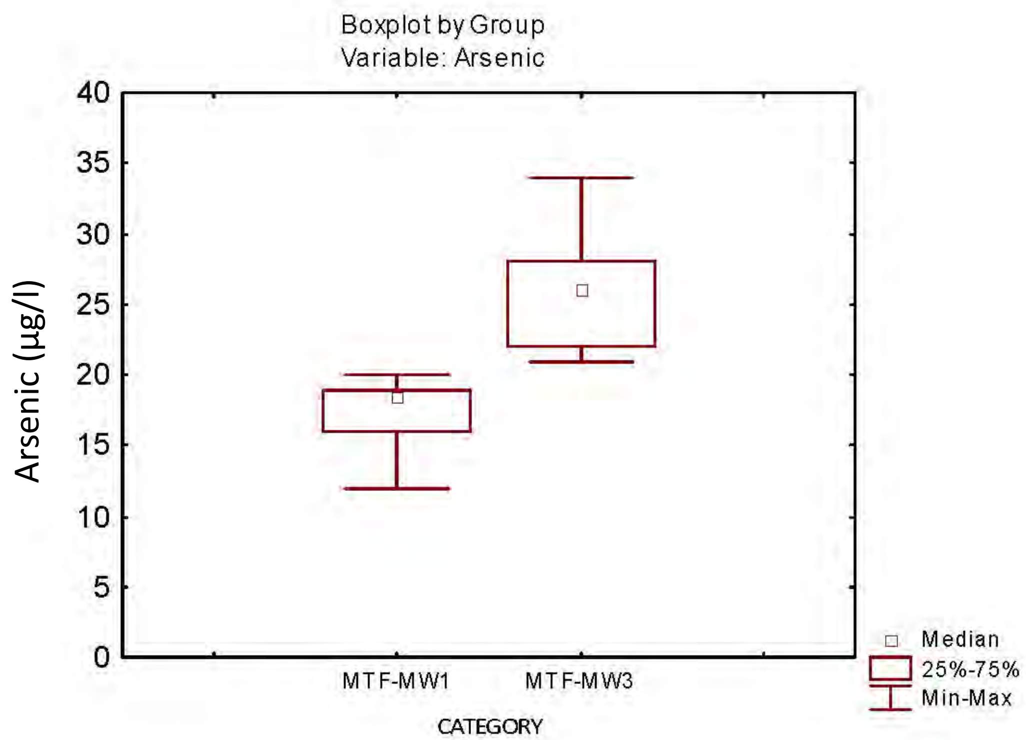


ATTACHMENT D-B

BOX PLOTS

MTF GROUNDWATER
BOX AND WHISKER PLOTS





MTF GROUNDWATER
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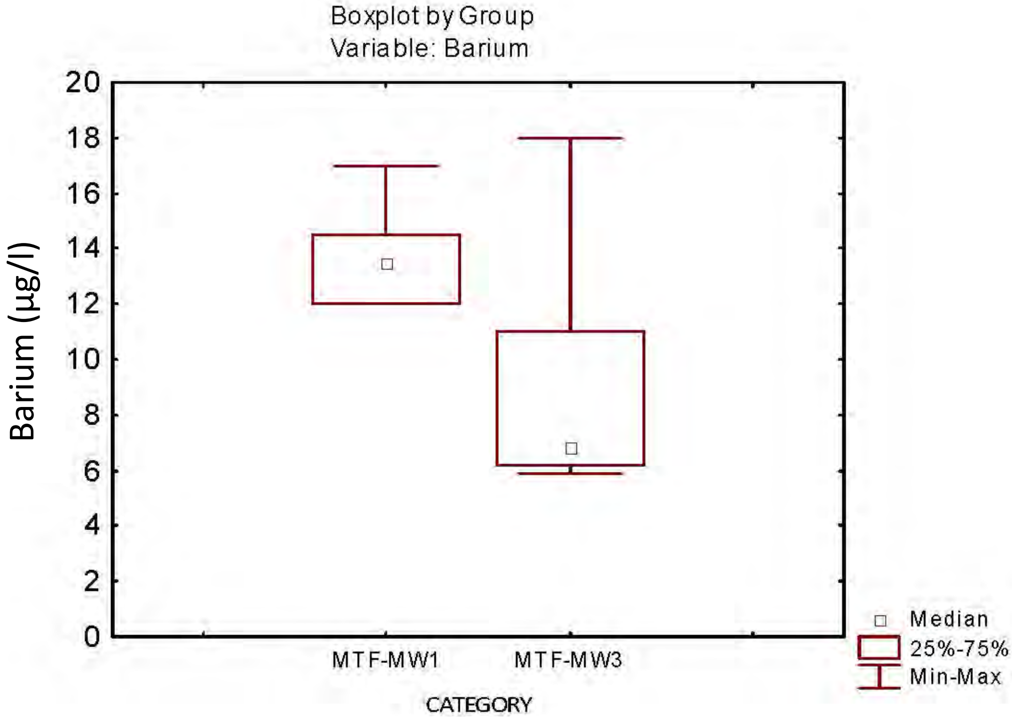

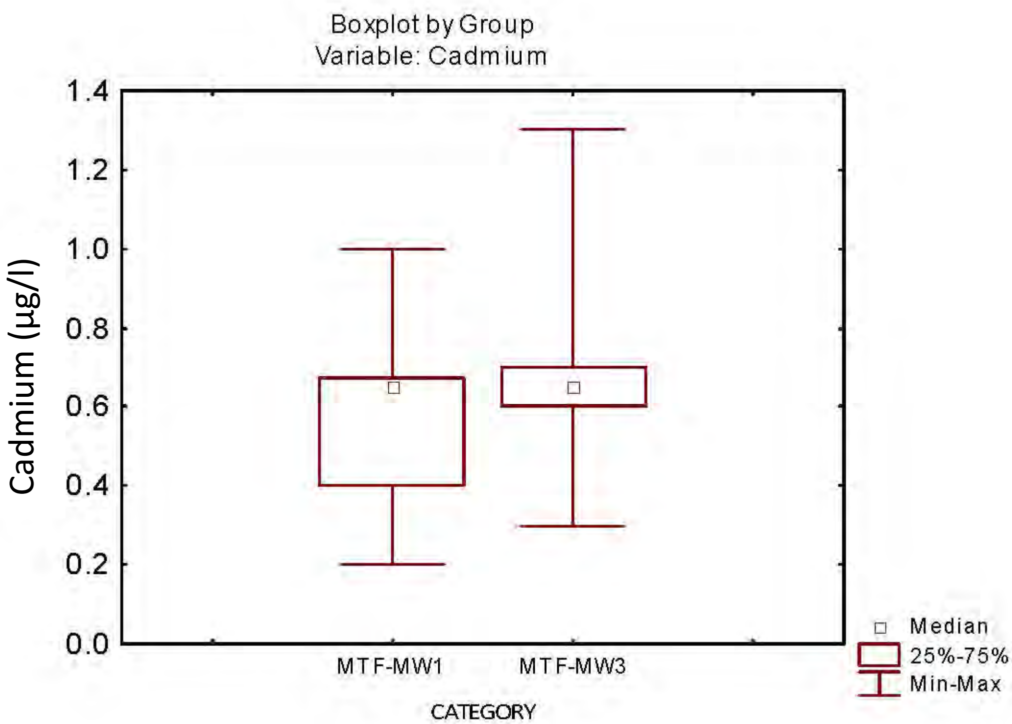

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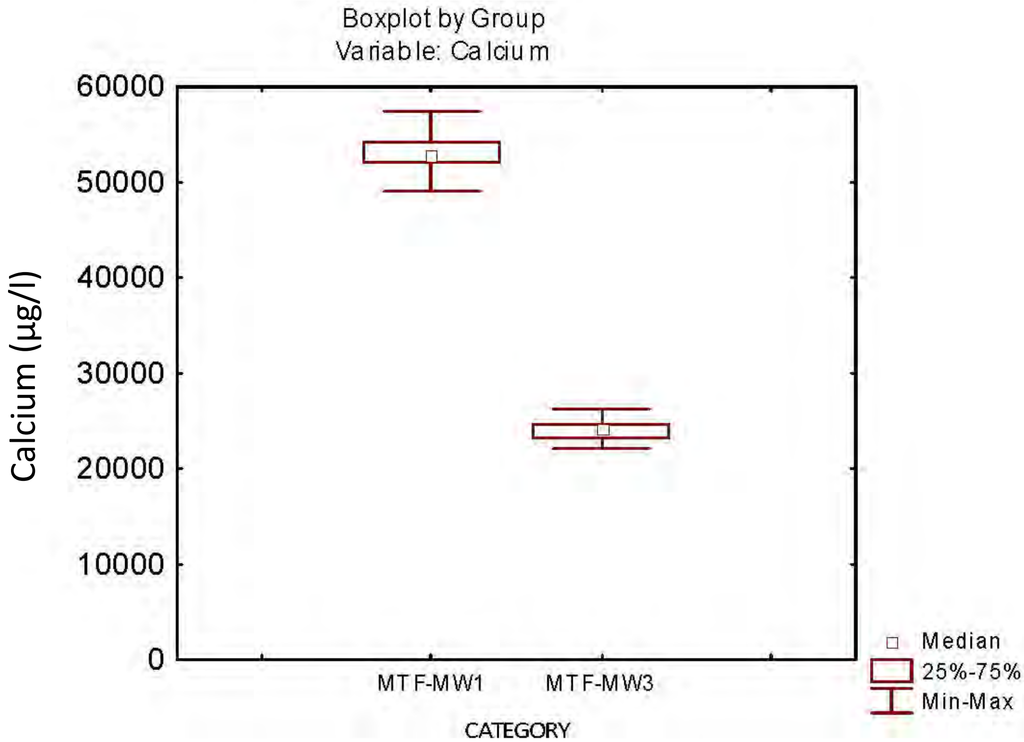
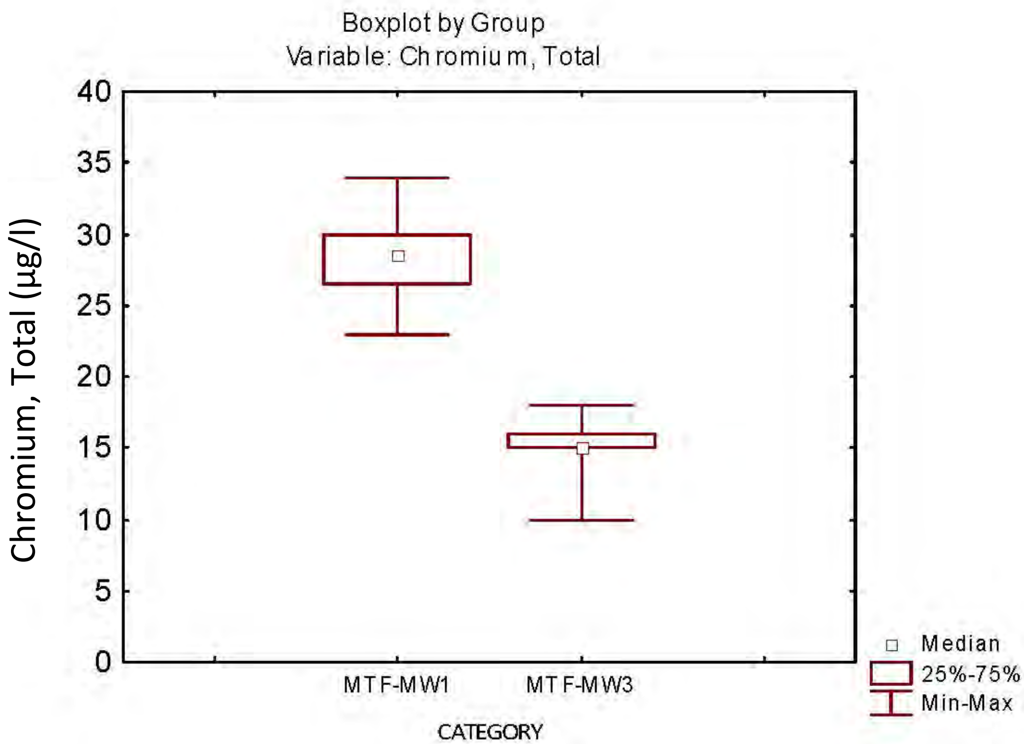
BOX AND WHISKER PLOTS





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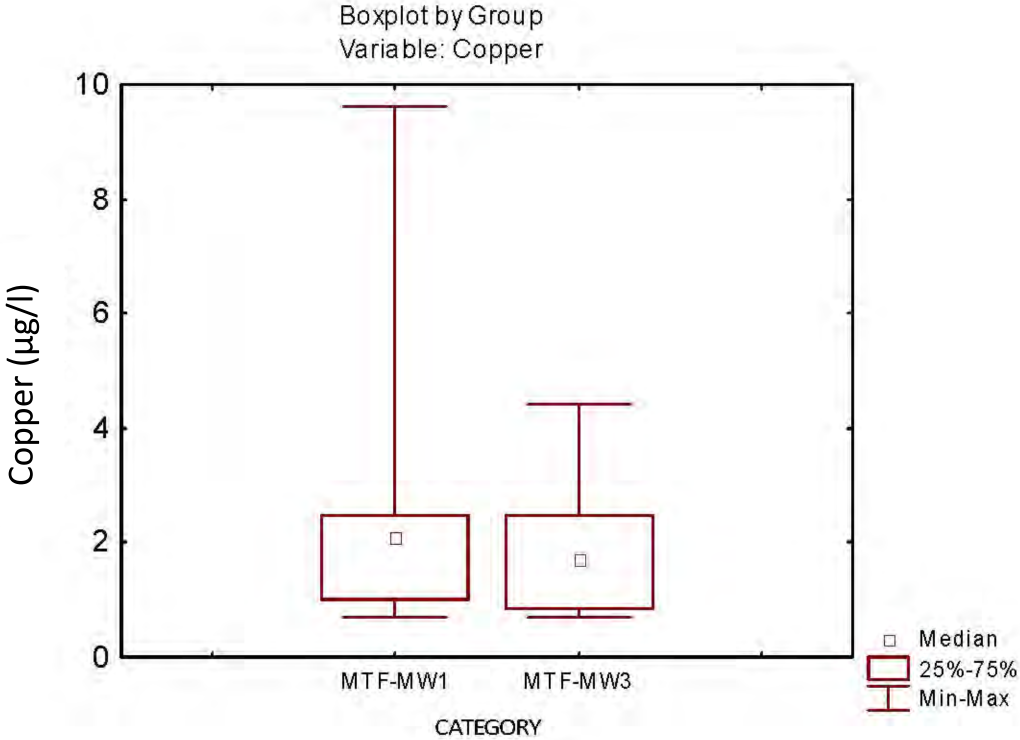

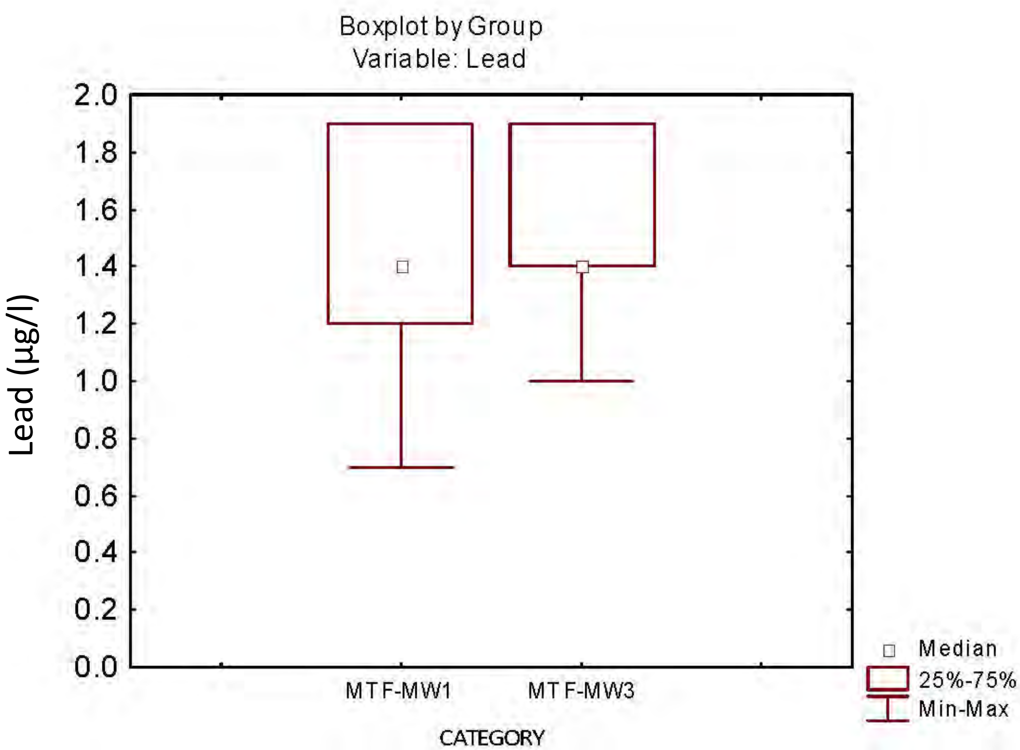

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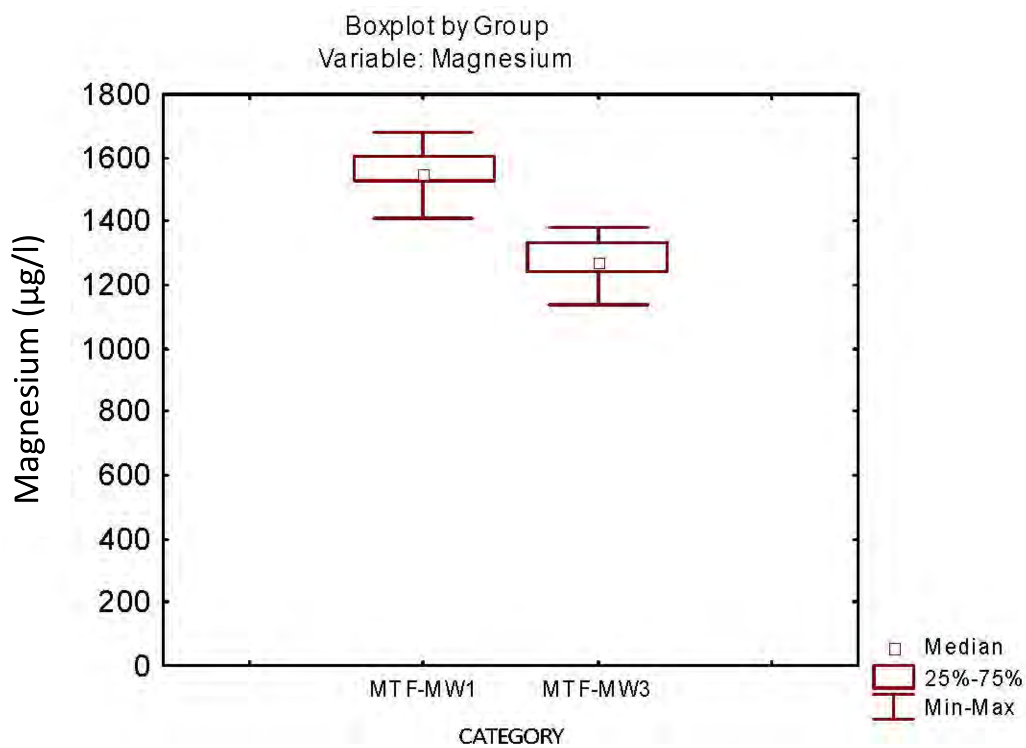

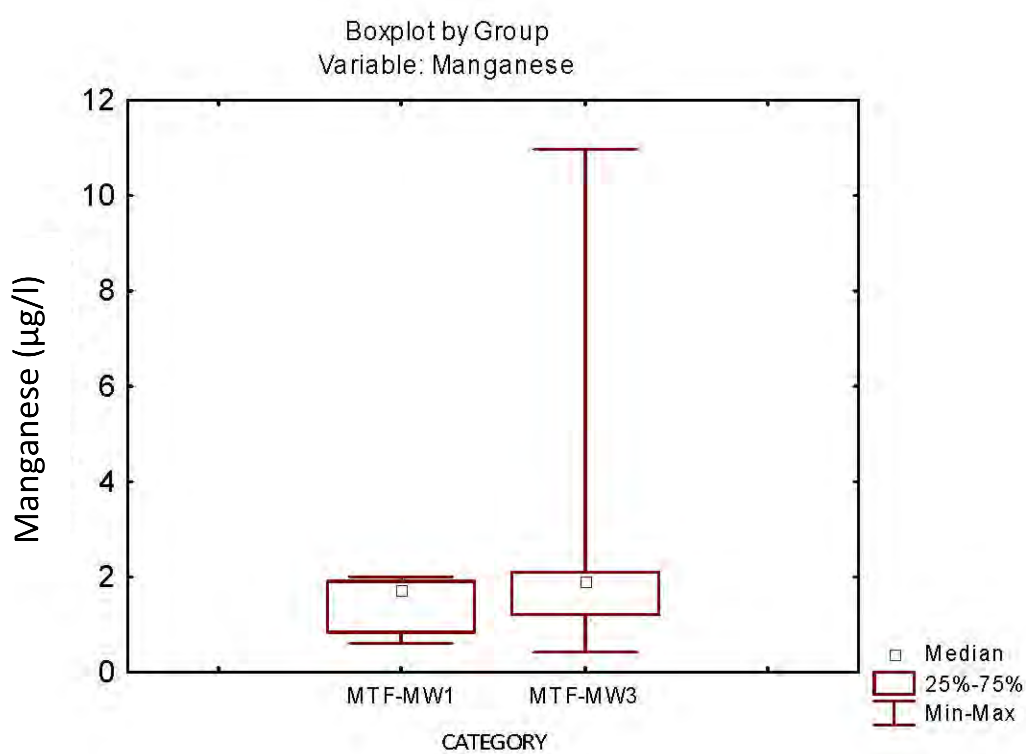

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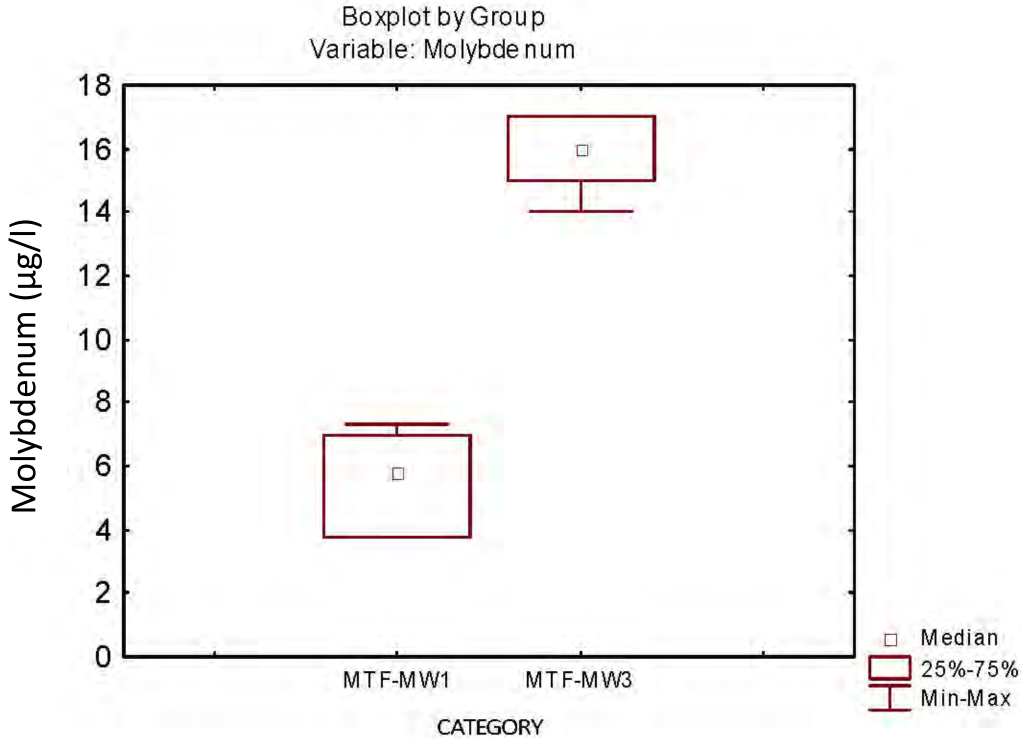

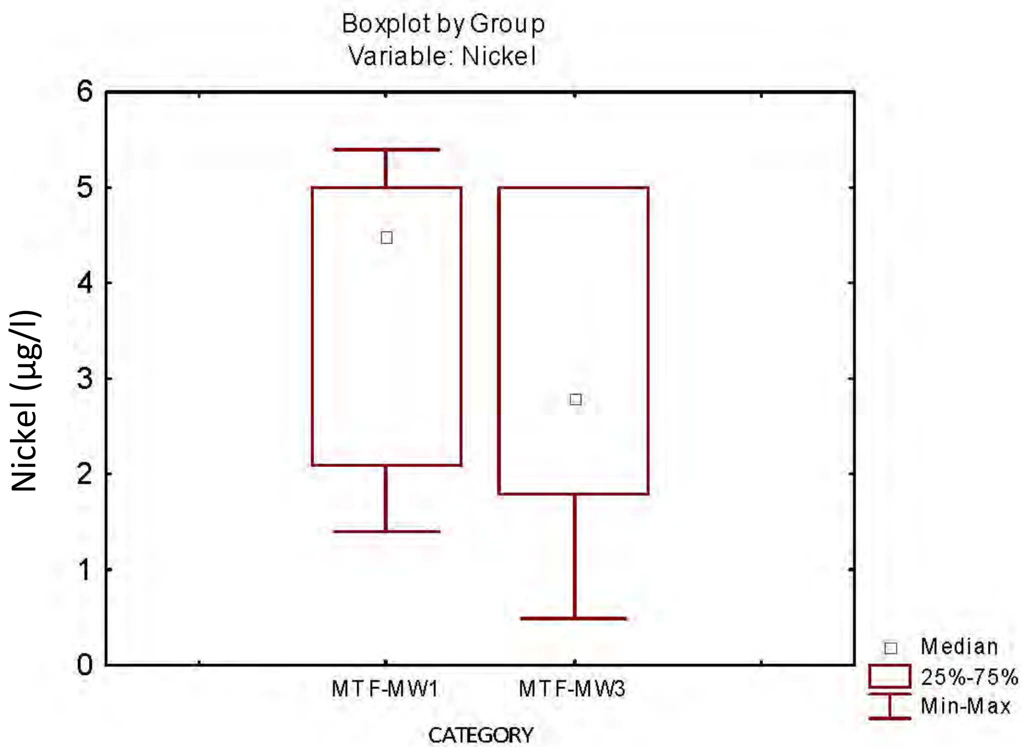

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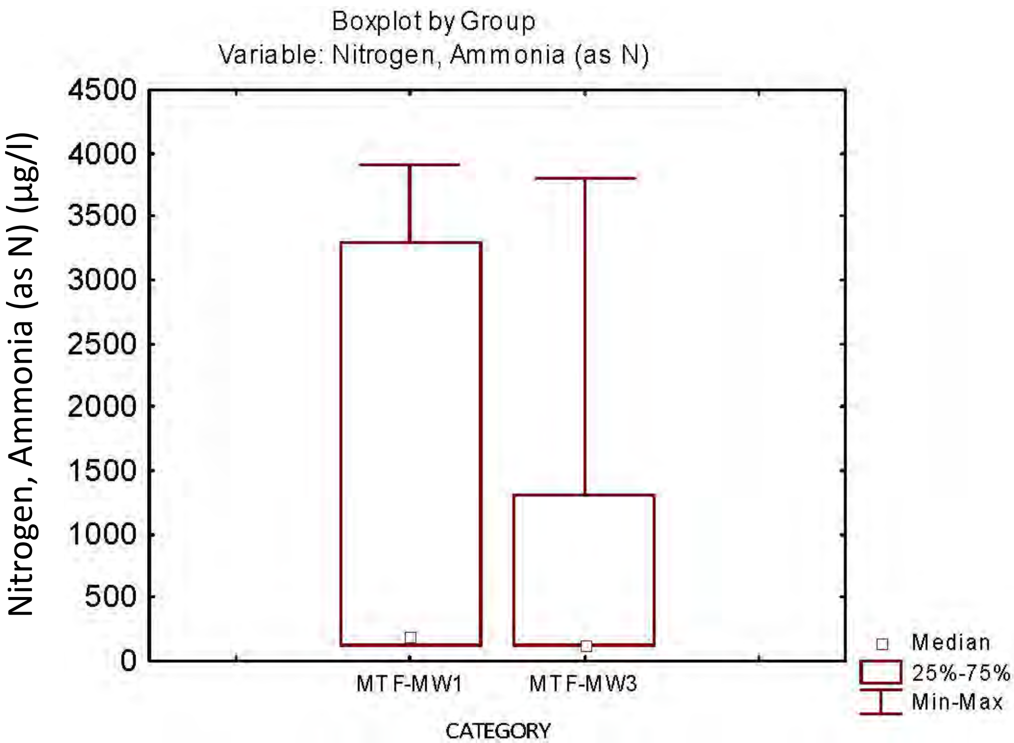

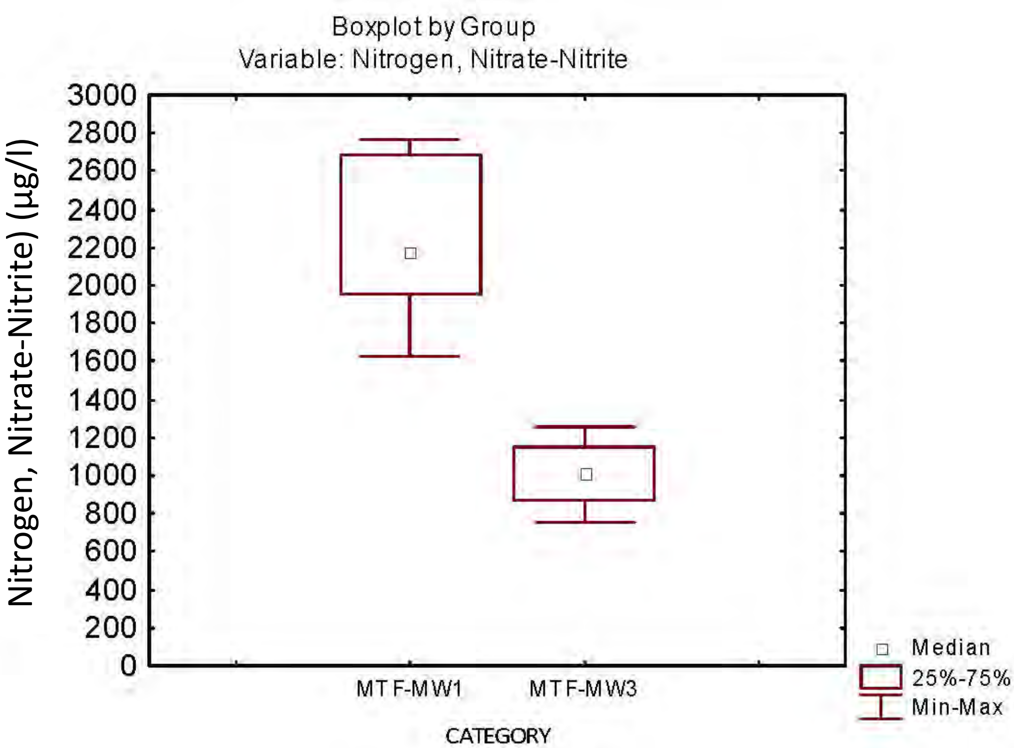

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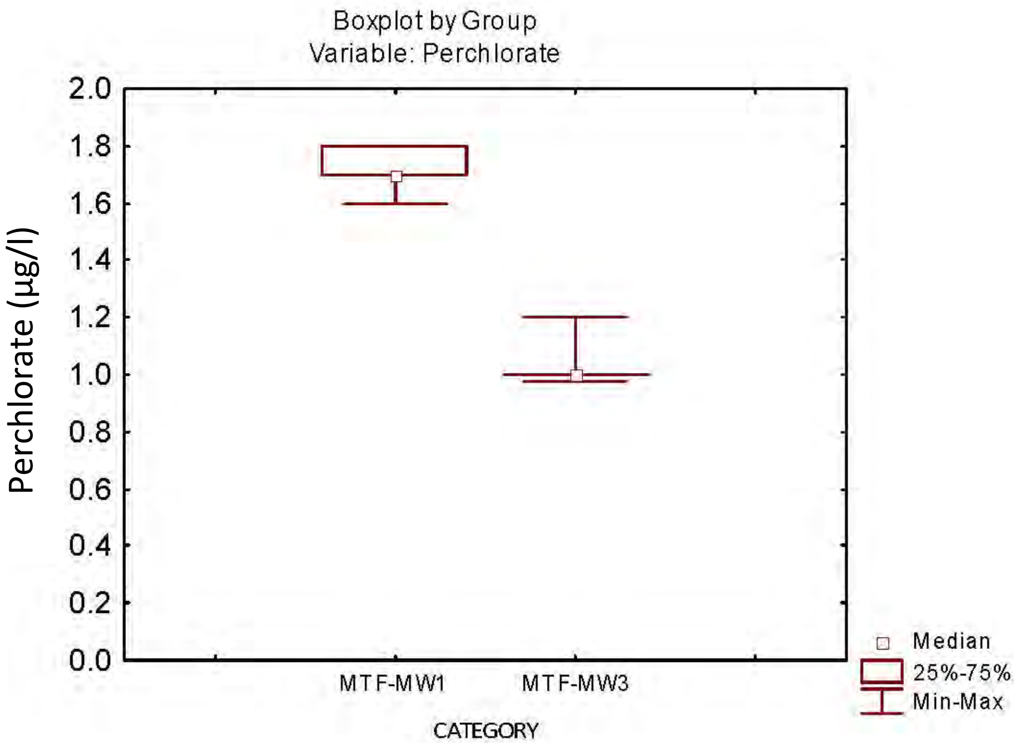
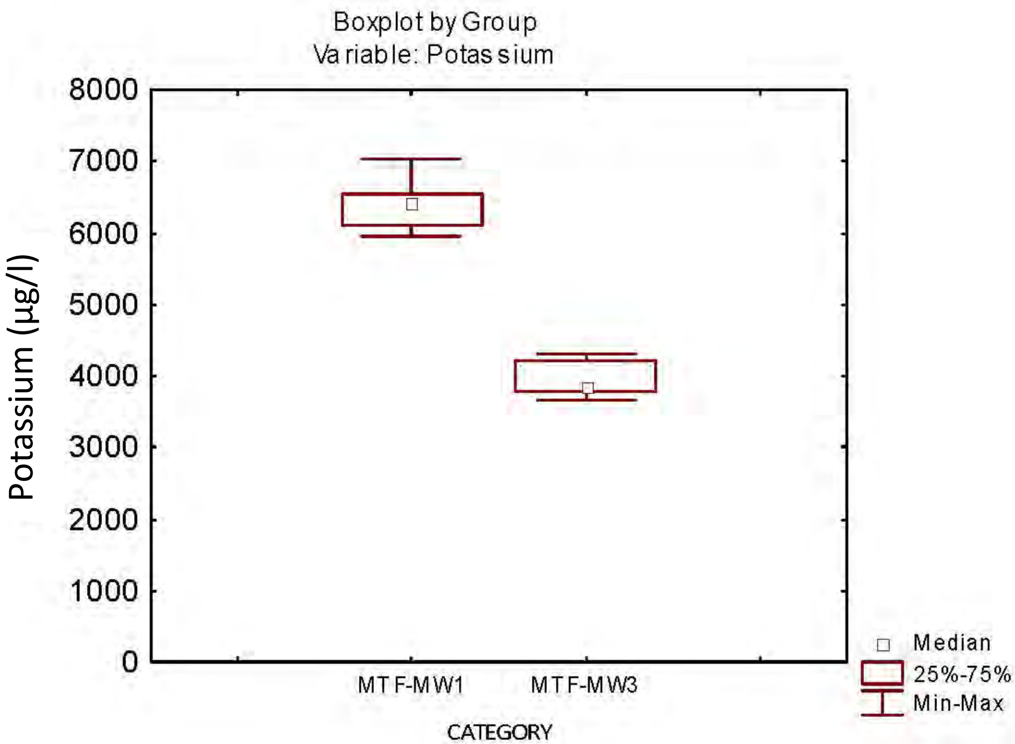
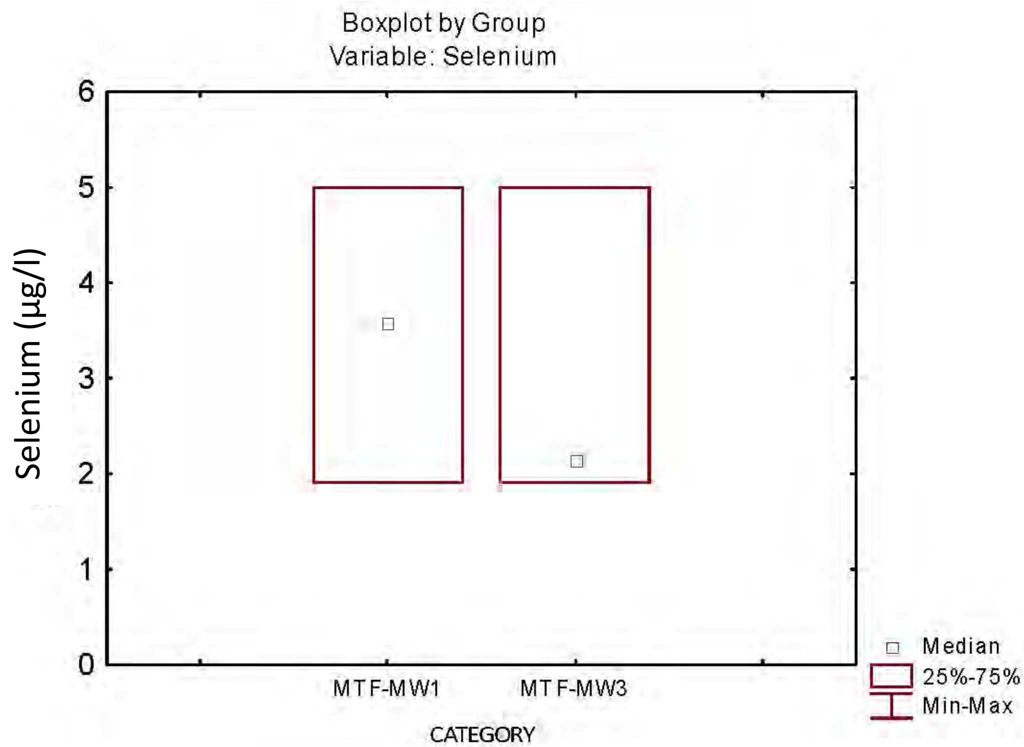
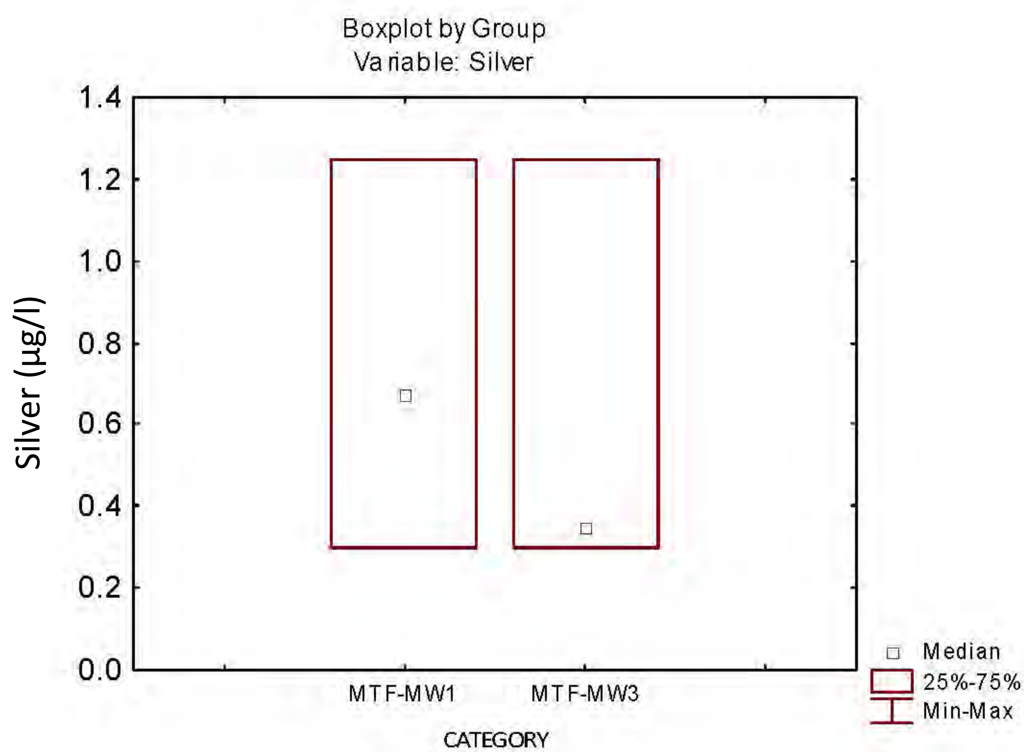




MTF GROUNDWATER
BOX AND WHISKER PLOTS





MTF GROUNDWATER
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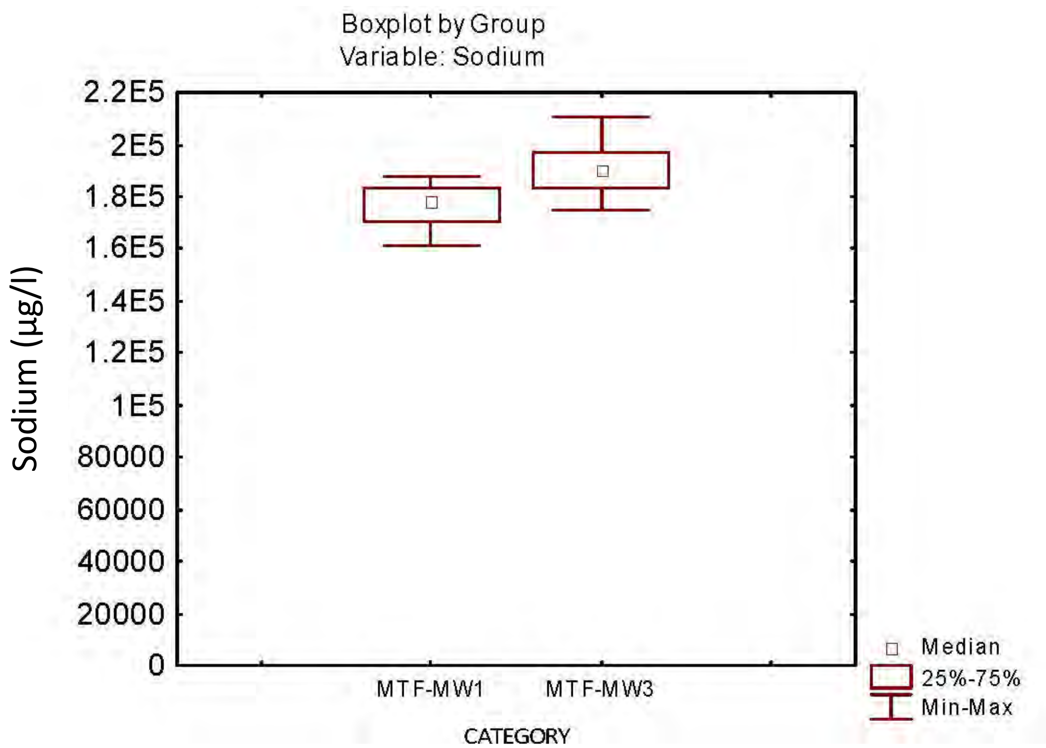

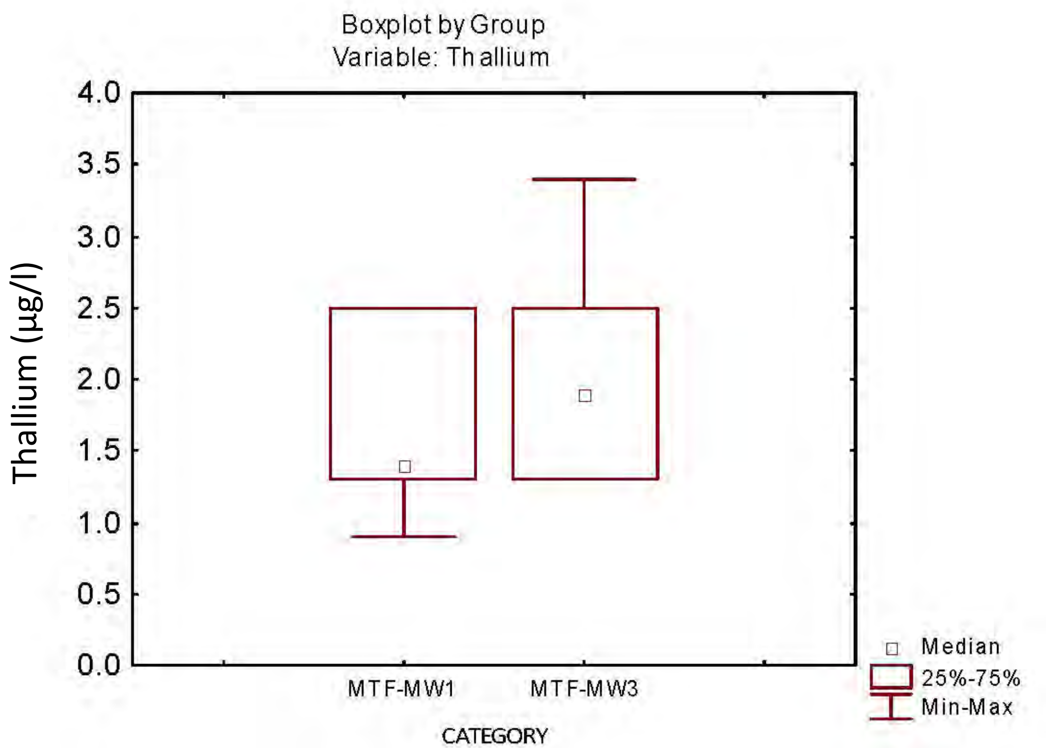

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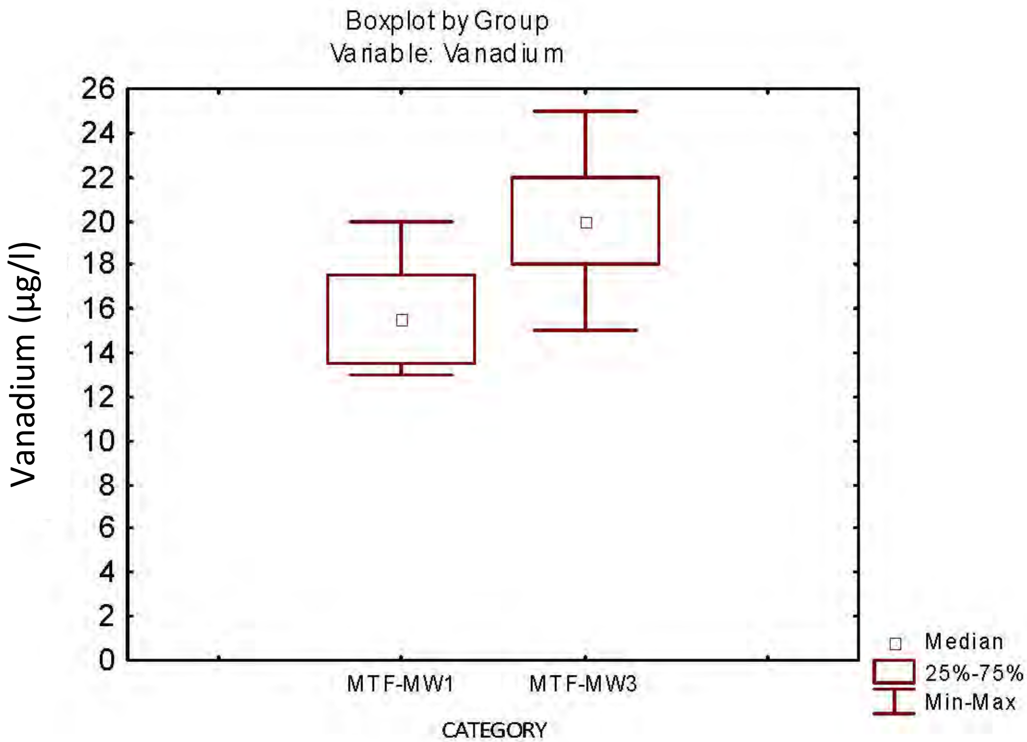
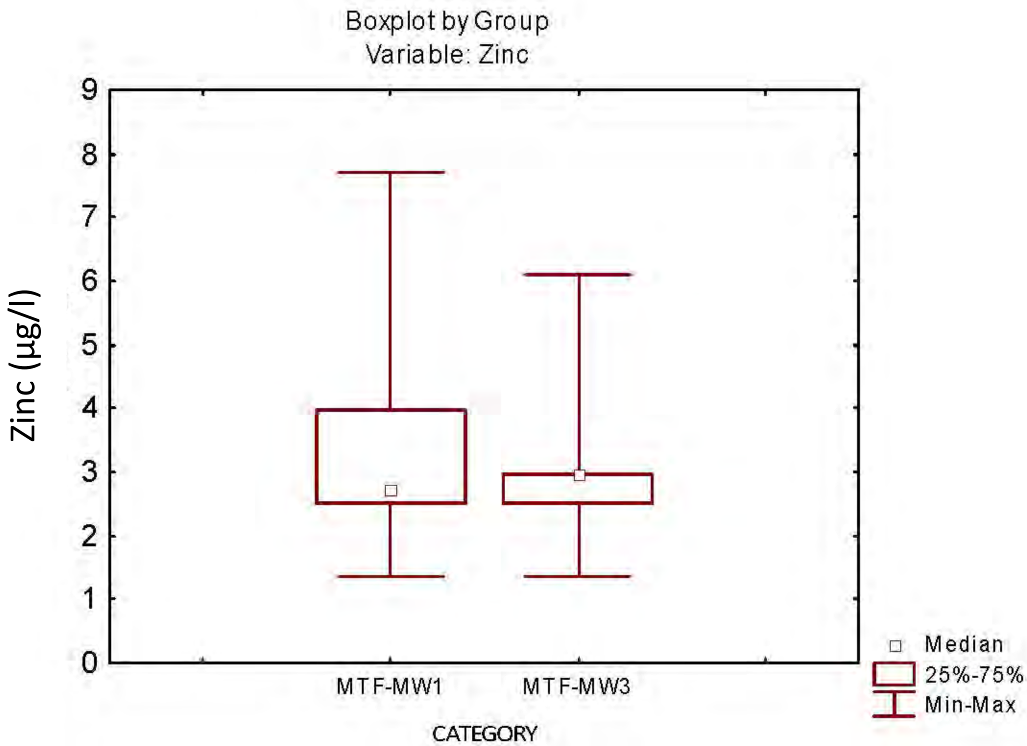
BOX AND WHISKER PLOTS





Attachment 7A-2

Addendum of Groundwater Monitoring Plan for the Munitions Treatment Facility, April 2017

ADDENDUM OF GROUNDWATER MONITORING PLAN FOR THE MUNITIONS TREATMENT FACILITY

April 2017

Paragraphs of the May 2014 Groundwater Monitoring Plan are amended as follows (changes are shown as strikeouts for deletions and bold for additions):

Section 1.0, Paragraph 3

This plan describes the process for obtaining groundwater samples for laboratory analysis and water quality field parameter data from the two groundwater monitoring wells, and depth to water measurements from two groundwater monitoring wells and one industrial use production well, at **two year** ~~five year~~ intervals under a detection monitoring program as required by the operating permit.

Section 1.1, Paragraph 2

The purpose of revising this Groundwater Monitoring Plan is to support USAGYPG's Class 2 Permit Modification Request (PMR) dated June 26, 2013. The PMR will reduce the number of downstream monitoring wells from three to one~~, and reduce the frequency of sampling from biennially to every five years to coincide with the long term surface soil sampling respectively~~.

Section 4.0, Paragraph 3

Based on the analytical results and the statistical analysis VOCs, SVOCs, nitrate/nitrite and ammonia were removed from the list. As a result, the current analyte list consists of explosives, perchlorate, and TAL metals. A summary of analytical results for the sampling effort is presented in Appendix D, Table D-2. There is no evidence from the data to indicate migration of hazardous constituents from the MTF operations to the ground water. Based on this, USAGYPG will continue the groundwater monitoring detection program on a **two year** ~~five year~~ cycle ~~to coincide with the long term surface soil sampling as proposed in the class 2 PMR~~.

Section 5.1, Paragraph 1

Groundwater monitoring is conducted in accordance with the indicator parameters required under RCRA in 40 CFR §264.94, 40 CFR §264.98(a), and the MTF permit. A risk based approach will be used for cleanup, if required. The potential for contamination of the groundwater at the MTF is minimal, therefore monitoring is conducted to determine if there is statistically significant evidence of contamination. For strictly anthropogenic compounds (i.e., explosives~~, and perchlorate~~), statistically significant evidence of contamination is defined as concentrations above detection limits in downgradient wells. For inorganics (i.e., TAL metals), statistically significant evidence of contamination is defined as levels in down-gradient wells that are statistically elevated when compared with up-gradient (background) well concentrations.

Section 5.2, Paragraph 1

A statistical analysis was performed on the analytical data collected over nine quarters, August 2011 through August 2013, of sampling at monitoring wells MTFMW1 (up-gradient well) and MTF-MW3 (down-gradient) located at the Kofa OB/OD MTF. The groundwater samples were analyzed for metals, explosives, VOCs, perchlorate, and SVOCs. The objective of the statistical analysis was to identify concentration differences between samples collected from the up- and down-gradient monitoring wells, potentially indicating impacts to groundwater from site activities. A summary of analytical results for the sampling effort is presented in Table D-2. Only metal analytes were detected consistently above laboratory reporting limits. Multiple statistical methods were used to determine if there is a statistical difference between the up- and down-gradient monitoring wells. The statistical analysis shows that there is no evidence from the data to indicate migration of hazardous constituents from the MTF. USAGYPG will continue the groundwater monitoring detection program on a **two year** ~~five year~~ cycle ~~to coincide with the long term surface soil sampling~~. The statistical analysis summary is provided in Appendix D.

Section 6.4.1, Paragraph 1

The USAGYPG will provide ADEQ a notice of tentative sampling dates for each ~~the first~~ **two year** ~~five year~~ cycle ~~due~~ of sampling ~~scheduled for August 2018~~. This notification will be provided 21 days in advance.

Section 6.4.2, Paragraphs 1, 2 and 3

After the next ~~initial~~ **two year** ~~five year~~ sampling event, a statistical evaluation of the analytical results will be performed.

Upon completion of data validation, analytical data summaries will be submitted to ADEQ. Similar reports will be submitted every **two years** ~~five years~~ thereafter. The compliance monitoring report will include sections on project activities, analytical results summary, and recommendations for future sampling. The project activities section will include project objectives, a summary of groundwater sampling activities, a summary of laboratory analyses, and a summary of the data quality evaluation. The results section will include well gauging data, analytical results summary and an evaluation of human health risks, if any. Raw analytical data and the full data quality validation will be submitted as appendices to the report.

The report will be prepared under the direction of and sealed by an Arizona Registered Professional Engineer. **The report will be certified by the appropriate USAGYPG authority for submission to ADEQ**.

Section 6.4.3, Paragraph 1

Future monitoring events are scheduled every **two years** ~~five years (beginning in Aug 2018) and will coincide with the USAGYPG Long -Term Surface Soils Monitoring Plan~~. Collected samples will be analyzed for explosives, perchlorate, and TAL metals analytes as identified in Sampling and Analysis Plan, Appendix B Table B-1. This analyte list is based on the statistical evaluation, of the analytical results for the groundwater samples collected at the Kofa OB/OD facility over nine quarters, which shows that there is no evidence from the data to indicate migration of hazardous constituents from the MTF. As a result VOCs, SVOCs, nitrate/nitrite and ammonia were removed from the list. The statistical analysis is provided in appendix D.

Appendix B, Section B.2.3, Paragraphs 1 and 3

This project describes the process for obtaining groundwater samples for laboratory analysis and water quality field parameter data from the two groundwater monitoring wells, and depth to water measurements from two groundwater monitoring wells and one industrial use production well, at **two year** ~~five year~~ intervals under a detection monitoring program as required by the operating permit under which USAGYPG is currently operating.

For the initial detection monitoring and to establish a baseline, groundwater samples were collected over nine quarters of sampling at monitoring wells MTF-MW1 (up-gradient well) and MTF-MW3 (down-gradient) located at the Kofa OB/OD MTF. Groundwater samples were analyzed for metals, explosives, volatile organic compounds (VOCs), perchlorate and semi volatile organic compounds (SVOCs). A statistical analysis was performed on the data. Based on this analysis, the analyte list was reduced to explosives, perchlorate, and TAL metals. ~~The five year sampling schedule is based on the statistical evaluation which shows that there is no evidence from the data to indicate migration of hazardous constituents from the MTF.~~ The groundwater monitoring detection program will continue at **two year** ~~five year~~ intervals ~~that coincide with the long term surface soil sampling as proposed in the class 2 PMR~~.

Appendix B, Section B.3.1, Paragraph 2

During each **two year** ~~five year~~ sampling event, groundwater samples will be collected for analysis explosives, perchlorate and TAL metals. The analytical protocol will also include an assessment of tentatively identified compounds (TICs) to reflect all types of explosive waste ever treated at the MTF. Both filtered and unfiltered (total) samples will be collected for metals analysis. One duplicate sample will be collected each sampling event. The two wells in the groundwater monitoring network will be selected for the duplicate location, once each sampling event. No equipment blank samples will be required, as the wells are equipped with dedicated pumps.

Appendix B, Table B.1, Header

SUMMARY OF GROUNDWATER SAMPLES TO BE COLLECTED FROM MTF GROUNDWATER MONITORING WELLS, EVERY **TWO YEARS** ~~FIVE YEARS~~

Appendix B, Table B.1, Table Row 6

Total # of Samples (per **two year** ~~five year~~ event):

Appendix D, Section D.1, Paragraph 4

The Kofa OB/OD site was designed to manage adequate surface water runoff that is channeled around the site. Any precipitation at the site is not likely to infiltrate to groundwater due to the high evapotranspiration rate. In addition to the depth of the water-bearing zone, the underlying groundwater flow is extremely slow due to a low hydraulic gradient. These factors indicate that vulnerability of the groundwater system at the Kofa OB/OD area is low. It is recommended that future groundwater sampling events be conducted every **two years** ~~five years~~, with groundwater samples being analyzed for metals, explosives and perchlorate.

ATTACHMENT 7B

PE CERTIFICATION

CTI-URS

Environmental Services, LLC

51331 W. Pontiac Trail, Wixom, MI 48393 248.486.5100 Main 248.486.5050 Fax

27 February 2015

Attn: Ismael Delgado
U.S. Army Garrison Yuma
DPW Environmental Science Division
301 C Street, Bldg. 307
Yuma, AZ 85365

RE: Engineer's Certification Statement
Groundwater Monitoring Plan for the Munitions Treatment Facility
U.S. Army Garrison Yuma Proving Ground
Yuma, Arizona

Dear Mr. Delgado,

CTI-URS Environmental Services, LLC (CUES) has reviewed the document *Groundwater Monitoring Plan for the Munitions Treatment Facility* (GWMP) which was previously submitted to the U.S. Army Garrison Yuma Proving Ground (USAGYPG), as prepared by Parsons dated September 2010 and revised by USAGYPG Environmental Sciences Division May 2014.

Based on our review of said document, the data presented in the GWMP is hereby certified to be complete and accurate to the best of our knowledge and professional opinion.

Please feel free to contact me with any questions.

Sincerely,

Kevin D. Manuel, P.E.
Project Director
kmanuel@cticompanies.com

Registered Professional Engineer (Civil)
CERTIFICATE NO.
57439
KEVIN D.
MANUEL
Date Signed 2/23/15
ARIZONA U.S.A.

CTI-URS

Environmental Services, LLC

ATTACHMENT 7C

DRAFT FINAL GROUNDWATER MONITORING REPORT KOFA OB/OD MUNITIONS TREATMENT FACILITY 2016

DISCLAIMER: The conclusions presented in this report are specific to this report only and are based on the engineering judgement of the authors. These conclusions do not indicate an official position or agreement from the Arizona Department of Environmental Quality.

YUMA PROVING GROUND
YUMA, ARIZONA

DRAFT FINAL GROUNDWATER MONITORING REPORT KOFA OB/OD MUNITIONS TREATMENT FACILITY 2016

Submitted to:
U.S. ARMY GARRISON YUMA PROVING GROUND

November 2016

Prepared by:

GSI North America, Inc.
and
Weston Solutions, Inc.

DRAFT FINAL

GROUNDWATER MONITORING REPORT
KOFA OB/OD
MUNITIONS TREATMENT FACILITY
2016

U.S. ARMY GARRISON
YUMA PROVING GROUND

Submitted To:

U.S. ARMY GARRISON YUMA PROVING GROUND

Prepared By:

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and
Weston Solutions, Inc.

November 2016

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ACRONYMS AND ABBREVIATIONS

%	Percent
ADEQ	Arizona Department of Environmental Quality
amsl	Above Mean Sea Level
AWQS	Arizona Aquifer Water Quality Standards
bgs	Below Ground Surface
CFR	Code of Federal Regulations
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
DO	Dissolved Oxygen
DQO	Data Quality Objective
ESA	Endangered Species Act
ºF	Degrees Fahrenheit
ft	Foot/Feet
GCAL	Gulf Coast Analytical Laboratory
HBGL	Health-Based Guidance Level (for drinking water)
IDW	Investigation-Derived Waste
IU	Inactive Hazardous Waste Treatment Unit
KFR	KOFA Firing Range
µg/L	Micrograms Per Liter
MC	Munitions Constituent
MCL	Maximum Contaminant Level (Drinking Water Standards)
MEK	Methyl Ethyl Ketone
MK	Mann-Kendall
MS/MSD	Matrix Spike/Matrix-Spike Duplicate
MTF	Munitions Treatment Facility
MW	Monitoring Well
NO_2	Nitrite
NO_3	Nitrate
OB/OD	Open Burn/Open Detonation

ACRONYMS AND ABBREVIATIONS (CONTINUED)

QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
SAP	Sampling and Analysis Plan
SLERA	Screening Level Ecological Risk Assessment
SOP	Standard Operating Procedure
SVOCs	Semivolatile Organic Compounds
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
U.S.	United States
USAGYPG	U.S. Army Garrison Yuma Proving Ground
USEPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
VOCs	Volatile Organic Compounds
WRS	Wilcox Rank Sum

SECTION 1.0
INTRODUCTION

This Groundwater Monitoring Report was prepared by GSI North America, Inc. (GSINA) on behalf of U.S. Army Garrison Yuma Proving Ground (USAGYPG), Yuma, Arizona, and U.S. Army Corps of Engineers (USACE), Albuquerque District, contract number W912PP-16-C-0008. The report summarizes the groundwater sampling event conducted in August 2016 at two monitoring wells (MTF-MW1 and MTF-MW3) located at the open burn/open detonation (OB/OD) munitions treatment facility (MTF) on the KOFA Firing Range (KFR). Previous groundwater monitoring at the MTF was performed by Parsons, Inc. (Parsons) and described in *Final Groundwater Monitoring Report, KOFA OB/OD Munitions Treatment Facility, 2011-2013* (Parsons, 2014b). This report adds to information presented by Parsons in 2014.

1.1 PURPOSE

The Arizona Department of Environmental Quality (ADEQ) issued an Arizona Hazardous Waste Management Act hazardous waste treatment permit to USAGYPG on June 29, 2007. This permit, number AZ5213820991, governs the operations and eventual closure activities for the MTF located on the KOFA Firing Range (KFR) of USAGYPG. Based on requirements of the permit, a Groundwater Monitoring Plan for assessing and monitoring potential impacts to groundwater as a result of activities at the MTF was submitted and approved by ADEQ (Parsons, 2010b).

Part VI.A.1 of the hazardous waste treatment permit requires USAGYPG to assess and correct releases of hazardous wastes, including hazardous constituents, from any solid waste management unit (SWMU) at the facility, regardless of when the waste was placed in the unit. If the results from groundwater sampling show that releases of hazardous waste from the MTF or any other SWMU have impacted groundwater, USAGYPG must perform investigations to assess the cause of the impact and mitigate the damage. The purpose of the groundwater monitoring activities at the KOFA MTF is to meet the requirement for a detection monitoring program under the Resource Conservation and Recovery Act (RCRA) and evaluate the quality of groundwater at the site as a baseline level.

Groundwater samples at the KOFA MTF were collected for analysis of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), explosives, perchlorate, target analyte list (TAL) metals, nitrate/nitrite, and ammonia in May 2011 and during nine quarterly groundwater sampling events conducted between August 2011 and August 2013.

In August 2014, ADEQ approved a Class 2 permit modification request (ADEQ, 2014). The request related to revisions to the existing Groundwater Monitoring Plan, and inclusion of the revised plan in the permit as Attachment 7. These revisions were incorporated into the permit and the existing Groundwater Monitoring Plan in August 2014 (Parsons, 2010b). The changes approved to the groundwater monitory plan involved:

1. Reduction in the number of downstream monitoring well from three to one.
2. Deletion of the VOCs, SVOCs, nitrite/nitrate, and ammonia from the original analyte list and restricting the groundwater analyses to explosives, perchlorate, and TAL metals.
3. Reducing the groundwater monitoring frequency from once a quarter to once in two years.
4. Inclusion of the results of quarterly sampling performed since May 2011 in Permit Attachment 7.

Groundwater samples were collected in August 2016 at the KOFA MTF for the analysis of explosives, perchlorate, and TAL metals (Total and Dissolved) as directed by the revised Groundwater Monitoring Plan (Parsons, 2010b).

1.2 BACKGROUND

Background information for the KOFA MTF was originally provided in the 2014 Groundwater Monitoring Report (Parsons, 2014b).

1.2.1 Site Description

USAGYPG is located in the southwestern portion of the State of Arizona (Figure 1.1). The KOFA MTF is located on the KFR, approximately 10 miles north of the main KFR complex. The MTF is a rectangular fenced area approximately one square mile in size (Figure 1.2). Active, inactive, and planned treatment units cover two to three acres in the central portion of the facility.

The inactive units were removed in early December 2013. The new units have been constructed in accordance with the MTF Permit, and include burn pads and demolition trenches (Figure 1.2). The remaining area of the MTF serves as a safety buffer zone.

Subsurface sediments at the MTF consist of sandy river deposits interbedded with finer-grained sediments and gravel lenses of variable thickness. These flood deposits have accumulated over the past one million years. Such flooding no longer occurs due to the construction of Hoover Dam on the Colorado River (Argonne, 2004).

1.2.2 Process Operations Description

USAGYPG is a modern research and development facility focused on testing military equipment. In conducting these test programs, USAGYPG uses significant quantities of munitions and explosives. Each year, quantities of these materials must be treated as wastes. These wastes include out-of-date explosives and propellants, items in storage or manufacture that have failed quality assurance tests, out-of-date and excess munitions items, and any unsafe munitions items, components, or explosives. At present, OB/OD operations are the means of demilitarizing many explosive items, decontaminating explosives from large metal objects, and reducing most combustibles to a smaller volume. OB/OD is the safest method currently available for the effective destruction, decontamination, and treatment of explosives and explosive wastes. OB/OD is conducted at USAGYPG at the MTF, which is subject to regulation under RCRA. ADEQ has primacy over implementation of RCRA rules within the State of Arizona.

1.3 SITE SETTING

1.3.1 Geology

The USAGYPG installation is located in the Sonoran Desert, in the Basin and Range physiographic province. The KOFA MTF is located on a broad alluvial plain bordered by pediments that surround the Middle Mountains to the west and the Castle Dome Mountains to the east. The area is composed of alluvial deposits, desert pavements, and shallow ephemeral stream systems. Additional details on the regional physiography and geology are provided in the Site Characterization Report (Jason, 2007) and Attachment 14 (Closure Report) in the RCRA Part B Permit (ADEQ, 2007).

1.3.2 Soils

The KOFA MTF is located on Quaternary alluvium of the broad Castle Dome Plain. Landforms in the area of the KOFA OB/OD Facility are characterized by dry washes, channel bars, fan aprons, flood plains and desert pavements. The following soil complexes are found in the area (Cochran, 1991):

- Riverbend family – Carrizo family complex; and
- Cristobal family – Gunsight family, gypsiferous substratum complex.

These soils consist of silty loam and sandy loam mixed with gravels. They are classified as being well drained. Available water capacity is very low, and runoff in unsaturated soil is slow to moderate. Soils from these two complexes constitute a braided channel depositional environment on a complex/coalescing alluvial fan (alluvial plain). Soils from the Riverbend family are found in active drainage channels, representing naturally disturbed soils. Soils from the Cristobal family are located on channel bars and delineate areas of undisturbed soils (i.e., development of desert pavements).

1.3.3 Surface Water

Surface water resources at USAGYPG include only desert washes. However, two major rivers flow through the adjacent desert areas bordering USAGYPG: 1) the Colorado River, which flows from north to south to the west of USAGYPG; and 2) the Gila River, which flows from east to west to the south of USAGYPG. The Gila Gravity Main Canal (which is used for transporting irrigation water and drinking water for the city of Yuma) lies approximately ¼ mile west of the USAGYPG boundary, approximately 11 miles west of the MTF. The drainage system in the western portion of USAGYPG flows west, northwest, and southwest into the Colorado River, while the central and eastern portions flow south into the Gila River. Unnamed washes located on the KFR flow into the Castle Dome Wash and eventually into the Gila River, which is located 13 miles south. Most of the surface flow occurs in lowland washes. These washes are dry during the year except during occasional periods of intense rainfall when precipitation is sufficient enough to cause overland flow into the washes. The combination of low precipitation and high evaporation in the area prevents surface water from infiltrating deeply into the soil.

1.3.4 Climate

The USAGYPG is in the Sonoran Desert, and its climate is typical of a hot, arid desert at a low elevation. It is characterized by high daytime temperatures with large daily temperature variations, low relative humidity, and very low average precipitation. The average monthly air temperature ranges from a low of 42 degrees Fahrenheit (°F) in January to a high of 106°F in July. The average annual precipitation in Yuma and other nearby areas along the lower Colorado River is 3.5 inches (Gutierrez-Palmenberg, Inc., 2001). Rainfall occurs predominantly in the form of summertime thunderstorms, which are sometimes intense and produce local flash flooding. Evaporation in the arid climate averages 103 inches annually.

1.3.5 Ecology

Two soil conditions, hardpans and desert pavement, exist at USAGYPG that strongly affect the distribution and composition of plant communities in the area. There are large areas dominated by shrubs, such as bursage and creosote, and depending on the soil type, common plant species may include ocotillo, cholla, paloverde, and saguaro. Wash areas include mesquites and catclaw (Gutierrez-Palmenberg, Inc., 2001).

The mammal community at USAGYPG includes numerous small herbivorous species (e.g., Arizona pocket mouse, Merriam’s kangaroo rat, and black-tailed jackrabbit), a number of larger omnivores and predators (e.g., coyote, badger, and kit fox), and five large herbivores (desert bighorn sheep, mule deer, Sonoran desert pronghorn, wild burro, and wild horse). The bird community is represented by more than 100 species, with particular bird communities associated with specific plant communities. Common birds include a variety of sparrows and finches, cactus wren, gila woodpecker, American kestrel, and red-tailed hawk. Habitat for the wide diversity of the bird community is clustered along the Colorado River, as well as common in trees and along desert washes.

The species diversity of reptiles is high at USAGYPG, which is typical of the Sonoran Desert (Argonne, 2004), and includes a variety of lizards and snakes. Although many amphibian species are found at USAGYPG year-round, their appearance is seasonal

As presented in the *Integrated Natural Resources Management Plan* (U.S. Army, 2012), there are no plants or resident animal species known to exist at USAGYPG that are protected under the Federal Endangered Species Act (ESA). The installation, in coordination with the U.S. Fish and Wildlife Service, has determined that past activities have not required consultation under Section 7 of the ESA (Gutierrez-Palmenberg, Inc., 2001). A number of species with federal protection under the ESA are present within Yuma and La Paz counties in Arizona, but these species have not been observed on post at USAGYPG. A majority of the species currently listed for protection in Yuma and La Paz counties include species of mammals and migratory birds that exist along the Colorado River corridor and associated riparian habitats. On occasion, animals from these areas may stray onto the installation, but in such cases are identified as transient species.

1.3.6 Land Use

There are no residential areas within 10 miles of the KOFA MTF. The nearest public road is Castle Dome Mine Road, which comes off of U.S. Highway 95 and travels to the east into KOFA National Wildlife Refuge. The closest point of public access is 7,809 feet (ft) from the facility's active area. Use of the area within the 7,800-ft radius requires a range clearance for passage. The nearest USAGYPG boundary is also the boundary to the KOFA National Wildlife Refuge.

1.4 GROUNDWATER SETTING

1.4.1 Existing Monitoring Well Network

There are two monitoring wells, MTF-MW1 and MTF-MW3, a few feet outside the perimeter fence of the OB/OD area (Figure 1.2). Installation of these wells was completed on April 26, 2011. USAGYPG conducted ten quarterly groundwater sampling events with the last event completed on August 2013 (Parsons, 2010b). A summary of the data collected over the initial rounds of sampling, sampling results, and groundwater flow direction are included in tables within Section 3 along with statistical analysis of the sampling data in Appendix D.

Production Well M is located approximately 1.4 miles up gradient of the KOFA MTF at the Castle Dome Heliport. This well is approximately 1,000 ft deep, with the last 100 ft in bedrock. Water was encountered at 720-730 ft below ground surface (bgs); however, the static water level in the well is approximately 635 ft bgs (approximately 198 ft above mean sea level [amsl]). This well was drilled as a replacement for an earlier well drilled to a total depth of approximately 600 ft bgs that went dry after construction. The earlier well was not drilled to a sufficient depth to intersect the water table (Click, 1971). Production Wells H and J are approximately 4 ½ miles south of the KOFA MTF, and separated by approximately one quarter of a mile. Each well is approximately 500 ft deep with a depth to water of approximately 331 ft bgs (169 ft amsl) in Well J and approximately 322 ft bgs (178 ft amsl) in Well H (Argonne, 2004). Production Well I is approximately 7 ½ miles south of the KOFA MTF in the KOFA Administrative Area. Well I (previously Well W) is approximately 500 ft deep with a depth to water of approximately 239 ft bgs (146 ft amsl) (Argonne, 2004).

Following the installation and completion of the two monitoring wells, depth to groundwater was measured to be 622 ft bgs (196.5 ft amsl) at monitoring well MTF-MW1 and 551 ft bgs (190.4 ft amsl) at monitoring well MTF-MW3.

1.5 REMEDIAL CORRECTIVE ACTIONS TO DATE

To date, one remedial corrective action has been conducted at the KOFA MTF. This remedial action was conducted from May through June 2013, and resulted in clean closure of inactive site features. Details of the remedial action are presented in the *Final Closure Report, KOFA Open/Burn Open Detonation Facility Inactive Hazardous Waste Treatment Units* (Parsons, 2013). Closure activities consisted of the excavation and disposal of soil and concrete contaminated with lead, beryllium, 1,3-dinitrobenzene, perchlorate, and hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) from four abandoned inactive hazardous waste treatment units (IUs).

As described by Parson's, remedial activities began with the removal of concrete pads at two of the four IUs (Abandoned South Pad [ASP] and Abandoned North Pad [ANP]) at the KOFA OB/OD facility. After the concrete pads were removed from the site, contaminated soil surrounding both pads and contaminated soil from two separate IUs (Burn on Ground [BOG] Area and Trash Trench [TT]) was excavated and removed. Excavated soil and concrete from the IUs were taken to the Copper Mountain Landfill in Welton, Arizona for disposal. Following the first round of soil excavation, confirmation soil samples were collected from the perimeter and floor of each excavation footprint. Because results of the confirmation soil sampling showed 14 samples exceeding remediation goals (five at BOG, seven at ASP, one at ANP, and one at TT), a second round of excavation was conducted to remove the remaining contaminated soil. A second round of confirmation soil sampling was also conducted following the excavation. Because results of the second round of confirmation soil sampling showed three samples exceeding remediation goals (two at ASP and one at TT), a third round of soil excavation was conducted, followed by a third round of confirmation soil sampling. Results of the third round of confirmation soil sampling showed no samples exceeding remediation goals; therefore, the IUs were backfilled with native soil and graded to match the surrounding topography.

SECTION 2.0

GROUNDWATER SAMPLING ACTIVITIES

This section describes sampling activities conducted at the KOFA MTF during the initial biennial groundwater monitoring event in August 2016. Sampling activities included:

- Measuring groundwater levels and inspecting monitoring well conditions.
- Purging monitoring wells.
- Groundwater sampling.
- Managing investigation-derived waste (IDW).

2.1 GROUNDWATER LEVEL MEASUREMENTS

Prior to sampling, the depth-to-groundwater was measured in each well to the nearest 0.01 foot using an electronic water-level indicator. The depth-to-groundwater measurements were taken from the top of casing at each well from a point that was previously surveyed on July 26, 2011 by Granite Surveying, LLC, an Arizona-licensed surveyor.

2.2 GROUNDWATER PURGING

Each of the two monitoring wells were purged so that groundwater samples would be collected from formation water. Purging of MTF-MW3 was performed using low-flow methodology with the dedicated pump installed in the well. Purging was continued until field parameters of dissolved oxygen (DO) and Redox stabilized (measurements were within 10% of one another over three consecutive measurements). The dedicated pump installed in MTF-MW1 was inoperable and the driller's pump was not able to be lowered down the well due to an assumed bend in the well casing. In order to meet the sampling schedule, purging in MTF-MW1 was accomplished using a bailer. Three casing volumes were removed in MTF-MW1. Field parameters were measured once every five gallons of purged water. Groundwater sampling logs including purge data are presented in Appendix B.

2.3 SAMPLE COLLECTION

The revised Groundwater Monitoring Plan approved in August 2014 outlined that USAGYPG would continue the ground monitoring detection program on a two-year cycle. To accomplish this requirement, groundwater samples were collected in August 2016 at the KOFA MTF Monitoring Wells (MTF-MW1 and MTF-MW3).

Groundwater sampling activities were conducted in accordance with the Groundwater Monitoring Sampling and Analysis Plan, Appendix B of the *Groundwater Monitoring Plan for the Munitions Treatment Facility* (Parsons, 2010b). All sample containers were new and Level I certified according to U.S. Environmental Protection Agency (USEPA) quality assurance cleaning protocols. The sampling team members at each well wore new, disposable gloves during sampling activities.

2.4 QUALITY ASSURANCE/QUALITY CONTROL

2.4.1 Field Quality Control Samples

Field quality control (QC) samples consisted of field duplicate and field blank samples. These samples were collected and analyzed at the rate of one per 20 samples. Equipment blanks were not collected, as each well was sampled with dedicated equipment. Critical supplies and materials used during field activities included sample bottles and de-ionized water. Critical field supplies and consumables were inspected and accepted by the Task Manager.

2.4.2 Laboratory Quality Assurance/Quality Control

Quality assurance (QA), as applicable to groundwater sampling, is defined as an integrated program for assuring the reliability of monitoring and measuring data. Quality control (QC), as applied to groundwater sampling, is defined as the routine application of procedures for obtaining prescribed standards of performance in the monitoring and measuring process.

The QA objectives are based on requirements outlined in the Groundwater Monitoring Plan and the Sampling and Analysis Plan (SAP) (Parsons, 2010b). Specific project activities of concern to the QA program include, but are not limited to, the following:

- Project-specific procedures and protocols in the SAP are followed.
- Project personnel receive adequate indoctrination and training on all project plans prior to initiation of project activities.
- The project proceeds in an orderly manner according to established procedures and protocols from the SAP for sample collection, chain-of-custody process, sample shipment, vendor processing, laboratory and data analysis, review, and final reporting.

The Groundwater Monitoring Plan and SAP include: sampling locations, design, and sampling techniques; decontamination procedures; sampling equipment; and calibration procedures. Specific QC and documentation protocols applicable to sampling procedures are discussed in the Standard Operating Procedures (SOPs) and are generally based on acceptable USEPA practices.

QA/QC samples are necessary to ensure that the data meet the Data Quality Objectives (DQOs) for precision, accuracy, representativeness, comparability, and completeness of the data. Three types of QA/QC samples were processed:

- Field duplicate. One duplicate sample was collected at MTF-MW1 and submitted for laboratory analysis. Duplicate sampling was used to identify possible real variability within the sampled matrix as well as introduced variability. The duplicate sample was collected at the same time and location as the environmental sample.
- Matrix Spike/Matrix Spike Duplicate. One matrix spike/matrix spike duplicate (MS/MSD) sample was collected and submitted to the laboratory. The MS/MSD sample was designed to evaluate the calibration of the analytical methods.
- Field blank. Field blanks are samples that originate from analyte-free water poured at the site. The field blank was used to assess the influence of ambient conditions.

The field duplicate and MS/MSD were collected in the field at the same time the environmental sample was collected; the field blank was collected at the end of field activities. The analytical data from groundwater samples collected from the wells have been reviewed, verified, and validated with regard to quality and usability. No quality control issues were discovered during the quality control assessment that would impact the data usability; therefore, the data are considered complete and usable for decision making purposes.

2.5 ANALYTICAL METHODS

Groundwater samples collected at the site were analyzed for explosives (USEPA SW-846 Method 8330B), perchlorate (USEPA SW-846 Method 6850), and TAL metals, total and dissolved (USEPA SW-846 Methods 6010B/7470A) by TestAmerica Laboratories.

Laboratory analyses utilized USEPA analytical methods including those published in *Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846)*. Analytical procedures followed established laboratory SOPs based on the referenced USEPA method.

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SECTION 3.0
RESULTS

The following section describes results of sampling activities conducted at the KOFA MTF during the biennial event conducted on August 2016. These results include determination of the groundwater gradient, analytical results of the initial groundwater sampling (following development of the wells in May 2011), results of the nine quarterly rounds, results of the biennial event, and results of the statistical evaluation.

3.1 GROUNDWATER GRADIENT

Depth-to-groundwater measurements and groundwater elevations were measured from August 2011 until August 2013, and again in August 2016 (Table 3.1). Depth-to-groundwater had little variability and water table elevations at monitoring well MTF-MW1 ranged from a low of 194.10 ft amsl (measured in November 2012) to a high of 194.42 ft amsl (measured in May 2012). Water table elevations at monitoring well MTF-MW3 ranged from a low of 187.53 ft amsl (measured in August 2016) to a high of 188.58 ft amsl (measured in May 2012).

Groundwater-flow direction at the MTF was established using water levels collected from August 2016, and surveyed surface elevations from monitoring wells MTF-MW1, MTF-MW3, and the ground surface elevation at Production Well M (as recorded on the original borehole log). The three-point calculation indicates the flow direction is S 54.6 degrees W. This is in general agreement with the estimated flow direction as stated in the Groundwater Monitoring Plan (Parsons, 2010b). The location of MTF-MW3 is almost directly downgradient of MTF-MW1. The details of the three point calculation are illustrated in Appendix C and a potentiometric surface map is presented on Figure 3.1.

3.2 INITIAL GROUNDWATER SAMPLING RESULTS

Initial groundwater samples were collected immediately following the development of MTF-MW1 and MTF-MW3 on May 18, 2011 from the development pump. Samples were collected for analysis VOCs, SVOCs, explosives, perchlorate, TAL metals, nitrate/nitrite, and ammonia. Sampling results from the initial sampling event in May 2011 are summarized in Table 3.2 (Parsons, 2014b). Results of the May 2011 initial sampling event were considered preliminary, and were not used in statistical evaluations.

3.3 QUARTERLY SAMPLING ANALYTICAL RESULTS

Following the initial groundwater sampling event in May 2011, monitoring wells MTF-MW1 and MTF-MW3 were sampled on a quarterly basis from August 2011 until August 2013 for analysis of VOCs, SVOCs, explosives, perchlorate, TAL metals, nitrate/nitrite, and ammonia. Analytical results from the quarterly sampling events are presented in Table 3.3 (Parsons, 2014b).

A statistical analysis was performed for the quarter sampling data to determine if there was statistical significant evidence of migration of hazardous constituents to the water table aquifer. Based on the analytical results and the statistical analysis, VOCS, SVOCs, nitrate/nitrite, and ammonia were removed from the required analyses. Additionally, since no evidence from the data indicated migration of hazardous constituents from the MTF operations to groundwater, the USAGYPG modified the groundwater monitoring detection program on a two year, or biennial, cycle (Parsons, 2010b).

3.4 BIENNIAL SAMPLING ANALYTICAL RESULTS

Following the quarterly groundwater sampling events from August 2011 until August 2013, monitoring wells MTF-MW1 and MTF-MW3 were designated to be sampled on a two-year cycle. The following sections summarize results of the first of these biennial sampling events that occurred in August 2016. Analytical results from the biennial sampling event are presented in Table 3.4. Complete laboratory reports of the groundwater analysis are included in Appendix A, and sampling logs are presented in Appendix B.

3.4.1 Inorganics

3.4.1.1 Perchlorate

Perchlorate was detected in both the upgradient well (MTF-MW1) at 1.7 µg/L and downgradient well (MTF-MW3) at 1.1 µg/L during the initial biennial sampling event in August 2016. Both of these concentrations were above the laboratory detection limit of 0.082 µg/L and the sample-specific Limit of Quantitation (LOQ) of 0.50 µg/L, but well below the remediation goal of 14 µg/L.

Perchlorate is the only munitions constituent (MC) compound detected in both wells during each sampling event; however, because concentrations of perchlorate are greater in the upgradient well (MTF-MW1) than the downgradient well (MTF-MW3) in all ten sampling events and all detections were below the remediation goal, it is likely that the perchlorate is naturally occurring. A U.S. Geological Survey (USGS) study conducted in 2007 supports the finding of elevated levels of perchlorate at the KOFA MTF. The USGS study identified perchlorate as a natural constituent of background aquifer conditions in the Colorado River region of the desert southwest, and found detections of perchlorate in 13 of 28 monitoring wells within the Colorado River area of the southwest at concentrations varying from 0.2 to 2.4 µg/L (USGS, 2007). Therefore, perchlorate is not considered a COC.

3.4.1.2 Metals, Total and Dissolved

As outlined in the groundwater monitoring plan (Parsons, 2010b), a statistical evaluation was performed on the data corresponding to metals that had sufficient detections to determine if there is evidence of migration of hazardous constituents to groundwater. Metals associated with OB/OD activities typically consist of copper, lead, and zinc. Analytical results of groundwater samples collected at the KOFA MTF over ten sampling events indicate metals were detected consistently above laboratory reporting limits. Multiple statistical methods (histograms, box plots and Wilcox Rank Sum [WRS]) were used on constituents consistently detected to determine if there is a statistical concentration difference between the upgradient and downgradient monitoring wells. Statistical methods used and statistical results for each analyte are detailed in Appendix D. Based on statistical analyses, arsenic, molybdenum, sodium, and vanadium were the only analytes found to have a higher concentration distribution in the downgradient well (MTF-MW3) than the upgradient well (MTF-MW1).

The Mann-Kendall (MK) test was then applied to metals results to identify increasing or decreasing trends in the data. Because arsenic, molybdenum, sodium, and vanadium were the only analytes to have concentrations higher in the downgradient well (MTF-MW3) than the upgradient well (MTF-MW1), only these analytes will be discussed in this section with regard to the MK test results. Results of the MK test are presented Appendix D and summarized below.

Molybdenum was detected consistently during an all ten groundwater sampling events at the site; however, all concentrations of molybdenum are below the remediation goal of 35 µg/L. Although molybdenum was found to have a higher concentration distribution in downgradient well (MTF-MK3), results of the MK test show molybdenum has no trend in the upgradient well (MTF-MW1) and a decreasing trend at the downgradient (MTF-MW3) well. Because molybdenum detections are below the corresponding remediation goal and molybdenum is not a constituent related to OB/OD activities conducted at the site, it is not considered a COC.

Sodium was detected consistently during an all groundwater sampling events. No remediation goal has been established for sodium, and results of the MK test show the analyte has no trend in the upgradient (MTF-MW1) well and a stable result for the downgradient (MTF-MW3) well. Because sodium concentrations have been generally stale and is not a constituent related to OB/OD activities at the site, sodium is not considered a COC. Note that sodium is also considered to be an essential nutrient as defined by the USEPA.

Vanadium was detected consistently during all groundwater sampling events; however, all concentrations of vanadium are below the remediation goal of 49 µg/L. Results of the MK test show vanadium has no trend in the upgradient (MTF-MW1) well and a stable result in the downgradient well (MTF-MW3). Because vanadium detections are below the remediation goal and it is not a constituent related to OB/OD activities at the site, vanadium is not considered a COC.

Arsenic was detected consistently during all sampling events at concentrations exceeding the remediation goal of 10 µg/L. Arsenic is a known naturally-occurring inorganic element in the Castle Dome Mining District, which is located upgradient from the KOFA MTF. Results of the MK test show concentrations of arsenic have a 'probably increasing' (as defined in Appendix D) trend in the upgradient (MTF-MW1) well and no trend in the downgradient (MTF-MW3) well. Linear trends of arsenic concentrations identified in both the upgradient (MTF-MW1) and downgradient (MTF-MW3) wells are similar (have similar slopes), supporting the assumption that arsenic is naturally occurring (see Figure D-1). Additionally, the arsenic data for both wells were tested for normality using USEPA ProUCL v4.1 and both data sets appear to be normally distributed, which is also evidence of natural occurring concentrations. Arsenic is not a constituent related to OB/OD activities conducted at the site and is not considered a COC.

3.4.2 Explosives

For strictly anthropogenic compounds (i.e., explosives), statistical significant evidence of contamination is defined as concentrations above reporting limits in down-gradient wells.

The explosive compound RDX was detected at estimated concentrations in both samples collected during the biennial collection effort. The concentration from the upgradient well (MTF-MW1) was 0.067 µg/L and the concentration from the downgradient well (MTF-MW3) was 0.15 µg/L. Both of these concentrations were above the laboratory detection limit of 0.033 µg/L, but were below the sample-specific Limit of Quantitation (LOQ) of 0.16 µg/L and well below the remediation goal of 0.32 µg/L. During the data validation process, both results were flagged as being detected below the LOQ and the values were considered estimated concentrations in the samples; therefore, RDX is not considered a COC.

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SECTION 4.0
SUMMARY AND RECOMMENDATIONS

This section summarizes findings of the August 2016 biennial groundwater sampling effort and makes recommendations regarding future groundwater monitoring activities at the KOFA MTF. Historic results of previous quarterly sampling events conducted from August 2011 until August 2013 are also included. These recommendations are based on results of the data analysis from the biennial groundwater sampling, the two years of quarterly groundwater sampling at the site (presented in Section 3), and professional judgment.

4.1 SUMMARY

Groundwater monitoring wells MTF-MW1 and MTF-MW3 were installed at the KOFA MTF in April and May 2011 to a depth of 678 ft bgs and 618 ft bgs, respectively. Initial groundwater sampling of the wells was conducted on May 18, 2011 using the development pump followed by nine quarterly groundwater sampling events from August 2011 through August 2013 using dedicated permanent pumps, and the first of the biennial sampling events in August 2016. Groundwater elevation measurements show the water table to be approximately 194.3 ft amsl (624.19 ft bgs) at MTF-MW1 and 187.53 ft amsl (553.85 ft bgs) at MTF-MW3, and the direction of groundwater flow is towards the southwest. Monitoring well MTF-MW3 is approximately 1.4 miles directly downgradient from monitoring well MTF-MW1.

Current, analytical results of groundwater sampling show the explosive RDX detected at low levels. Concentrations of RDX were detected below the LOQ of 0.16 µg/L, but greater than the method detection limit of 0.033 µg/L and are considered estimated concentrations. The reported concentrations are below the corresponding remediation goal, and therefore RDX is not considered a COC.

Perchlorate was also detected at low levels, above the laboratory detection limit and the LOQ, but well below the corresponding remediation goal. Because the concentration distribution of perchlorate are greater in the upgradient well (MTF-MW1) than the downgradient well (MTF-MW3), and because the concentrations were below corresponding remediation goals, perchlorate was determined to be naturally-occurring, and not considered a COC.

In accordance with the groundwater monitoring plan (Parsons, 2010b), a statistical evaluation was performed on data corresponding to analytes that had sufficient detections to determine if there is evidence of migration of hazardous constituents to the aquifer. Statistical evaluation results show that several metals (arsenic, molybdenum, sodium, and vanadium) have a higher concentration distribution in the downgradient well (MTF-MW3) than the upgradient well (MTF-MW1). Although molybdenum, sodium, and vanadium have a higher concentration in the downgradient well (MTF-MW3), molybdenum was found to have a decreasing trend and sodium and vanadium concentrations at the downgradient well were found to have a stable trend. Molybdenum, sodium, and vanadium detections were below the corresponding remediation goal. Arsenic was the only analyte with elevated concentrations greater than the remediation goal, a higher distribution in the downgradient well, and an increasing trend. However, because the linear trends for arsenic concentrations in both wells were determined to be similar (having similar slopes), and because arsenic is a known naturally-occurring inorganic element in the area, arsenic was not considered a COC.

The evaluation of data from the two years of quarterly groundwater sampling at the KOFA MTF, as well as the August 2016 biennial sampling event, indicate evidence of migration of hazardous constituents from OB/OD activities to groundwater is not present. .

4.2 RECOMMENDATIONS

Groundwater monitoring data suggests there is no evidence to support migration of hazardous constituents from OB/OD activities at the site. The depth-to-groundwater was measured at approximately 600 ft bgs. The lack of any identified groundwater COCs and the depth-to-groundwater indicate it is unlikely groundwater would be impacted by site activities. It is recommended that the groundwater monitoring program remain biennial, with no permit modifications.

SECTION 5.0

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TABLES

TABLE 3.1
KOFA OB/OD WATER LEVEL MEASUREMENTS
AUGUST 2011 THROUGH AUGUST 2013, AUGUST 2016
KOFA Open Burn/Open Detonation Munitions Treatment Facility
U.S. Army Garrison Yuma Proving Ground, Yuma, Arizona

Monitoring Well	Measuring Point Elevation (ft amsl)	Aug-11		Nov-11		Feb-12		May-12		Aug-12		Nov-12		Feb-13		May-13		Aug-13		Aug-16	
		Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)	Depth to Water (ft btoc)	Water Elevation (ft amsl)
MW 1	818.49	624.14	194.35	624.20	194.29	624.19	194.30	624.07	194.42	624.18	194.31	624.39	194.10	624.20	194.29	624.12	194.37	624.17	194.32	624.19	194.30
MW 3	741.38	552.86	188.52	552.94	188.44	552.94	188.44	552.80	188.58	552.92	188.46	553.06	188.32	552.93	188.45	552.87	188.51	552.90	188.48	553.85	187.53

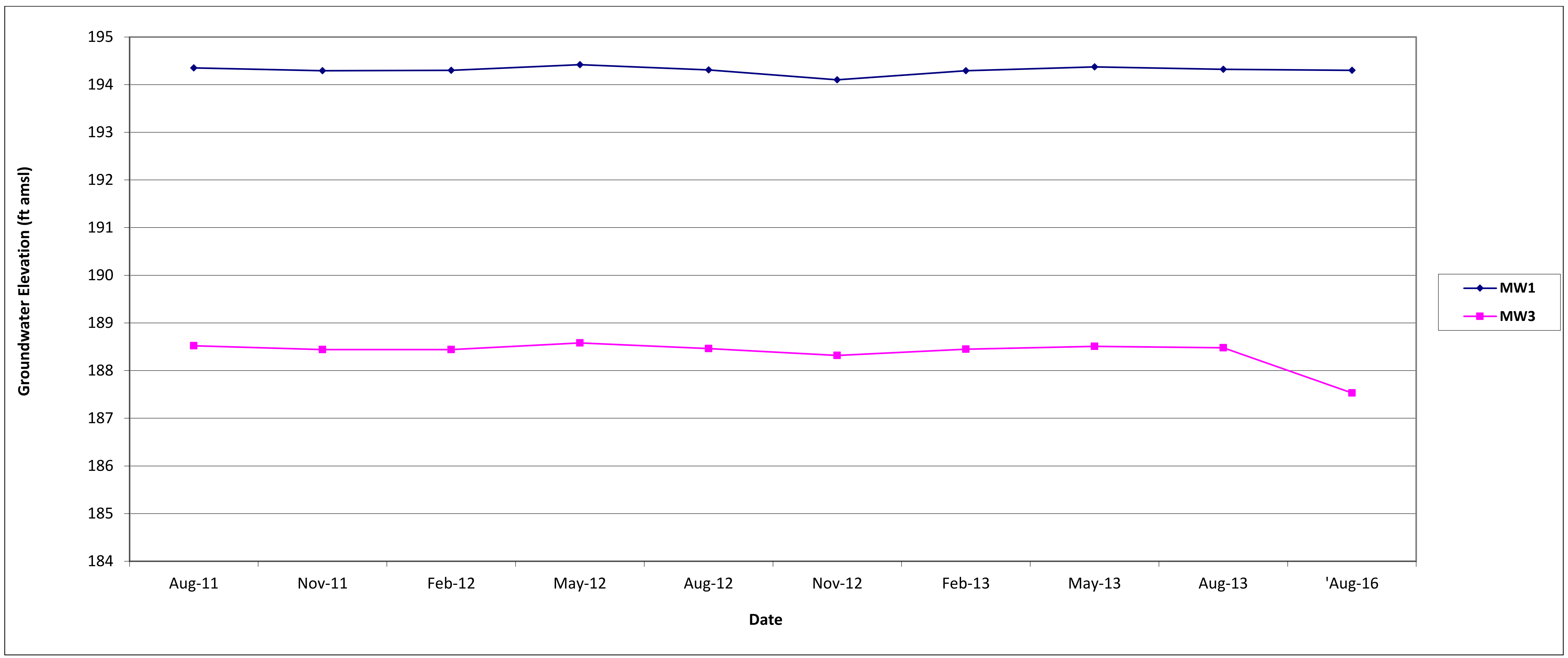

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TABLE 3.2

SUMMARY OF INITIAL GROUNDWATER SAMPLING ANALYTICAL RESULTS[1,2]
KOFA Open Burn/Open Detonation Munitions Treatment Facility
U.S. Army Garrison Yuma Proving Ground, Arizona

Analyte	May 18, 2011				Remediation Goal[3]	Remediation Goal Reference
	MTF-MW1 (Upgradient)	Flag[4]	MTF-MW3 (Downgradient)	Flag[4]		
VOCs						
Toluene	20.4		23.8		1,000	MCL
SVOCs						
bis(2-Ethylhexyl) Phthalate	--		1.82	E5	3	HBGL
Di-n-Octyl Phthalate	--		0.599	E5	140	HBGL
Metals						
Aluminum	150	E5	170	E5	NV	NA
Arsenic	**11**		**11**		10	MCL
Barium	44		39		2,000	MCL
Cadmium	0.4	E5	0.4	E5	5	MCL
Calcium	51,900		22,200		NV	NA
Chromium, Total	20		8.9	E5	100	MCL
Copper	5	E5	7.3	E5	1,300	MCL
Iron	290		550		NV	NA
Lead	1.7	E5	2.5	E5	15	MCL
Magnesium	1,940		1,330		NV	NA
Manganese	130	E5	84	E5	35	HBGL
Mercury	--		0.1	E5	2	HBGL
Molybdenum	16	E5	22	E5	35	HBGL
Nickel	1.5	E5	--		100	AWQS
Potassium	6,520		4,340		NV	NA
Selenium	4.7	E5	--		50	MCL
Sodium	187,000		193,000		NV	NA
Vanadium	12	E5	12	E5	49	HBGL
Zinc	360	E5	280	E5	2,100	HBGL
Anions						
Nitrogen, Nitrate-Nitrite	668		414		10,000	MCL
Perchlorate	1.8		1.1		14	HBGL

Notes:

[1] Groundwater sampling results in micrograms per liter (µg/L). Only detected analytes shown.

[2] Bolded values indicate results above the remediation goal.

[3] Groundwater remediation goal is the USEPA maximum contaminant level (MCL) (USEPA, 2009), Arizona aquifer water quality standard (AWQS) (ADEQ, 2007), or the Arizona human health-based guidance level (Oral HBGL) (ADHS, 1998) when no MCL or AWQS is available.

[4] Flags were applied following the Arizona Department of Environmental Quality Groundwater Data Submittal Guidance version 3.3 (ADEQ, 2005).

Definitions:

µg/L = micrograms per liter. J = estimated value. NV = no value. NA = not applicable. "--" = not detected.

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TABLE 3.3

SUMMARY OF QUARTERLY GROUNDWATER SAMPLING ANALYTICAL RESULTS[1,2]
KOFA Open Burn/Open Detonation Munitions Treatment Facility
U.S. Army Garrison Yuma Proving Ground, Arizona

Analyte	Aug-11						Nov-11				Remediation Goal[3] (µg/L)	Remediation Goal Reference
	MTF-MW1 (Upgradient)	Flag[4]	MTF-MW3 (Downgradient)	Flag[4]	MTF-MW3FD	Flag[4]	MTF-MW1 (Upgradient)	Flag[4]	MTF-MW3 (Downgradient)	Flag[4]		
Analyte												
Acetone	--		--		--		--		--		700	HBGL
Benzene	--		--		--		--		--		5	MCL
Methyl Ethyl Ketone (2-Butanone)	--		--		--		--		--		4,200	HBGL
SVOCs												
Diethyl Phthalate	--		--		--		--		--		5,600	HBGL
Metals												
Aluminum	--		--		--		48	E5	61	E5	NV	NA
Arsenic	**18**		**21**		**21**		**16**		**22**		10	MCL
Barium	17		18		19		15		12		2,000	MCL
Cadmium	0.2	E5	0.3	E5	0.2	E5	0.3	E5	0.5	E5	5	MCL
Calcium	52,600		23,800		24,300		52,400		24,700		NV	NA
Chromium, Total	25		11		11		23		10		100	MCL
Copper	--		--		--		--		--		1,300	MCL
Lead	--		1.5	E5	1.9	E5	--		--		15	MCL
Magnesium	1,520		1,210		1,220		1,540		1,270		NV	NA
Manganese	--		11	E5	9.7	E5	1	E5	2.1	E5	35	HBGL
Molybdenum	7	E5	17	E5	16	E5	5.4	E5	15	E5	35	HBGL
Nickel	1.4	E5	--		--		1.7	E5	1.6	E5	100	AWQS
Potassium	6,050		3,670		3,730		5,970		3,790		NV	NA
Selenium	--		--		--		--		--		50	MCL
Silver	--		--		--		--		--		35	HBGL
Sodium	182,000		197,000		202,000		161,000		183,000		NV	NA
Thallium	--		1.9	E5	--		--		--		2	MCL
Vanadium	13	E5	15	E5	14	E5	14	E5	18	E5	49	HBGL
Zinc	--		--		3.9	E5	--		--		2,100	HBGL
Explosives												
Hexahydro-1,3,5-Trinitro-1,3,5-Triazine (RDX)	**0.38**		--		--		--		--		0.32	HBGL
Anions												
Nitrogen, Ammonia (as N)	--		--		--		--		--		NV	NA
Nitrogen, Nitrate-Nitrite	1,630		820		837		2,170		1,050		10,000	MCL
Perchlorate	1.6		1		1		1.7		1		14	HBGL

Notes:
[1] Groundwater sampling results in micrograms per liter (µg/L). Only detected analytes shown.
[2] Bolded values indicate results above the remediation goal.
[3] Groundwater remediation goal is the USEPA maximum contaminant level (MCL) (USEPA, 2009), Arizona aquifer water quality standard (AWQS) (ADEQ, 2007), or the Arizona human health-based guidance level
[4] Flags were applied following the Arizona Department of Environmental Quality Groundwater Data Submittal Guidance version 3.3 (ADEQ, 2005).

Definitions: µg/L = micrograms per liter. NV = no value. NA = not applicable. "--" = not detected.

TABLE 3.3 (continued)

SUMMARY OF QUARTERLY GROUNDWATER SAMPLING ANALYTICAL RESULTS[1,2]
KOFA Open Burn/Open Detonation Munitions Treatment Facility
U.S. Army Garrison Yuma Proving Ground, Arizona

Analyte	February 2012				May 2012				August 2012		November 2012				Remediation Goal[3] (µg/L)	Remediation Goal Reference
	MTF-MW1 (Upgradient)	Flag[4]	MTF-MW3 (Downgradient)	Flag[4]	MTF-MW1 (Upgradient)	Flag[4]	MTF-MW3 (Downgradient)	Flag[4]	MTF-MW3 (Downgradient)	Flag[4]	MTF-MW1 (Upgradient)	Flag[4]	MTF-MW3 (Downgradient)	Flag[4]		
VOCs																
Acetone	1.07	E5[4]	--		--		--		--		--		--		700	HBGL
Benzene	--		--		--		0.708	E5	--		--		--		5	MCL
Methyl Ethyl Ketone (2-Butanone)	--		--		--		--		--		--		--		4,200	HBGL
SVOCs																
Diethyl Phthalate	--		--		--		--		--		0.841	E5	0.982		5,600	HBGL
Metals																
Aluminum	34	E5	37	E5	--		--		48	E5	--		--		NV	NA
Arsenic	**19**		**28**		**16**		**24**		**34**		**12**		**22**		10	MCL
Barium	14		11		12		7.5	E5	6.8	E5	12		6.2	E5	2,000	MCL
Cadmium	0.5	E5	0.6	E5	0.7	E5	0.7	E5	1.3	E5	1	E5	1	E5	5	MCL
Calcium	57,500		26,300		49,100	E5	22,200		23,200		52,800		24,200		NV	NA
Chromium, Total	30		15		28		15		15		28		16		100	MCL
Copper	1.7	E5	1.7	E5	9.6	E5	4.4	E5	--		1.2	E5	1.5	E5	1,300	MCL
Lead	--		--		--		--		--		--		--		15	MCL
Magnesium	1,680		1,370		1,410		1,140		1,240		1,530		1,300		NV	NA
Manganese	2	E5	1.2	E5	1.5	E5	1	E5	--		--		2.4	E5	35	HBGL
Molybdenum	7.3	E5	17	E5	7	E5	17	E5	15	E5	6.2	E5	16	E5	35	HBGL
Nickel	4	E5	1.8	E5	5.4	E5	3.2	E5	2.2	E5	2.5	E5	2.8	E5	100	AWQS
Potassium	7,040		4,300		6,160		3,790		4,300		6,350		3,980		NV	NA
Selenium	--		<3.8		--		--		--		5	E5	--		50	MCL
Silver	<0.6		<0.6		1	E5	1.1	E5	--		--		--		35	HBGL
Sodium	188,000		204,000		178,000	M1	190,000		183,000		174,000		193,000		NV	NA
Thallium	--		--		--		--		--		--		**3.4**	E5	2	MCL
Vanadium	17	E5	22		20		23		21		16	E5	20		49	HBGL
Zinc	--		--		7.7	E5	--		--		5	E5	--		2,100	HBGL
Explosives																
Hexahydro-1,3,5-Trinitro-1,3,5-Triazine (RDX)	--		--		--		--		--		--		--		0.32	HBGL
Anions																
Nitrogen, Ammonia (as N)	3,100		3,000		--		--		--		--		--		NV	NA
Nitrogen, Nitrate-Nitrite	1,930		877		1,970		939		757		2,170		1,010		10,000	MCL
Perchlorate	1.7		0.98		1.8		1		1		1.7		1		14	HBGL

Notes:
[1] Groundwater sampling results in micrograms per liter (µg/L). Only detected analytes shown.
[2] Bolded values indicate results above the remediation goal.
[3] Groundwater remediation goal is the USEPA maximum contaminant level (MCL) (USEPA, 2009), Arizona aquifer water quality standard (AWQS) (ADEQ, 2007), or the Arizona human health-based guidance level
[4] Flags were applied following the Arizona Department of Environmental Quality Groundwater Data Submittal Guidance version 3.3 (ADEQ, 2005).

Definitions: µg/L = micrograms per liter. NV = no value. NA = not applicable. "--" = not detected.

TABLE 3.3 (concluded)
SUMMARY OF QUARTERLY GROUNDWATER SAMPLING ANALYTICAL RESULTS[1,2]
KOFA Open Burn/Open Detonation Munitions Treatment Facility
U.S. Army Garrison Yuma Proving Ground, Arizona

Analyte	February 2013				May 2013				August 2013				Remediation Goal[3] (µg/L)	Remediation Goal Reference
	MTF-MW1 (Upgradient)	Flag[4]	MTF-MW3 (Downgradient)	Flag[4]	MTF-MW1 (Upgradient)	Flag[4]	MTF-MW3 (Downgradient)	Flag[4]	MTF-MW1 (Upgradient)	Flag[4]	MTF-MW3 (Downgradient)	Flag[4]		
VOCs														
Acetone	--		--		--		--		7.09		--		700	HBGL
Benzene	--		--		--		--		--		--		5	MCL
Methyl Ethyl Ketone (2-Butanone)	--		--		--		--		11.5		--		4,200	HBGL
SVOCs														
Diethyl Phthalate	--		--		--		--		--		--		5,600	HBGL
Metals														
Aluminum	56	E5	69	E5	91	E5	64	E5	58	E5	--		NV	NA
Arsenic	**19**	E5	**30**		**20**		**26**		**19**	E5	**26**		10	MCL
Barium	13		6.2	E5	12		5.9	E5	14		6.4	E5	2,000	MCL
Cadmium	--		--		--		--		--		--		5	MCL
Calcium	53,900		26,000		51,700		22,900		54,600		24,500		NV	NA
Chromium, Total	34		18		29		16		30		16		100	MCL
Copper	--		--		--		--		--		--		1,300	MCL
Lead	--		--		--		--		--		--		15	MCL
Magnesium	1,610		1,380		1,560		1,260		1,600		1,330		NV	NA
Manganese	--		--		--		--		--		--		35	HBGL
Molybdenum	--		16	E5	--		15	E5	--		14	E5	35	HBGL
Nickel	--		--		--		--		--		--		100	AWQS
Potassium	6,480		4,210		6,530		3,740		6,540		3,840		NV	NA
Selenium	--		--		--		--		--		--		50	MCL
Silver	--		--		--		--		--		--		35	HBGL
Sodium	184,000		211,000		167,000		175,000		178,000		184,000		NV	NA
Thallium	--		--		--		--		--		--		2	MCL
Vanadium	18	E5	25		13	E5	17	E5	15	E5	19	E5	49	HBGL
Zinc	--		--		--		6.1	E5	--		--		2,100	HBGL
Explosives														
Hexahydro-1,3,5-Trinitro-1,3,5-Triazine (RDX)	--		--		--		--		--		--		0.32	HBGL
Anions														
Nitrogen, Ammonia (as N)	--		--		3,900		1,300		3,500		3,800		NV	NA
Nitrogen, Nitrate-Nitrite	2,770		1,260		2,700		1,210		2,670		1,150		10,000	MCL
Perchlorate	1.7		1		1.8		1.1		1.8		1.2		14	HBGL

Notes:
1 Groundwater sampling results in micrograms per liter (µg/L). Only detected analytes shown.
2 Bolded values indicate results above the remediation goal.
3 Groundwater remediation goal is the USEPA maximum contaminant level (MCL) (USEPA, 2009), Arizona aquifer water quality standard (AWQS) (ADEQ, 2007), or the Arizona human health-based guidance level
4 Flags were applied following the Arizona Department of Environmental Quality Groundwater Data Submittal Guidance version 3.3 (ADEQ, 2005).
Definitions: µg/L = micrograms per liter. NV = no value. NA = not applicable. "--" = not detected

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TABLE 3.4

SUMMARY OF BIENNIAL GROUNDWATER SAMPLING ANALYTICAL RESULTS[1,2]
KOFA Open Burn/Open Detonation Munitions Treatment Facility
U.S. Army Garrison Yuma Proving Ground, Arizona

Analyte	August 2016												Remediation Goal[3]	Remediation Goal Reference
	MTF-MW1 (Upgradient)	LOQ	DL	Flag[4]	MTF-MW3 (Downgradient)	LOQ	DL	Flag[4]	MTF-MW3FD (Downgradient)	LOQ	DL	Flag[4]		
Metals, Total														
Aluminum	9700 J	300	18	J+ (V3, M3)	21 J	300	18	E4	24 J	300	18	E4	NV	NA
Arsenic	**23**	5.0	0.33		**27**	5.0	0.33		**28**	5.0	0.33		10	MCL
Antimony	1.6 J	6.0	0.40	6.0 UJ (M2)	1.3 J	6.0	0.40	6.0 U	1.0 J	6.0	0.40	6.0 U	6	MCL
Barium	110	3.0	0.29		4.3	3.0	0.29		4.3	3.0	0.29		2,000	MCL
Beryllium	0.96 J	1.0	0.080	E4	--	1.0	0.080		0.17 J	1.0	0.080	E4	4	MCL
Cadmium	--	1.0	0.27		--	1.0	0.27		--	1.0	0.27		5	MCL
Calcium	83,000	1,000	35		24,000	1,000	35		24,000	1,000	35		NV	NA
Chromium, Total	**140**	10	0.5		15	10	0.5		15	10	0.5		100	MCL
Cobalt	4.3	1.0	0.054		--	1.0	0.054		0.082 J	1.0	0.054	E4	NV	NA
Copper	34	2.0	0.56		0.84 J	2.0	0.56	E4	0.99 J	2.0	0.56	E4	1,300	MCL
Iron	12000 J	100	22	M3	38 J	100	22	E4	35	100	22	E4	NV	NA
Lead	11	3.0	0.18		--	3.0	0.18		--	3.0	0.18		15	MCL
Magnesium	3700	500	11		1200	500	11		1300	500	11		NV	NA
Manganese	**190**	3.5	0.31		1.3 J	3.5	0.31	E4	1.5 J	3.5	0.31	E4	35	HBGL
Molybdenum	20	2.0	0.14		15	2.0	0.14		15	2.0	0.14		35	HBGL
Nickel	33	3.0	0.30		1.5 J	3.0	0.30	3.0 U	1.7 J	3.0	0.30	3.0 U	100	AWQS
Potassium	9600	3000	240		4100	3000	240		4200	3000	240		NV	NA
Selenium	2.4 J	5.0	0.70	E4	1.1 J	5.0	0.70	E4	1.4 J	5.0	0.70	E4	50	MCL
Silver	0.13 J	5.0	0.033	E4	0.049 J	5.0	0.033	E4	0.061 J	5.0	0.033	E4	35	HBGL
Sodium	190000 J	5000	92	M3	190000	5000	92		190000	5000	92		NV	NA

TABLE 3.4 (continued)

SUMMARY OF BIENNIAL GROUNDWATER SAMPLING ANALYTICAL RESULTS[1,2]
KOFA Open Burn/Open Detonation Munitions Treatment Facility
U.S. Army Garrison Yuma Proving Ground, Arizona

Analyte	August 2016												Remediation Goal[3]	Remediation Goal Reference
	MTF-MW1 (Upgradient)	LOQ	DL	Flag[4]	MTF-MW3 (Downgradient)	LOQ	DL	Flag[4]	MTF-MW3FD (Downgradient)	LOQ	DL	Flag[4]		
Metals, Total (concluded)														
Thallium	0.22 J	1.0	0.050	1.0 U	0.20	1.0	0.050		0.18 J	1.0	0.050	E4	2	MCL
Vanadium	29	6.0	0.50		17	6.0	0.50		18	6.0	0.50		49	HBGL
Zinc	89	20	2.0		12 J	20	2.0	E4	13 J	20	2.0	E4	2,100	HBGL
Mercury	0.19 J	0.20	0.027	E4	--	0.20	0.027		--	0.20	0.027		2	MCL
Metals, Dissolved														
Aluminum, Dissolved	--	300	18	V1	--	300	18		--	300	18	E4	NV	NA
Arsenic, Dissolved	**15**	5.0	0.33		**26**	5.0	0.33		**28**	5.0	0.33		10	MCL
Antimony, Dissolved	1.7 J	6.0	0.40	6.0 U	1.3 J	6.0	0.40	E4	1.1 J	6.0	0.40		6	MCL
Barium, Dissolved	25	3.0	0.29		4.5	3.0	0.29		4.7	3.0	0.29		2,000	MCL
Beryllium, Dissolved	--	1.0	0.080		--	1.0	0.080		0.25 J	1.0	0.080	E4	4	MCL
Cadmium, Dissolved	--	1.0	0.27		--	1.0	0.27		--	1.0	0.27		5	MCL
Calcium, Dissolved	69,000	1,000	35		22,000	1,000	35		25,000	1,000	35		NV	NA
Chromium, Dissolved	20	10	0.5		14	10	0.5		15	10	0.5		100	MCL
Cobalt, Dissolved	--	1.0	0.054		--	1.0	0.054		0.11 J	1.0	0.054	E4	NV	NA
Copper, Dissolved	1.0 J	2.0	0.56	E4	0.99 J	2.0	0.56	E4	0.96 J	2.0	0.56	E4	1,300	MCL
Iron, Dissolved	--	100	22		24 J	100	22	E4	--	100	22		NV	NA
Lead, Dissolved	--	3.0	0.18		--	3.0	0.18		0.24 J	3.0	0.18	E4	15	MCL
Magnesium, Dissolved	1800	500	11		1100	500	11		1300	500	11		NV	NA
Manganese, Dissolved	4.8	3.5	0.31		0.86 J	3.5	0.31	3.5 U	1.1 J	3.5	0.31	3.5 U	35	HBGL

TABLE 3.4 (concluded)

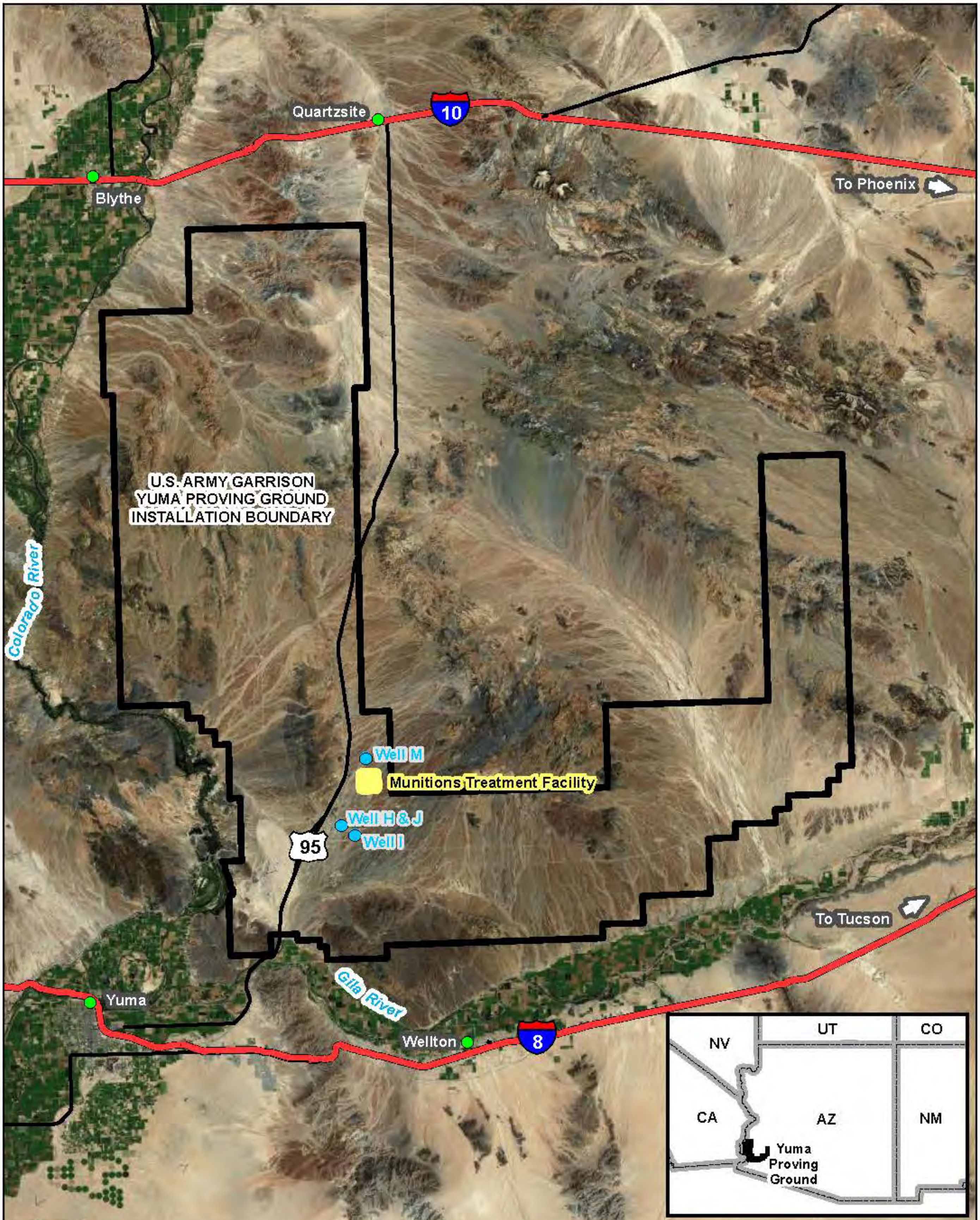
SUMMARY OF BIENNIAL GROUNDWATER SAMPLING ANALYTICAL RESULTS[1,2]
KOFA Open Burn/Open Detonation Munitions Treatment Facility
U.S. Army Garrison Yuma Proving Ground, Arizona

Analyte	August 2016												Remediation Goal[3]	Remediation Goal Reference
	MTF-MW1 (Upgradient)	LOQ	DL	Flag[4]	MTF-MW3 (Downgradient)	LOQ	DL	Flag[4]	MTF-MW3FD (Downgradient)	LOQ	DL	Flag[4]		
Metals, Dissolved (concluded)														
Molybdenum, Dissolved	12	2.0	0.14		15	2.0	0.14		16	2.0	0.14		35	HBGL
Nickel, Dissolved	1.7 J	3.0	0.30	3.0 U	1.4 J	3.0	0.30	3.0 U	1.6 J	3.0	0.30	3.0 U	100	AWQS
Potassium, Dissolved	6900	3000	240		4000	3000	240		4400	3000	240		NV	NA
Selenium, Dissolved	2.1 J	5.0	0.70	E4	1.2 J	5.0	0.70	E4	1.4 J	5.0	0.70	E4	50	MCL
Silver, Dissolved	0.045 J	5.0	0.033	5.0 U	0.049 J	5.0	0.033	5.0 U	0.064 J	5.0	0.033	5.0 U	35	HBGL
Sodium, Dissolved	190000 J	5000	92	J (M1)	180000 J	5000	92	J+ (M1)	200000	5000	92	J+ (M1)	NV	NA
Thallium, Dissolved	--	1.0	0.050		--	1.0	0.050		0.17 J	1.0	0.050	E4	2	MCL
Vanadium, Dissolved	11	6.0	0.50		17	6.0	0.50		18	6.0	0.50		49	HBGL
Zinc, Dissolved	2.6 J	20	2.0	E4	12 J	20	2.0	E4	13 J	20	2.0	E4	2,100	HBGL
Mercury, Dissolved	--	0.20	0.027		--	0.20	0.027		--	0.20	0.027		2	MCL
Explosives														
Hexahydro-1,3,5-Trinitro-1,3,5-Triazine (RDX)	0.067 J	0.16	0.033	NJ (C3, C8, E4)	0.15 J	0.16	0.033	J (E4, C3, H4)	0.15 J	0.16	0.033	J (C3, C8 Mod, E4)	0.32	HBGL
Anions														
Perchlorate	1.7 J	0.50	0.082	J (M1)	1.1	0.50	0.082		1.1	0.50	0.082		14	HBGL

Notes:
[1] Groundwater sampling results in micrograms per liter (µg/L). Only detected analytes shown.
[2] Bolded values indicate results above the remediation goal.
[3] Groundwater remediation goal is the USEPA maximum contaminant level (MCL) (USEPA, 2009), Arizona aquifer water quality standard (AWQS) (ADEQ, 2007), or the Arizona human health-based guidance level
[4] Flags were applied following the Arizona Department of Environmental Quality Groundwater Data Submittal Guidance version 3.3 (ADEQ, 2005).

Definitions:
µg/L = micrograms per liter. NV = no value. NA = not applicable. "--" = not detected.
C3 = Qualitative confirmation performed
C8 = Sample RPD between the primary and the confirmatory analysis exceeded 40%. Per EPA Method 8000C, the lower value was reported as there was no evidence of chromatographic problems.
C8 Mod = Sample RPD between the primary and confirmatory analysis exceeded 40% and the higher concentration was reported.
E4 = Concentration estimated. Analyte was detected below laboratory minimum reporting limit (MRL).
H4 = Sample was extracted past required extraction holding time, but analyzed within analysis holding time.
M1 = Matrix spike recovery was high; the associated blank spike recovery was acceptable.
M2 = Matrix spike recovery was low; the associated blank spike recovery was acceptable.
M3 = The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated blank spike recovery was acceptable
V1 = CCV recovery was above method acceptance limits. This target analyte was not detected in the sample.
V3 = CCV recovery was above method acceptance limits. This target analyte was detected in the sample, but the sample was not reanalyzed.
U = Analyte is not detected at the reported concentration.
UJ = Analyte is not detected at the reported concentration and the detection limit is estimated.
J = The reported concentration is estimated.
J+ = The reported concentration is estimated with high bias.
NJ = The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value is the estimated concentration in the sample.
LOQ = Limit of Quantitation
DL = Sample-specific Detection Limit

FIGURES



LEGEND

Production Well Location (Approximate)

Munitions Treatment Facility

Miles
0 5 10
0 8 16
Kilometers

FIGURE 1.1

REGIONAL LOCATION

U.S. Army Garrison
Yuma Proving Ground

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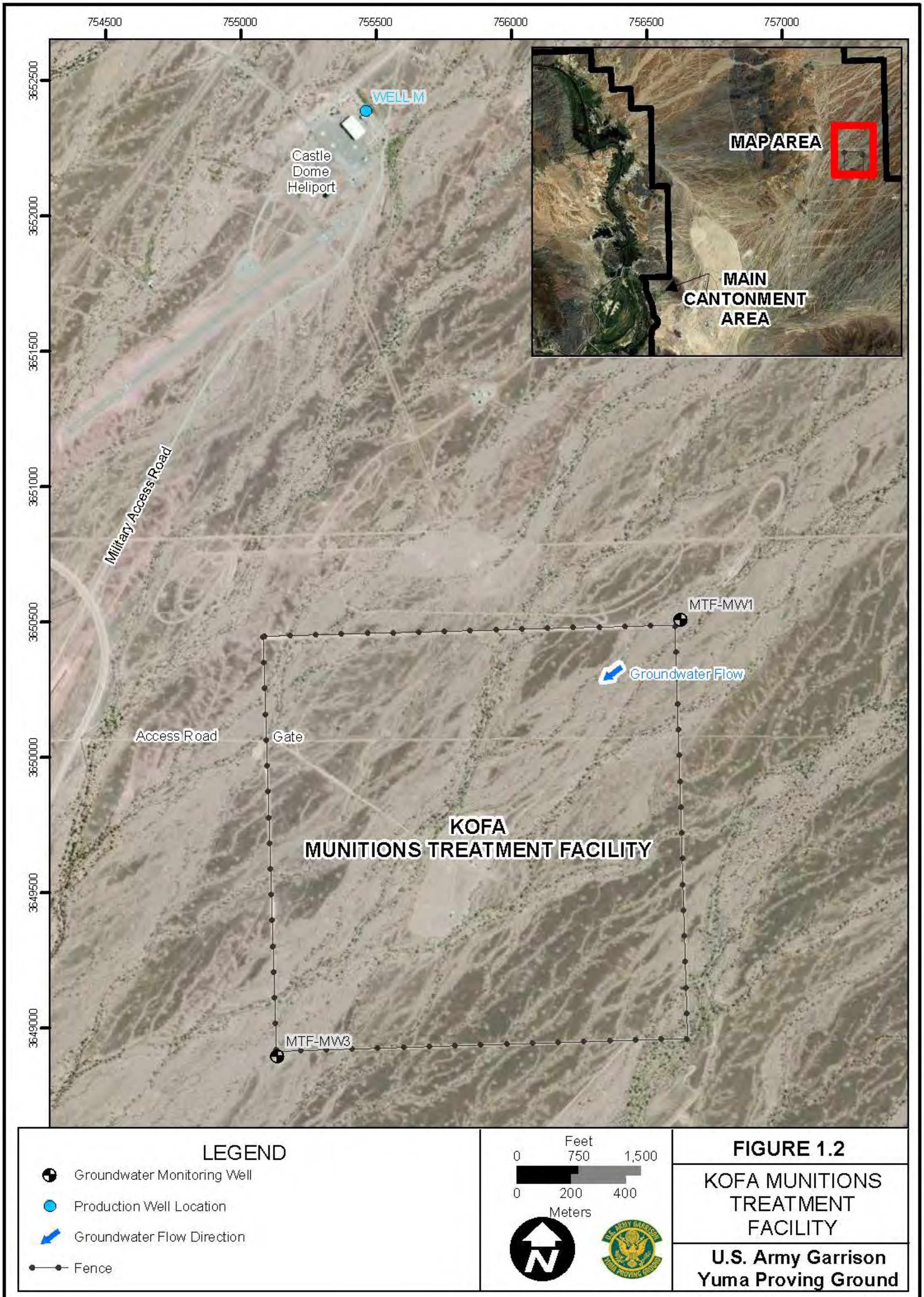

FIGURE 1.2

KOFA MUNITIONS TREATMENT FACILITY

U.S. Army Garrison
Yuma Proving Ground

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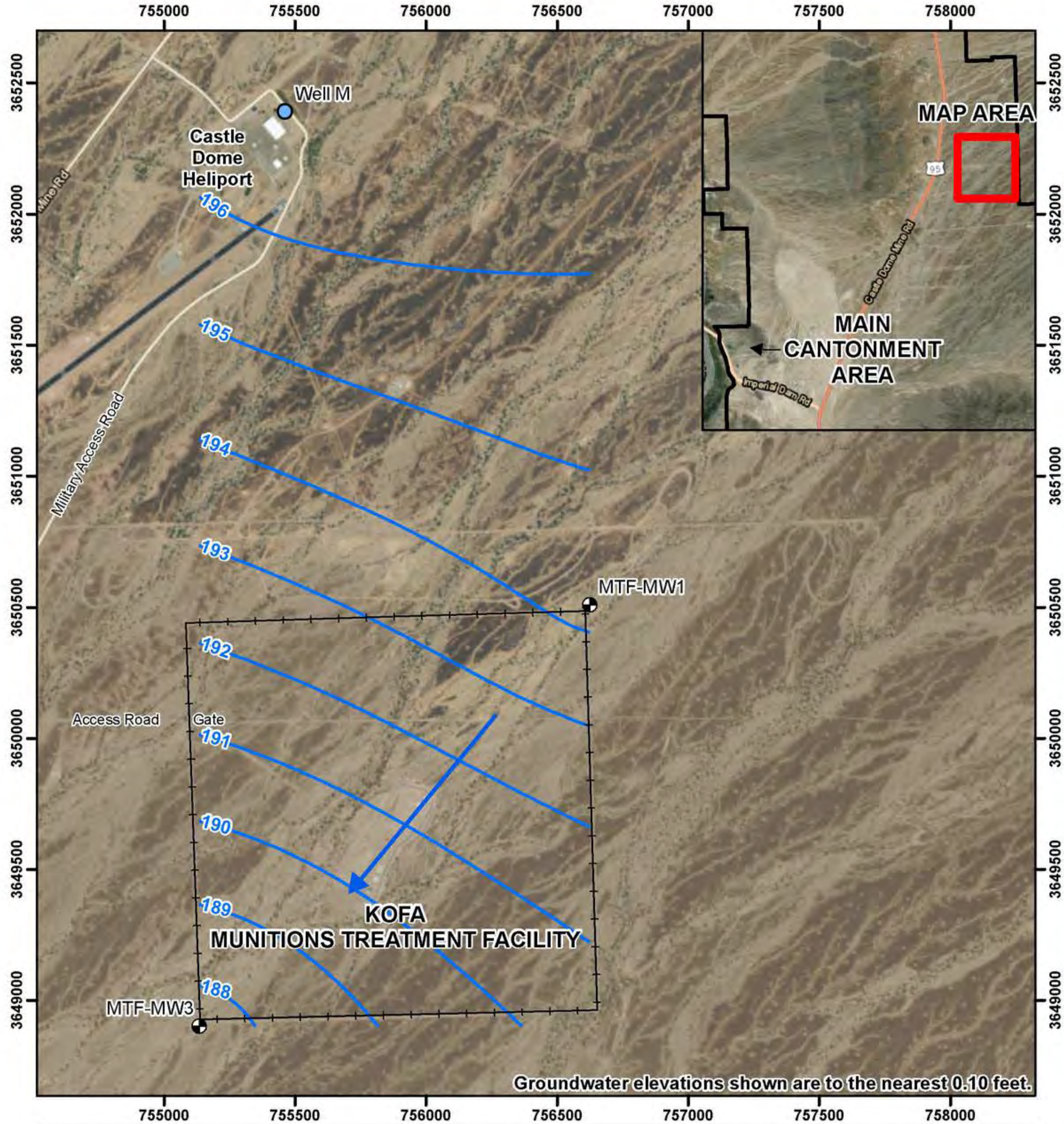

Legend

- Groundwater Monitoring Well
- Production Well Location
- Groundwater Flow Direction
- Groundwater Contour (1 Ft Interval)
- Fence
- U.S. Army Garrison Yuma Proving Ground

0 0.25 0.5 Kilometers

0 0.25 0.5 Miles

FIGURE 3.1

Potentiometric Map

U.S. Army Garrison Yuma Proving Ground

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ARIZONA HAZARDOUS WASTE MANAGEMENT PERMIT

EPA I.D. NO. AZ5213820991

U.S. ARMY GARRISON YUMA PROVING GROUND

PERMIT ATTACHMENT 8

SECURITY PROVISIONS

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ATTACHMENTS

SECURITY PROVISIONS

8.1 GENERAL SECURITY MEASURES

Security measures are in place to prevent unknown and/or unauthorized contact with any wastes and disturbances of wastes or equipment. No waivers for security measures are requested for the Open Burn/Open Detonation Munitions Treatment Facility (OB/OD MTF) Permit. Therefore, the requirements of A.A.C. R18-8-264.A (40 CFR 264.14(a)(1-2)) are not applicable.

Several procedures and equipment in use at the U.S. Army Garrison Yuma Proving Ground (USAGYPG) minimize the possibility for unauthorized entry of persons onto the USAGYPG installation. The procedures and equipment for the USAGYPG facility-wide activities are not discussed as part of this permit. The following sections describe the security measures and procedures for the OB/OD MTF.

8.2 BARRIERS

The OB/OD MTF is surrounded by a perimeter fence at the edge of the buffer zone (active area). Permit Attachment 8A, Figure 8A-1 shows the OB/OD MTF buffer zone fence perimeter layout, the access gates, and key road junctions into the OB/OD MTF.

8.2.1 Fencing

The OB/OD MTF perimeter is within a fenced area, approximately 1,500 meters by 1,500 meters (4,921 feet by 4,921 feet). The fence is a two-strand fence and has wire rope vehicle gates. The fence strands are located at approximately 24 and 40-inch heights above ground surface, with metal tee posts approximately 48 inches high and on approximately 16-foot centers. Due to variations in topography, the height of the wire strands can vary by several inches. Permit Attachment 8B provides photographs of the perimeter fencing (Photos 1 and 2).

This fence was specifically designed per the Arizona Game and Fish Department guidelines for wildlife compatible fencing. It is intended to restrict the movement of larger wildlife such as horses and burros into the OB/OD MTF, and allow for passage of smaller wildlife without injury.

8.2.2 Gates

The buffer-zone fence is equipped with wire rope vehicle gates into the facility on the east and west sides. These gates are used by vehicles for delivering waste items to be treated and transferring hazardous waste shipments from the temporary waste storage area inside the buffer zone. The wire rope vehicle gates are constructed with 0.5-inch wire rope secured to a 0.75 inch steel bolt. The bolt passes through a 6-inch diameter wood post, with a padlock securing the gate, and is shown in Permit Attachment 8B, Photo 7.

All gates to the OB/OD MTF are locked when the facility is unmanned. The locked gates control access to the OB/OD MTF. When explosive operations are in progress, the west gate is left unlocked for safety reasons but the east gate remains locked.

8.2.3 Barricades and Red Warning Devices

All personnel accessing the range area are briefed on barricading and signaling procedures to ensure safety. When explosive operations are in progress, ORT personnel barricade the access road and activate a warning device(s) located near the barricade. The barricade and warning device(s) are located on the access road within 75 yards east of the intersection of the OB/OD Access Road and Firing Front Road (Firing Front Road traverses north-south while the OB/OD Access Road traverses east-west.).

The barricade is a small plastic blockade barrier that can be easily lifted and moved. When viewed from the front, it is about 3 feet x 4 feet in dimensions and the words “Stop! Demo in Progress” or equivalent is posted on it. When viewed from the side, it is “A” shaped. Only one barrier is used to block the road.

At a minimum, the warning device activated shall be a red warning flag on a flagpole which signals hazardous operations are in progress. Additionally, a solar-powered flashing light may also be activated, especially when visibility is limited such as operations occurring during dawn or dusk. The warning light and flagpole are shown in Photo 3 of Permit Attachment 8B. The intersection at Firing Front Road is approximately 914 meters (3000 feet) west of the safety bunker (see Permit Attachment 8A, Figure 8A-1).

Note that neither the flagpole rope or the flashing light switch is under lock and key during operations. However, both are on a secure military installation which is likely to prevent tampering or deactivation during operations. Red flags and flashing lights are well-known range communication devices per the Range operating procedures.

Permit Attachment 8B, Photo 4 shows the west gate of the OB/OD MTF which provides a single entry/exit control for personnel during operations.

No red flags or flashing lights are located at the OB/OD MTF east gate. The east gate is only accessible from the firing range and is always locked. Range control closely monitors all access in these areas.

8.3 WARNING (DANGER) SIGNS

Warning signs (“Danger – Unauthorized Personnel Keep Out” signs) are posted at the OB/OD MTF gates and fences to provide notice that the area is restricted and unauthorized entry is prohibited while informing personnel of the hazard (unexploded ammunition). The signs meet A.A.C. R18-8-264.A (40 CFR 264.14(c)).

These signs measure approximately 1.5 feet by 3 feet and have a white background with a red legend. The signs are legible from a distance of 25 feet and are in English and Spanish. The signs are located at approximately 50-meter (164 feet) intervals along the fence line. The typical signs are shown in Permit Attachment 8B (Photos 5 and 6).

8.4 24-HOUR SURVEILLANCE SYSTEM

The OB/OD Treatment Facility is equipped with an artificial barrier meeting the requirements of A.A.C. R18-8-264.A (40 CFR 264.14(b)(2)(i), (b)(2)(ii)), eliminating the 24-hour continuous monitoring requirements.

However, specific surveillance provisions for the OB/OD MTF consist of armed security patrols 24 hours each day in the Kofa region of the USAGYPG. The roads allowing access to the Kofa range are secured by 24-hour armed guards, and all persons require access passes or escorts. During operation, entry to the OB/OD MTF is limited to the west gate.

8.5 ACCESS CONTROL

The OB/OD MTF is in a remote desert area completely within the USAGYPG boundaries. Access within the fenced OB/OD MTF and its immediate surrounding areas is restricted, with little or no reason for pedestrian traffic. All lands surrounding the fenced OB/OD MTF are secured by the military for military use, and access to the installation is restricted. Castle Dome Mine road is the closest public access road, about 2.38 kilometers (1.48 miles) to the west.

8.5.1 Range Control

The USAGYPG Range Control monitors movement and road access throughout the range. All persons are briefed on range access procedures and warning devices prior to accessing the USAGYPG ranges.

Vehicle access to the OB/OD Treatment Facility will be coordinated and controlled by the USAGYPG Range Control. Visits to the OB/OD MTF will be coordinated through the Ammunition Recovery Branch for escort.

8.5.2 Entry Control List

The names of personnel assigned to the OB/OD MTF for operations and visitors will be placed on an entry control list maintained with the Ammunition Recovery Branch and the Lead ORT assigned. OB/OD MTF personnel and visitors will be verified against this list for entry into the facility on a daily basis. All visitors must notify the USAGYPG prior to visiting the OB/OD Treatment Facility.

8.5.3 Visitor Log Book

During operations of the OB/OD MTF, visitors will be restricted to the safety bunker. Prior to operations and after verification of ‘all clear,’ visitors will be given access to the grounds inside the fence boundary and the OB/OD MTF. All visitors will sign in on the Visitor Log.

In addition, all visitors must wear the minimum PPE prescribed by the Ordnance Response Team (ORT) at all times.

8.5.4 ORT Escort

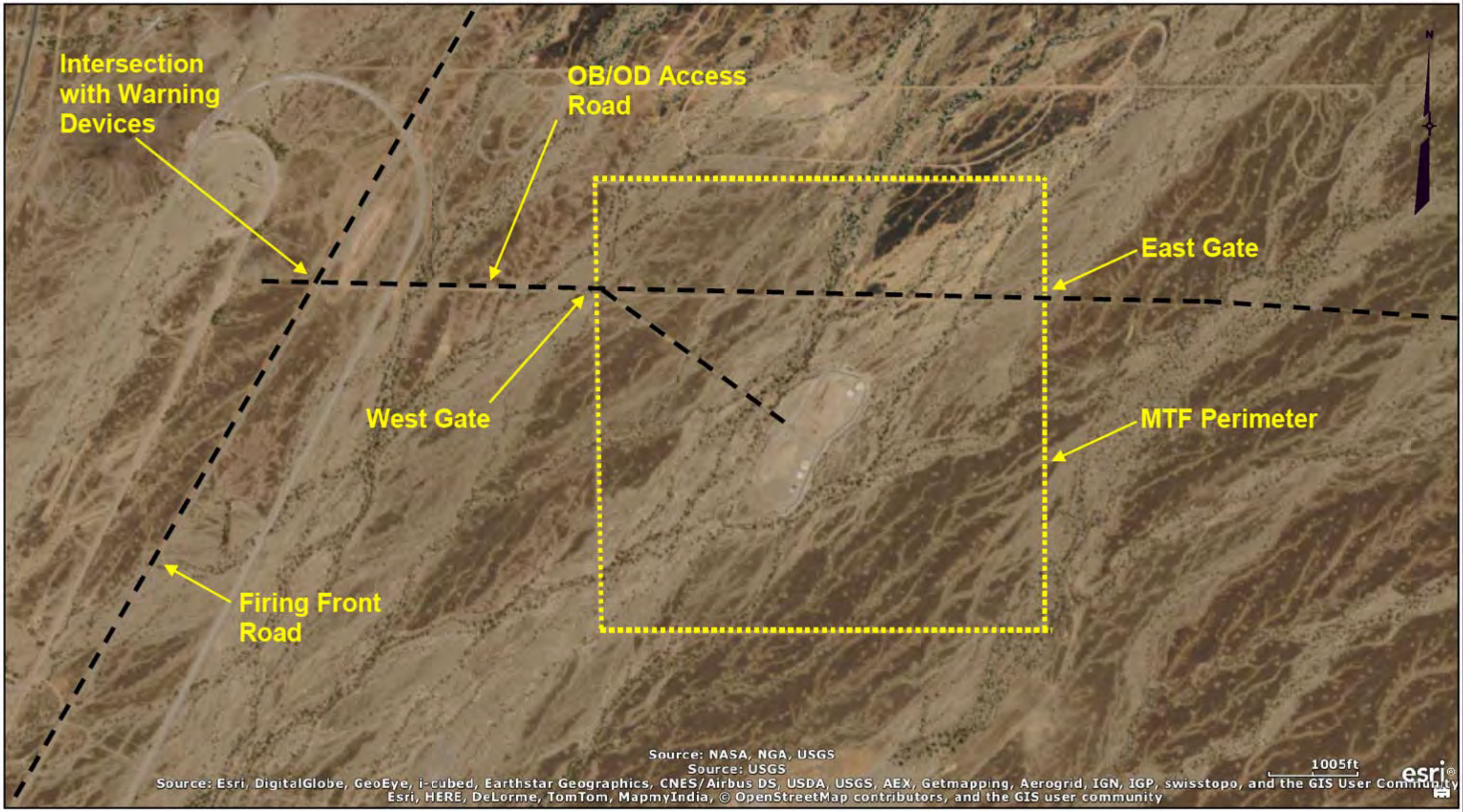
All personnel entering the facility require escort by qualified ORTs. Visitors admitted to the facility must be escorted at all times.

ATTACHMENT 8A

FIGURES

12:41:09 PM
12/9/2016
L:\Shared\home\Public\banderson\YUMA\DRAWINGS\FIGURE 8A-1 (MUNITIONS TREATMENT FACILITY).dgn

11x8.5 (in.)



NOT TO SCALE

CTI and Associates, Inc.
28001 Cabot Drive, Ste. 250
Novi, Michigan 48377
248.486.5100 (fax)248.486.5050
www.cticompanies.com

FIGURE 8A-1
MUNITIONS TREATMENT FACILITY
PERIMETER AND ROAD/GATE ACCESS POINTS
YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION
JULY 2016 1165010006.3

ATTACHMENT 8B

PHOTOGRAPHS

Photo 1 – OB/OD OB/OD Munitions Treatment Facility Perimeter Wire Fencing With 48-Inch High Metal Posts (measured from road surface to top of post).

Photo 2 – Close-up of OB/OD MTF Perimeter Fencing Showing Wire Strands At Approximately 24-Inches Above Grade (24-Inch Mark on Ruler) and 43-inches (5-Inch Mark on Ruler)

Photo 3 – Warning Devices at Intersection of Firing Front Road and the OB/OD Access Road

Photo 4 – Fence and West Gate Entrance to the OB/OD Munitions Treatment Facility

Photo 5 – Warning Signs at West Gate, and at Intervals Along Entire Fence Line Surrounding the Munitions Treatment Facility

Photo 6 – Warning Signs At West Gate and at Intervals Along Entire Fence Line Surrounding the Munitions Treatment Facility

Photo 7 – Padlock Used to Secure Wire Rope Across The West Gate (Same Type of Lock Used at East Gate)

ARIZONA HAZARDOUS WASTE MANAGEMENT PERMIT

EPA I.D. NO. AZ5213820991

U.S. ARMY GARRISON YUMA PROVING GROUND

PERMIT ATTACHMENT 9

EQUIPMENT PROVISIONS

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EQUIPMENT PROVISIONS

This attachment describes the U.S. Army Garrison Yuma Proving Ground (USAGYPG) Open Burn/Open Detonation Munitions Treatment Facility (OB/OD MTF): internal and external communication systems; OB/OD operational equipment; personnel protective equipment for routine operations; emergency equipment; required aisle space for equipment; protection from run-on, run-off, and groundwater protection; and impact of equipment and power failure at the OB/OD MTF.

9.1 COMMUNICATIONS

9.1.1 Internal Communications

Ordnance Recovery Team (ORT) personnel communicate between vehicles, with offsite supervisory personnel, and with Range Control via two-way radio and/or cellular phones. Environmental Sciences Division inspection personnel carry cellular phones when on the site, allowing communication with offsite personnel and Range Control. Radio equipment will also be made available when personnel are required to use respiratory protection equipment, and the "two-man rule" will be invoked to ensure personnel safety when working on contaminated or "hot" equipment.

Non-routine operating conditions, including spills and releases, will be conveyed verbally to workers using the internal communication system described above.

9.1.2 External Communications

The radio is the primary mechanism used to summon emergency assistance from USAGYPG security, Fire Department, and other emergency response teams. Telephones (wireless and wired) may also be available to summon external assistance in an emergency. Range Operations Control coordinates emergency assistance, which is accessible on the USAGYPG radio net or the telephone at 328-5111. Range Operations Control, responsible for directing all traffic on the Firing Range, has a "crash" phone that opens the line to all emergency services for subsequent notification to the USAGYPG Fire Services and the Environmental Coordinators (EC). Range Operations Control is fully staffed during normal duty hours and whenever any location on the Kofa Range is operationally active ("hot"). When Range Operations Control is closed, the Police Desk serves as the back up until Range Operations Control becomes operational. Both Range Operations Control and the Police Desk have emergency services "crash" phone combined with telephone capabilities and can make contact with external (outside the USAGYPG) groups or services as needed. All personnel who work in the OB/OD MTF will be required to be in direct visual or voice contact with persons who have access to a radio or a telephone. A wired telephone is located at about 100 feet east of the intersection of the Firing Front Road and the OB/OD MTF access road (see Permit Attachment 10 (Contingency Plan), Permit Attachment A Figure 10A-3).

9.2 OB/OD OPERATIONAL EQUIPMENT

Required equipment for specific OB/OD MTF related activities is listed in Permit Attachment 9A, Table 9A-1.

9.3 PERSONNEL PROTECTIVE EQUIPMENT

In accordance with 40 CFR 270.14(b)(8)(v), this section describes the personnel protective equipment (PPE) required for use by OB/OD MTF personnel during facility operations and by visitors at the facility. All visitors must wear the minimum PPE prescribed by the ORT at all times.

The selection and use of PPE during OB/OD MTF operations and emergency response operations is based on the U.S. Department of the Army, EPA, and Occupational Safety and Health Administration (OSHA) health and safety requirements. It is also based on a site-specific evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the location, specific conditions, duration of the activity, the actual or potential hazards identified, and the actual hazards identified through monitoring. Where hazards have not been fully evaluated, the highest level of protection required for the potential hazard will be specified until an evaluation is complete. The evaluation shall be performed by a certified industrial hygienist and shall consider such risks as dermal exposure and inhalation of potential toxic gases generated due to the combustion or detonation. If necessary, the hygienist or qualified specialist shall request test data.

OB/OD treatment activities are carried out in accordance with the approved operational procedures which specify required PPE (see Permit Attachment 6 (OB/OD Operations)). This PPE can include safety glasses, fire retardant coveralls, etc. as indicated in Permit Attachment 9A, Table 9A-1 and shall be consistent with the ASTM and NFPA guidance in Permit Attachment 9A, Table 9A-2.

The PPE selected for OB/OD MTF operations includes OSHA Level C to OSHA Level D. In general, level D PPE (i.e. safety glasses, closed toe shoes or ASTM F2413-05 approved steel-toe safety shoes [task dependent], gloves, and sunscreen) is the only PPE used. Level D PPE is suitable for most operations. However, at a minimum, protective clothing shall include long pants, shirts (short or long sleeves), and closed toe shoes. Level C might be required for cleanup operations periodically.

Personnel protective measures to be used during the cleaning, bagging, and containerization of ash residue are also specified in the approved procedures. These measures can include respiratory protection. The details of the respiratory protection program are maintained by the ORT contractor.

Other operations have PPE specified in the procedures, such as sampling waste ash. Each sampling event will be required to have a SAP which will specify the required PPE.

Infrequent or unusual operations will have specific procedures developed.

All procedures will address the details of the PPE requirements in the procedure or a separate health and safety plan, if required. For example, Niton or PVA gloves and a full- or half-face respirator might be specified.

9.4 EMERGENCY EQUIPMENT

Permit Attachment 10 (Contingency Plan) describes the emergency equipment available to respond to emergencies at the OB/OD MTF. In general, equipment for explosive emergencies will depend on the type of emergency.

The USAGYPG maintains adequate supplies of emergency equipment in the Ammunition Recovery Branch complex. This equipment will be transported to the scene if an explosive emergency occurs. The basis for this action is that, in the event of an explosive materials emergency, the site would be evacuated.

In the case of process wastes or other emergencies not involving explosion hazards, equipment for spill control, personal protection, decontamination, monitoring and surveillance, and fire control will be available at the safety bunker to respond to emergencies.

Further information concerning emergency equipment and supplies available to be transported to the OB/OD MTF during a potential or actual emergency is given in the Permit Attachment 10 (Contingency Plan).

9.5 REQUIRED AISLE SPACE FOR EQUIPMENT

The OB/OD MTF is a large open area with few obstructions that would hinder access by personnel, fire protection equipment, or spill control equipment.

The perimeter gate is wide enough to allow the largest vehicle required during an emergency to enter the OB/OD MTF. Once inside the perimeter fence and associated gates, roadways and paths provide access to each of the burn pads and detonation pits/trenches as well as to the safety bunker and waste accumulation area. If the limited equipment in the facility [e.g., ORT vehicles, forklift, or earthmover] temporarily impede access roadways, there would be little problem in moving around the obstacle through the relatively flat natural terrain.

The waste accumulation area (safety bunker area) is small and holds only a small number of containers. The area is always maintained in a clean and uncluttered condition with a minimum of three (3) feet of aisle space to support easy access for personnel performing routine inspections as well as access to emergency equipment.

The OB pans are designed to have eight (8) feet of clearance between each other. Historically, without refractory lining in the pan (including the pan sides), 6 feet of spacing between pans was required to avoid thermal damage to other pans. This aisle space also accommodates unobstructed movements of personnel and fire protection, spill control, or decontamination equipment to this area.

The OB pan lids are removed to a location outside of the heat from the open burning operation, and will not inhibit aisle space. The sump and sump grate is located 18 inches from the nearest OB pan and more than 15 feet from the next closest pan (see Permit Attachment 2, Permit Attachment 2C).

There are no concrete berms surrounding, or special ramps onto and off of, the OB concrete pads. Rather, there is a slight elevation increase to the pad, and then a slight elevation decrease from the pad perimeter to the pad center where the sump is located. Therefore, there are no restricting aisle widths to the pad.

The concrete stormwater retention basin has a steeper decent from the basin perimeter down to the floor of the retention basin. There is no special on or off ramp with restrictive aisle width.

OD Pit #2 and OD Pit #3 have an approximate thirty (30) foot wide excavated soil load/unload ramp that decreases in elevation from the ground surface down to base of the pits. The base of the pits is approximately 15 feet deep. This width is sufficient to support access during emergencies even with an unmovable vehicle of fifteen feet width. OD Pit #1 does not have a defined load/unload ramp; rather the base is accessible from all sides.

9.6 PROTECTION FROM RUN-ON, RUN-OFF, & GW PROTECTION

This section specifies fixed equipment or structures necessary to minimize run-on into the OB pads and OD pits, to minimize (if not eliminate) run-off from the units onto adjacent soil, and to protect groundwater from any potential migration of ejecta contamination infiltrating through the soil.

9.6.1 Run-On Protection

Run-on to OB/OD MTF operations will be prevented by the following:

A. The engineering design of the flood control measures and containment structures installed as shown in Permit Attachment 2, Permit Attachment 2B.

B. OB operations are conducted in elevated burning pans.

C. Run-on prevention requirements do not apply directly to the concrete safety bunker because the waste management actions for which the OB/OD MTF is permitted do not occur at that location. (The bunker is approximately 731 meters (2,400 feet) northwest of the OB and OD treatment units.) There is a well-defined wash to the west of the safety bunker and the immediate area of the bunker is approximately 1.75 feet higher than the top of the wash's nearest side wall. Based on the topography of the area surrounding the bunker, there should be no significant potential for run-on to damage items or hinder the limited activities that occur at the safety bunker. Therefore, contaminated run-off resulting from any run-on is not possible.

9.6.2 Run-Off Protection

Runoff from OB/OD MTF operations will be prevented by the following:

A. For the OB Pad, occasional run-off from the concrete pads to the retention basin does not affect the burning pans.

B. The OB/OD MTF will not accept liquid wastes.

C. The OB pads are equipped with sumps to catch releases of any loose materials or precipitation. These sumps are checked as part of the operational inspections. Any accumulated materials are removed as appropriate. An exceptionally high evaporation rate allows accumulated water to evaporate rapidly during most months of the year. Operating procedures allows a nominal amount of precipitation to accumulate in sumps without removal.

D. OB operations are not conducted in adverse weather conditions and the burning pans are kept covered with precipitation covers when not in use. The precipitation covers have a wind tie down to prevent being blown off.

E. The OB pads are constructed to contain run-off in retention basins. Historical analysis of accumulated storm water indicates the water is not contaminated. However, water will be sampled prior to release in accordance with Permit Attachment 3 (Waste Analysis Plan).

F. The OD pit volumes are large enough to contain any reasonable precipitation and sheet flow into it (resulting from the immediate adjacent areas within the flood protection berm surrounding the upper and side portion of the site).

G. Run-off prevention requirements do not apply directly to the concrete safety bunker because the waste management actions for which the OB/OD MTF is permitted do not occur at that location.

9.6.3 Groundwater Protection

Groundwater contours for the site were developed from published information and are shown on the map in Permit Attachment 1, Permit Attachment 1A Figure 1A-3c. The potential groundwater contamination issues are addressed in Permit Attachment 7 (Groundwater Monitoring Plan). The following is a brief outline of groundwater protection measures.

A. Removal of ash as soon as practical after OB operations.

B. Removal of scrap metal and searches for undetonated PEP as soon as practical after OD operations.

C. Use of precipitation covers on burn pans.

D. Use of burn pads and retention basins to control runoff.

E. Based on data previously presented by ENTECH, Inc. (YPG 2004c, Submittal 4), Well M is 2.5 kilometers (8,160 feet) upgradient at Castle Dome Heliport and Wells J and H are approximately 9 kilometers (5.5 miles) downgradient from the site. The depth to groundwater at Well M is approximately 195 meters (635 feet) below grade. The recorded depth to groundwater at Well J is about 100 meters (330 feet) below grade. Based on these recorded depths, an estimated depth of groundwater beneath the site of 177 meters (580 feet) was interpolated.

The infiltration study and the Baseline Soils Investigation Study performed by USAG, Yuma has demonstrated that potentially-contaminated water could percolate from the pit surfaces to the groundwater table. A Groundwater Monitoring Plan for assessing contamination caused by the OB/OD MTF has been submitted and approved by ADEQ, and is provided in Permit Attachment 7 (Groundwater Monitoring Plan).

9.7 EQUIPMENT & POWER FAILURE

There are minimal risks to OB/OD operations from either equipment failures or power outages. Any problems with equipment utilized during treatment are handled in accordance with the approved operational procedures. The majority of burns and detonations are ignited using non-electric devices. A loss of electrical power to the USAGYPG base would have no impact on operations at the OB/OD MTF.

9.7.1 Power Supply Failure

No power is supplied to the OB/OD MTF. Most treatment operations are initiated by non-electric devices and are not power-dependent. However, for the few treatment operations that do require battery powered electrical devices and wiring, approved operational procedures include use of backup blasting devices in the event of a misfire.

When explosive operations are in progress, the access road to the facility is barricaded and a red flag or red flashing light signaling hazardous operations is activated at the roadway. The red flashing light is solar powered and the manually operated flag provides redundancy should the light lose power.

Portable generators supply the power required for cleanup operations with a vacuum cleaner or electromagnet. Spare generators are easily obtained at the USAGYPG from the equipment pool, and will not require restriction of operations.

9.7.2 Waste-Handling Equipment Failure

The waste-handling equipment used at the OB/OD MTF will be inspected periodically for deterioration and malfunctions. Preventive maintenance will be conducted to ensure peak operating performance. If operations require any piece of equipment (MHE or earthmoving) and it fails, operations will cease until repairs or replacement can be completed. Failure of equipment would not endanger operations and would not result in the release of waste. Equipment inspections are described in Permit Attachment 11 (Inspection Plan).

In addition, all personnel who operate waste-handling equipment will be trained and qualified to use the appropriate equipment (see Permit Attachment 12 (Training Plan)).

Should equipment fail such that it is in the way of OB/OD operations, OB/OD actions will be halted, and the site will remain manned if explosives are present until the equipment is repaired or otherwise removed. When the obstruction is cleared, actions will be resumed.

With the maintenance and heavy equipment capabilities within the USAGYPG, repair or removal of obstructing equipment would normally be expected to occur within hours of the request for assistance.

If for any reason, OB/OD actions cannot be performed on the day waste explosives are taken to the site, remaining explosive material will be repacked in containers, labeled as hazardous waste, as appropriate, and transported in accordance with SOPs to the designated storage magazine. The return of waste munitions and/or propellant to the magazine will be reported to the Regional Director by the Environmental Coordinator and managed in accordance with 40 CFR 266.205.

9.7.3 Communications Equipment Failure

As noted earlier in this section, OB/OD MTF operators normally have immediate access to both radio and telephone, but radio is the primary mechanism for emergency external communications. If, for some reason, the site phone is inoperable at the time of a planned OB/OD operation, the Lead ORT may proceed with operations as long as radio communication capabilities have been verified.

9.7.4 Determination of Meteorological Conditions

OB/OD treatment activities are carried out in accordance with the approved operational procedures which specify acceptable weather conditions (see Permit Attachment 6 (OB/OD Operations)). OB/OD MTF operators obtain weather information by calling the USAGYPG Meteorological Team or by connecting to the USAGYPG intranet weather web site maintained by the USAGYPG Meteorological Team. The following weather conditions are unacceptable for OB/OD operations:

- OB/OD operations will not be undertaken during an approaching electrical storm, or when Range Control informs of a thunderstorm warning;

- OB operations will not be undertaken when the wind velocity is in excess of 15 miles per hour (except under circumstances where any interruption of treatment operations would impose an unacceptable hardship or hazard).

All other weather conditions are acceptable for OB/OD operations.

If acceptable weather conditions cannot be established, including conditions where information is unavailable due to equipment failure or power outages, OB/OD actions will not be performed.

9.7.5 Off-Site Emergency Equipment

The contingency plan (Permit Attachment 10) requires certain emergency equipment maintained by the USAGYPG organizations not normally affiliated with the OB/OD MTF (e.g., fire engines maintained by the USAGYPG Fire Dept.) to be available in case there is an emergency at the OB/OD facility that requires use of the equipment. In the event that these equipment become unavailable for use, the responsible organization should notify Range Control so that a determination of applicable range operations affected could be made.

9.8 REFERENCES

The following documents from the 2007 RCRA Permit issued by ADEQ are incorporated by reference into this 2017 renewal permit:

YPG 2004c — RCRA Operating Permit Application, Open Burn/Open Detonation Facility, U.S. Army Yuma Proving Grounds, prepared by Jason Associates Corporation, September 2004 Update.

- YPG 2004c, Submittal 4: “*Geohydrologic Study of the Yuma Proving Ground with Particular Reference to the Open Burning/Open Detonation Facility at Yuma County, Arizona”,* prepared by ENTECH Engineers, Inc, May 1988, accompanied by a “Memorandum to the Record” by Jason Associates Corp.

ATTACHMENT 9A

TABLES

Table 9A-1(a-c)	**Equipment & Supplies for Routine Operations**
Table 9A-2	**Personal Protective Equipment**

Table 9A-1a. Equipment & Supplies for Routine Operations

General Equipment/Supplies	Location
2-Way Radio and/or Cellular Phones	Each ORT Vehicle
Portable Cellular Phones	Each ORT Individual
2-Way Radio As Part Of Respirator	Each Respirator
Wired Telephone (Adjacent To Flagpole, Flashing Light)	About 100 Feet East Of Intersection Of OB/OD Access Road & Firing Front Road
Warning Flag and Flashing Red Light	As Required
Drinking Water	Each ORT Vehicle
First Aid Kits	Each ORT Vehicle
Emergency Signaling Devices (Smoke Grenade For Day, Flare For Night)	Each ORT Vehicle
Drag With Tow Line	As Required
Required PPE & Equipment	**Level (See Table 9A-2)**
Safety Glasses	Required Level D
Long Pants	Required Level D
Long- Or Short-Sleeve Shirt	Required Level D
Closed-Toe Shoes Or Safety Shoes	Required Level D
Gloves	Required Level D
Sun Screen	Required Level D
Fire Retardant Coveralls	As Required
Respirator	As Required

Table 9A-1b. Equipment & Supplies for Routine Operations

Demilitarization by Detonation and Open Burn (SOP YP-0000-K-002)			
Equipment/Supplies/Required PPE	OB/OD Prep. (Op #1)	OB & OD (Op #2, 3, 4, 5)	Cleanup (Op #6)
Leather Or Leather-Palmed Gloves When Handling Wooden Boxes Or Metal Banding	1 Pair/Person	1 Pair/Person	1 Pair/Person
Steel Toed Safety Shoes (ANSI Z41 Approved)	1 Pair/Person	1 Pair/Person	1 Pair/Person
Safety Boots	1 Pair/Person	1 Pair/Person	1 Pair/Person
Safety Glasses	1 Pair/Person	1 Pair/Person	1 Pair/Person
Hearing Protection	1 Pair/Person	1 Pair/Person	1 Pair/Person
Fire Extinguisher	2 Ea., 10 BC Min.	2 Ea., 10 BC Min.	2 Ea., 10 BC Min.
Portable 2-Way Radio	As Required[a]	As Required[a]	As Required[a]
Mobile 2-Way Radio	As Required[b]	As Required[b]	As Required[b]
Flame-Resistant Coveralls		1 Pair/Person	
Broom, Dustpan			Yes
Plastic Bag			Yes
Grounding Straps For Rocket Disassembly (Appendix A Of SOP YP-0000-K-002)	As Required	As Required	
Grounding Rod Or Other Grounding Method For Removing Shunts	As Required	As Required	

a. Portable hand-held transmissions shall not be made within 30 meters of electrical explosive devices.

b. Mobile transmissions shall not be made within 50 meters of electrical explosive devices

Table 9A-1c. Equipment & Supplies for Routine Operations

Surface Range Clearance (SOP YP-0000-K-028)				
Equipment/Supplies/Required PPE	Preparation & Sweep (Op. #1 & #3)	Sweep (Op. #2)	Sweep (Op. #4)	Impact Field Preparation (Op. #5)
Portable 2-Way Radio		As Required		
Mobile 2-Way Radio	As Required	As Required	As Required	As Required
Leather/Leather-Palmed Gloves When Handling Wooden Boxes	1 Pair/Person	1 Pair/Person	1 Pair/Person	1 Pair/Person
Safety Boots	1 Pair/Person	1 Pair/Person	1 Pair/Person	1 Pair/Person
Safety Glasses Or Goggles	1 Pair/Person	1 Pair/Person	1 Pair/Person	1 Pair/Person
Yellow Flags	As Required	As Required	As Required	
Red Flags	As Required	As Required	As Required	
Wooden Lathe	As Required	As Required	As Required	
Colored Surveyor's Ribbon	As Required	As Required	As Required	
First Aid Kits	As Required	As Required	As Required	As Required
Dump Truck	As Required		As Required	
Backhoe/Front-End Loader	As Required	As Required	As Required	As Required
Pickup Trucks W/Bed Liner	As Required			
Holding Bin/Barrels	As Required	As Required	As Required	
Personal Respirator	1 Each Person			
Cotton Sack, Sand Bag, Or Plastic Bucket	As Required	As Required		
Trash Bin Or Dumpsters		As Required	As Required	
Helmet	One/Person[c]	One/Person[c]		One/Person
Flak Vest With Groin Protector	One/Person[c]	One/Person[c]		One/Person
Armored Truck				As Required
Armored Magnetic Sweeper				As Required

c. Required for ORTs in areas of heavy vegetation where HE sub-munitions have been found.

Table 9A-2. Personal Protective Equipment

Pursuant to NFPA-471-1989 and EPA/600/2-85/028, the PPE (respiratory, chemical, thermal) is divided into four categories based on degree of protection afforded. An asterisk (*) indicates the item is optional.

Level A protection should be used when:

- The hazardous material has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on either the measured (or potential for) high concentration of atmospheric vapors, gases, or particulates; or the site operations and work functions involve a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulate of material that are harmful to skin or capable of being absorbed through the intact skin;
- Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible; or
- Operations must be conducted in confined, poorly ventilated areas, and the absence of conditions requiring Level A have not yet been determined.

Level A equipment includes: (to be used as appropriate).

- Pressure-demand, full facepiece, self-contained breathing apparatus (SCBA), or pressure-demand supplied air respirator with escape SCBA, approved by NIOSH.
- Totally encapsulating chemical-protective suit. Totally encapsulating chemical-protective suit (TECP suit) means a full body garment that is constructed of protective clothing materials; covers the wearer's torso, head, arms, and legs; has boots and gloves that may be an integral part of the suit, or separate and tightly attached; and completely encloses the wearer by itself or in combination with the wearer's respiratory equipment, gloves, and boots. All component of a TECP suit, such as relief valves, seams, and closure assemblies, should provide equivalent chemical resistance protection.
- Long Underwear and Coveralls.*
- Gloves, outer and inner, chemical-resistant.
- Boots, chemical-resistant, steel toe and shank.
- Hard hat (under suit).*
- Disposable protective suit, gloves, and boots (depending on suit construction, may be worn over totally encapsulating suit).*
- Two-way radios (worn inside encapsulating suit).

Level B protection should be used when:

- The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection; NOTE: This involves atmospheres with IDLH (immediately dangerous to life and health) concentrations of specific substances that do not represent a severe skin hazard, or that do not meet the criteria for use of air-purifying respirators.
- The atmosphere contains less than 19.5 percent oxygen; or
- The presence of incompletely identified vapors or gases is indicated by a direct-reading organic vapor detection instrument, but the vapors and gases are known not to contain high levels of chemicals harmful to skin or capable of being absorbed through the intact skin.
- The presence of liquids or particulate is indicated but they are known not to contain high levels of chemicals harmful to skin or capable of being absorbed through the intact skin.

Table 9A-2. Personal Protective Equipment

Level B equipment includes:

- Pressure-demand, full facepiece, self-contained breathing apparatus (SCBA), or pressure-demand supplied air respirator with escape SCBA, NIOSH approved.
- Hooded chemical-resistant clothing (overalls and long-sleeved jacket, coveralls, one or two-piece chemical-splash suit, disposable chemical-resistant overalls).
- Coveralls, and Face Shield.*
- Gloves, outer and inner, chemical-resistant.
- Boots, outer, chemical-resistant, steel-toe and shank.
- Boot-covers, outer, chemical-resistant (disposable).*
- Hard hat.
- Two-way radios (worn inside encapsulating suit).

Level C protection should be used when:

- The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin;
- The types of air contaminants have been identified, concentrations measured, and an air-purifying respirator is available that can remove the contaminants; and
- All criteria for the use of air-purifying respirators are met.
- Atmospheric concentration of chemicals must not exceed IDLH levels. The atmosphere must contain at least 19.5 percent oxygen.

Level C equipment includes:

- Full-face or half-mask, air purifying respirators (NIOSH approved).
- Hooded chemical-resistant clothing (overalls, two-piece chemical-splash suit, disposable chemical-resistant overalls).
- Gloves, outer and inner, chemical-resistant.
- Boots, outer, chemical-resistant, steel toe and shank.
- Boot-covers, outer, chemical-resistant (disposable).*
- Hard hat.
- Escape mask, Face shield, and Coveralls.*
- Two-way radios (worn under outside protective clothing).

Level D protection should be used when:

- Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals. NOTE: Combinations of personal protective equipment other than those described for Levels A, B, C, and D protection may be more appropriate and may be used;
- The atmosphere contains no known hazard.

Level D equipment:

- Coveralls.
- Boots/shoes, chemical-resistant steel toe and shank.
- Boots, outer, chemical-resistant (disposable).*
- Safety glasses or chemical-splash goggles, and Hard hat.
- Escape mask, Face shield, and Gloves.*

ARIZONA HAZARDOUS WASTE MANAGEMENT PERMIT

EPA I.D. NO. AZ5213820991

U.S. ARMY GARRISON YUMA PROVING GROUND

PERMIT ATTACHMENT 10

CONTINGENCY PLAN

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CONTINGENCY PLAN

This Contingency Plan is a required attachment to the Resource Conservation and Recovery act (RCRA) Permit for the U.S. Army Garrison Yuma Proving Grounds (USAGYPG) Open Burn/Open Detonation Munitions Treatment Facility (OB/OD MTF). The facility is located in the Kofa firing range region of the USAGYPG. See Permit attachment 10A, Figure 10A-1 for the location of the OB/OD MTF.

This Contingency Plan is not to be confused with the National Contingency Plan or the Integrated Contingency Plan for other USAGYPG sites. Also, other requirements in the RCRA Permit (such as equipment provisions to prevent accidental ignition or reaction of hazardous waste explosives or residues contained in Permit Attachment 6 (OB/OD Operations)), may be useful during the initial response, and are applicable after the initial response, during implementation of this plan.

10.1 GENERAL INFORMATION

10.1.1 Plan Overview

This attachment describes how OB/OD MTF personnel (which includes at least a Lead Ordnance Recovery Technician (ORT)) will respond to a fire, explosion, or any unplanned sudden or other release of hazardous waste, hazardous material, or constituents that occurs outside the engineering controls of the OB/OD MTF activity that could threaten human health or the environment. This attachment also describes how OB/OD MTF personnel will respond to incidental releases or spills of propellants, explosives, and pyrotechnics (PEP)-related materials occurring within engineering controls. An incidental release may or may not require implementation of this Contingency Plan.

Unplanned events involving PEP-related materials, such as miss-fires or ejecta from OD Pits or Burn Pans, do not in and of themselves constitute an “emergency” invoking the Contingency Plan. USAGYPG Standard Operating Procedures (SOPs) cover events such as these. OB/OD MTF personnel will manage them because of their specific training and expertise. Typical examples of ”emergencies” that would require action by the USAGYPG Installation Response Team would be range fires, transportation accidents involving personnel injuries and other events above and/or beyond the training of ORT technicians.

The EPA hazardous waste codes applicable to the OB/OD operations are:

1. D001 (ignitability - all non-liquid compounds meeting 40 CFR 261.21(a)(2) except those which ignite upon absorption of moisture);

2. D001 (ignitability - all non-liquid oxidizers) (see 40 CFR 261.21(a)(4));

3. D003 (reactivity - all non-liquid compounds meeting 40 CFR 261.23 except those normally unstable (see 40 CFR 261.23(a) (1)), those which react with water (see 40

CFR 261.23(a) (2-4)), and reactive cyanide or sulfide bearing waste (see 40 CFR 261.23(a) (5))) (Ref: USEPA H.W. Permits Compendium Document # 9443.1995(01)); and

4. D002 (corrosivity), D004 (arsenic), D005 (barium), D006 (cadmium), D007 (chromium), D008 (lead), D009 (mercury), D010 (selenium), D011 (silver), D030 (2,4-dinitrotoluene), D032 (hexachlorobenzene), D033 (Hexachlorobutadiene), D035 (Methyl Ethyl Ketone), and/or D036 (nitrobenzene) (see 40 CFR 261.24).

The OB/OD MTF ORT personnel will manage the majority of spills/releases at the facility, including, incidental releases or spills occurring within engineering controls. An incidental release is a release of hazardous waste or waste constituents where the substance can be absorbed, neutralized, contained, or otherwise controlled by personnel in the immediate release area using emergency equipment on hand. USAGYPG Installation Response Team (IRT) personnel will manage releases or other incidents beyond the management capability of the ORTs.

10.1.2 Plan Modification

This OB/OD MTF Contingency Plan will be reviewed and amended, if necessary, in the event of any of the following:

1. Modification of the RCRA Permit;

2. Failure of the Contingency Plan in a test or actual emergency;

3. Changes in the design (including specific equipment), operation, maintenance, or other areas of the OB/OD MTF or its activities that increase the potential for fires, explosions, or releases of hazardous waste or materials or hazardous waste constituents, or changes the response necessary in an emergency;

4. Changes to the emergency coordinators list information; or

5. Changes to the list of emergency equipment

A copy of any revised Contingency Plan will be sent to all USAGYPG emergency services and all local and state agencies that may be called on to provide emergency services.

10.1.3 Access to the OB/OD MTF

The main base roadways, well-traveled base secondary roads, and access roads to the OB/OD MTF are maintained. This maintenance includes grading and repair of any storm-damage. However, roads in the Kofa firing range where the OB/OD MTF is located are mostly gravel and unimproved.

For travel along the main base road to the OB/OD MTF, there are no vehicle height clearance requirements. The OB/OD MTF road is described as primary gravel with a street width of 20 feet. All vehicles requiring access to the site, including USAGYPG fire fighting vehicles, are all-terrain. Vehicles do not cross arroyos that contain flowing water. Muddy terrain is not a problem for these vehicles. Vehicles can easily pass one another if one becomes disabled on the road. No vehicle is allowed to come within 20 feet outside of the OD Pits 2 and 3 sidewalls.

The nearest public area and roads to the OB/OD MTF are the Kofa National Wildlife Refuge (KNWR) and the junction of U.S. Highway 95 and Castle Dome Road. The KNWR western border, which runs north south, is about 1.6 miles east of the OB/OD site at its closest point. About 1.6 miles west of the OB/OD site is U.S. Highway 95, which runs north-northeast to south-southwest. The junction between U.S. Highway 95 and Castle Dome Road is west-northwest of the OB/OD site. This public road goes northeast to KWNR. The Castle Dome Heliport located about 1.5 miles northwest of the OB/OD MTF is within the USAGYPG and not on the public domain.

Any offsite responders meet at the guard gate at the entrance to the Kofa Support Facilities area, as shown in Permit Attachment 10A, Figure 10A-4, and are escorted by the USAGYPG Department of Emergency Services (DES) personnel to the OB/OD MTF.

10.2 EMERGENCY COORDINATORS

10.2.1 Emergency Coordinators

In most instances, including incidental releases or spills of PEP-related materials, the Emergency Coordinator (EC) will be the Lead ORT.

For emergencies at the OB/OD MTF, above and/or beyond the training and expertise of the Lead ORTs, the EC will be the on-duty USAGYPG Fire Chief (Primary) or Assistant Chiefs (Secondary) listed below. USAGYPG sometimes refers to the EC as the Installation On-Scene Coordinator (IOSC); however, for purposes of this document the term ‘EC’ will be utilized.

10.2.1.1 Primary Emergency Coordinator (Department of Emergency Services)

Name:	Gerald Ball, Fire Chief, USAGYPG
Office Address:	Building 1220 Fire Protection Division Yuma, Arizona 85365
Phone:	(928) 328-5111 Range Operations Control (if emergency on the firing range) (928) 328-3915 (Office)

10.2.1.2 Secondary Emergency Coordinators (Department of Emergency Services)

Name(s):	John Staggs, Supervisory Fire Fighter / Assistant Fire Chief, USAGYPG
Office Address:	Building 3013 Laguna Airfield Fire Protection Division Yuma, Arizona 85365
Phone:	(928) 328-5111 Range Operations Control (if emergency on the firing range) (928) 328-2316 (Office)

10.2.1.3 Alternate Emergency Coordinators (ORTs)

Name:	Benjamin Wallace, Ordnance Lead
Office Address:	Building 3700 Ordnance Recovery Section Yuma, AZ 85365
Phone:	(928) 328-5111 (Range Operations Control (if emergency on the firing range) (928) 328-7296 (office)

For home addresses and telephone numbers for individuals above, refer to Permit Attachment 10B, Table 10B-2.

10.2.1.4 Cleanup Emergency Coordinator

After an emergency, the Environmental Coordinator (EnvC) is designated with responsibility for assisting in the cleanup of the affected area, and other related duties as described in this plan, in order to comply with A.A.C R18-8-264.A (40 CFR 264.56(g and h)). The contacts and duties of the EnvC are stated in Permit Attachment 10 Section 10.2.2.

10.2.1.5 Emergency Coordinator Notification

For emergency situations above and/or beyond the training and capabilities of the ordnance recovery technicians that could threaten the human health or environment, the Lead ORT contacts Range Operations Control and describes the nature of the emergency at the facility. (Initial notification of emergencies on the Firing Range, including at the OB/OD MTF, are to be directed to Range Operations Control by radio or telephone at 328-5111). Range Operations Control notifies the EC of the situation.

Range Operations Control is responsible for directing all traffic on the Firing Range. They have a “crash” phone to perform notifications as described in Permit Attachment 9 and as directed by the EC.

One of the ECs listed is available at all times and can reach the OB/OD MTF within two hours. The closest full time manned fire station is approximately 7 miles to the southwest and will respond within approximately 15 to 20 minutes. This fire station in within the Kofa Support Facility and is shown on Permit Attachment 10A, Figure 10A-4.

The EC has the responsibility to coordinate all emergency response measures and the authority to commit resources needed to manage emergencies and to clean up spills or other releases. The required notifications per A.A.C. R18-8-264.F are the responsibility of the EC; however, they can also be performed by the EnvC. The EC shall also be available to help appropriate authorities decide whether off-site support or action (e.g., evacuation, etc.) is necessary. The EC and EnvC must be thoroughly familiar with all aspects of the OB/OD MTF's Contingency Plan, all operations, and activities at the OB/OD MTF, the location, and characteristics of waste handled, the location of all records within the OB/OD MTF, and the OB/OD MTF layout.

If for any reason the on-duty Fire Chief or Assistant Chiefs cannot be reached at the phone numbers provided above, contact should be made at the home or individual phone number in the order they are presented in Permit Attachment 10B, Table 10B-2 until an available EC is reached.

When called, the EC shall secure and maintain control upon arrival until the situation is abated. Once the immediate danger is abated and the emergency scene stabilized, the area is ready for environmental cleanup and restoration to its pre-spill condition. The EC shall then relinquish control to the EnvC.

10.2.2 Environmental Coordinator

The EnvC or the Alternate EnvC, identified in Permit Attachment 10B, Table 10B-3 will be responsible for cleanup operations, including the selection of personnel, equipment, and procedures. The Lead ORT technician will assume the role of Alternate EnvC for incidents involving PEP-related materials at the OB/OD MTF that are within his training and capability. Cleanup procedures will begin following the stabilization of the emergency scene by either the Lead ORT technician or the EC / DES depending on who managed the incident.

The EnvC is responsible for interacting with Federal, state, or local environmental regulatory agencies, including reporting releases and spills, which could threaten human health or the environment. It is the responsibility of the EnvC or Alternate EnvC to select appropriate cleanup techniques or technologies consistent with environmental laws and regulations. These decisions could require the input and assistance of the IRT Support and Advisory Personnel. The EnvC or Alternate EnvC will make all decisions on necessary storage and disposal of wastes generated during response and cleanup activities. Permit Attachment 10B, Table 10B-3 lists the names, addresses and phone numbers for the EnvC and Alternate EnvC.

With regard to notification of Federal, State of Arizona, and Local Environmental Regulatory Agencies, the EnvC is responsible for interacting with Federal, State of Arizona and local regulatory agencies.

10.2.3 Installation Response Team

The IRT members (see Permit Attachment 10B, Table 10B-4)) will be notified by the EC in relation to the severity of the incident. These offices are not primary responders, but operate as support personnel. Their involvement in a hazardous material/waste incident, which could result in a threat to human health or the environment, may be immediate or delayed as part of the follow up. Decisions regarding the involvement of the IRT are the responsibility of the EC, EnvC and/or the Alternate EnvC. The roles and responsibilities of the personnel comprising the IRT are summarized in the paragraphs that follow.

10.2.3.1 Garrison Yuma Installation Commander

The USAGYPG Installation Commander exercises overall control of installation and contract personnel who manage or handle oil, hazardous substances, and hazardous wastes. The Installation Commander is responsible for ensuring that the following duties are performed in the event of a spill or other hazardous substance incident on USAGYPG:

1. Ensures that all spills/releases (which could threaten human health or the environment), fires, and explosions are properly reported;

2. Ensures that spill or release cleanup occurs to acceptable levels, based on Federal, state, or local laws;

3. If directed, assists by providing resources to support the Federal On-Scene Coordinator of the Regional Response Team (RRT) upon implementation by the National Response Center for the National Contingency Plan for a non-Army caused spill;

4. Directs the annual testing of the effectiveness of USAGYPG Contingency Plans, including directing annual drills or exercises; and

6. Authorizes, in coordination with the Public Affairs Office, the release of information to the public.

10.2.3.2 Range Operations Control

Range Operations Control is responsible for the safety and coordination of activities on the firing ranges. All incidents occurring on the ranges must be reported first to Range Operations Control. They will notify the DES through the installation “crash phone” system, which is a dedicated line, used for emergency services only. Range Operations Control is active whenever firing programs are scheduled. When closed, calls are automatically routed to the Police Desk, which has duplicate capabilities and systems in place to notify the DES.

10.2.3.3 Garrison Manager

The Garrison Manager is responsible for decisions involving resources and personnel for the Garrison operations. The Garrison Manager will coordinate directly with the EC during emergencies.

10.2.3.4 Industrial Safety Program Manager

The Industrial Safety Program Manager is responsible for the general safety of personnel while working on the job site and for compliance with Occupational Safety and Health Administration (OSHA) safety regulations that pertain to emergency responders and site cleanup workers. Participation in annual drills or exercises to test the effectiveness of the USAGYPG Contingency Plans is also a duty of the Industrial Safety Program Manager, or alternate.

10.2.3.5 Industrial Hygiene Unit

The Industrial Hygiene Unit assures that safe procedures and equipment are used in the response to an emergency. The Industrial Hygiene unit monitors air and water quality conditions in accordance with OSHA guidelines during hazardous substance spills or emergencies. The Industrial Hygienist, or alternate, will participate in annual drills or exercises to test the effectiveness of USAGYPG Contingency Plans.

10.2.3.6 Public Affairs Officer

The Public Affairs Officer, in coordination with the Installation Commander, is responsible for handling relations with all forms of media. The Public Affairs Officer is the official spokesperson for the installation and approves all media communications prior to release. The Public Affairs Officer, or alternate, will participate in annual drills or exercises to test the effectiveness of USAGYPG Contingency Plans.

Public Affairs Considerations and Requirements - Although prompt action is essential in coping with any accident or incident, the potential impact on public health and the public's perceptions of releases of hazardous substances magnify this importance. Specific guidance on the release of information concerning these accidents or incidents is found in U.S. Army Regulation (AR) 360-1, Community Relations, Sections 5-19 and 5-20.

10.2.3.7 Emergency Operations Officer

When the Emergency Operations Center is activated during an emergency, the Emergency Operations Officer is responsible for briefing the Installation Commander to provide information and recommendations concerning emergency operations and the use of resources. The Emergency Operations Officer, or alternate, will play an active role in annual drills or exercises to test the effectiveness of USAGYPG Contingency Plans.

10.2.3.8 Public Works Operations

Public Works Operations is responsible for the supply and operation of heavy support equipment, such as trucks, backhoes, front-end loaders. They are also responsible for interacting with the cleanup contractors who will be called in to do the final cleanup work. Public Works Operations Manager, or alternate, will participate in annual drills or exercises to test the effectiveness of USAGYPG Contingency Plans.

10.2.3.9 Readiness Office

The Readiness Office will notify Environmental Sciences Directorate of hazardous materials brought onto YPG by training units or visiting troops. This office will be notified when hazardous substance/waste incidents involve visiting or training units and will provide information and support requested by the EC. The Readiness Office will participate in annual drills or exercises to test the effectiveness of USAGYPG Contingency Plans.

10.2.3.10 Office of the Command Judge Advocate

The Office of the Command Judge Advocate is responsible for providing legal assistance to all elements of the Installation Response Team and the advisory personnel.

10.2.4 Regional Response Team

In the event of large-scale emergencies, the Regional Response Team provides support, advice, and backup for the EC when a release threatens to exceed post boundaries or is of such a magnitude that it is necessary to contact the National Response Center (NRC). The Director of Environmental Sciences, or his designee will initiate the NRC contact. Installation spill response equipment and supplies as described in Permit Attachment 9 (Equipment Provisions) are available to the Regional Response Team.

10.3 IMPLEMENTATION OF CONTINGENCY PLAN

The provisions of this Contingency Plan will be carried out immediately whenever there is a fire, explosion, or release of hazardous waste or hazardous waste constituents which could threaten human health or the environment (40 CFR 264.51(b)). Permitted Open Burns (fires) and Open Detonations (explosions) of military munitions hazardous waste are not subject to this requirement so long as personal injury does not occur.

This Contingency Plan will be implemented when a release of hazardous waste occurs outside the engineering controls of the OB/OD MTF. USAGYPG has three incident levels: Level I, II, and III. A description for each category of incident is provided below.

1. Is a condition which could threaten human health or the environment, including any of the following:

- Any fire or explosion that involves or could spread to hazardous waste management areas outside its own control area at the OB/OD MTF

- Spills or releases accompanied by any of the following (i) imminent danger of fire or explosion (including instances where ejected discarded military munitions (DMM) is blown in place (BIP) rather than being returned to an OB/OD unit for treatment, as defined by Ordnance Recovery Technician (ORT); (ii) release of toxic fumes; (iii) evidence of spreading toward surface water or groundwater; (iv) release of material outside USAGYPG boundaries; and (v) quantities and/or periods of time large enough to support extensive leaching to soil

These are categorized as Level III incidents. They are likely to require significant USAGYPG resources, external notifications and follow-up report, incident investigation, and longer-term mitigation.

2. Is a spill or release which constitutes a release of a “reportable quantity” of a hazardous substance regulated under Section 103 of CERCLA (40 CFR § 302) or Section 311 of the CWA (40 CFR § 117).

An incident for which external notifications are required are categorized as Level II. Follow-up reporting is required and there may or may not be mitigation requirements for the affected area.

3. Level I incidents are those releases that can be addressed using resources available at USAGYPG, for which no external notifications are required.

Immediate response actions to the above situations are to be performed in accordance with this Contingency Plan, but are not otherwise considered to be part of the OB/OD MTF’s normal operations and are not subject to other operational standards included in the Facility’s RCRA operating permit. Implementation procedures include: describing and reporting the incident, if the release involved a “release of a reportable quantity” and/or; if the release could threaten human health or the environment, to the Arizona Department of Environmental Quality (ADEQ) Emergency Response Unit, and eventually verifying clean up (with sampling data if necessary).

In accordance with 40 CFR 264.56(i), for any incident that requires implementing the Contingency Plan, USAGYPG must also:

1. Submit a written report the EPA Regional Administrator within 15 days after the incident, which must include the required information in 40 CFR 264.56(i)(1-7); and

2. Record in the RCRA Permit operating record the time, date, and incident details.

The report to the EPA Regional Administrator will include the follow items:

1. Name, address, and telephone number of the USAGYPG authorized representative;

2. Name, address, and telephone number of the facility;

3. Date, time, and type of incident (e.g., fire, explosion);

4. Name and quantity of material(s) involved;

5. The extent of injuries, if any;

6. An assessment of actual or potential hazards to human health or the environment, where this is applicable; and

7. Estimated quantity and disposition of recovered material that resulted from the incident.

The RCRA Permit operating record will include much of the same information reported to the EPA Regional Administrator, in particular items 3, 4, 5, 6 and 7, and will include follow-up items such as clean-up/sampling, and investigation/corrective actions to prevent future incidents.

Documentation of a reportable incident can be made using Permit Attachment 10D, Incident Reporting Form. However, USAGYPG may use any format desired as long as the required information items are included.

10.4 RESPONSE PROCEDURES FOR INCIDENTAL RELEASES

The process of treating military munitions in Open Burn Pans and Open Detonation Pits is by its very nature highly energetic, frequently involving ejecta, which is easily managed by OB/OD MTF ORTs, under Military SOPs. These events are not a threat to human health and the environment. In a discussion of when a response to a release would trigger the facility Contingency Plan, a distinction should be made between releases that are part of normal operations, in the case of an OB/OD event, and unplanned or uncontrolled events which could threaten human health or the environment. The OB/OD operations are different from more traditional operations, such as industrial processes, and require unique management and contingency response approaches.
There are a number of processes during operations that create a small release of materials at the site. This section details the methods for response to such incidents. A small incident (incidental release) is defined as one that may be abated using manpower and materials on the site. Therefore an incidental release may or may not require implementation of the Contingency Plan.

Some of the processes include open burning of propellant that may eject ash and other components of the burn mix onto the pad or the ground. The concrete pads are designed to contain this ejection; however, the ejected materials must be cleaned up. For OD operations, DMM and munitions scrap that is kicked out will be visually inspected. The location marked and noted in the operating logbook and the soil sampled for presence of hazardous material and any hazardous waste residuals cleaned up and placed in a properly labeled drum and place in the satellite accumulation area.

In accordance with USAGYPG SOPs (in Permit Attachment 6 (OB/OD Operations)), areas surrounding the Burn Pads and OD Pits are routinely cleared, as soon as it is safe to do so following OB/OD treatment actions. Each of the ORTs performing this work is qualified as an "explosives or munitions emergency response specialist" (see 40 CFR 260.10 and 40 CFR 266.201) in determining whether any suspect hazardous material found in surrounding areas must be detonated or burned in-place or can be moved back into the permitted OB/OD MTF.

1. If the suspect item can be safely moved back to the OB/OD unit, then the subsequent actions do not require implementation of this Plan. Evidence of explosive material breakdown will constitute an operational action including sampling; however, if it can be safely and completely collected, it will be treated in the next operation. If there is no evidence of explosive material breakdown, the top three inches of soil beneath the item will be removed and placed into the pit. These actions will not be considered an implementation of the Contingency Plan, but only an operational function.

2. The highest potential for incidents of concern involve a non-PEP related materials injury, a brush fire beyond the incipient stage or a petroleum leak from operating equipment or refueling operations.

The following actions will be taken in the event of incidental spills or releases, which are considered operational actions:

1. Contain the release to the smallest area possible, taking appropriate safety measures, including wearing appropriate protective clothing.

2. For container releases, remove container contents, if necessary, and transfer material to an overpack drum.

3. Decontaminate the release area. If the release is on the soils, ensure decontamination by removing all impacted soil to a depth of 3 inches below staining, and an area extending 3-6 inches horizontally in all directions beyond the limits of the staining. The removed soil will be placed in one of two locations depending on whether it is an OB or OD operation: OB into the ash satellite accumulation container and OD into the detonation pit. In the opinion of the Lead ORT, if an area is littered with too many pieces of OE filler materials to make an efficient and safe clean up, a flame will be applied to the surface area using torches as appropriate. Location documentation to + one (1) foot and clean verification sampling will be conducted, as required by the Recordkeeping and Record Retention procedures (Permit Attachment 15). The Waste Analysis Plan (Permit Attachment 3) and the QA Program Plan (Permit Attachment 13) contain appropriate sampling and analytical procedures for soil and waste. A running log of all soil locations decontaminated (including method of decontamination) will be kept with the operating record and be made available to ADEQ upon request.

4. If the material was released to secondary containment systems, remove it with a vacuum, pump or manually with shovels or dustpans.

5. Decontaminate equipment and clothing as directed by the Lead ORT.

6. Place material into compatible containers, label appropriately with a hazardous waste label, and if other than standard OB/OD materials, store in a waste storage area.

7. Manage all waste as hazardous until classification as non-regulated waste [in accordance with (IAW) A.A.C. R18-8-261.A (40 CFR § 261) and Permit Attachment 3 (Waste Analysis Plan)].

10.5 INITIAL EMERGENCY RESPONSE PROCEDURES

The primary concern in any actual or imminent spill/release, explosion, or fire situation is to protect personnel from harm.

Initial emergency response procedures include: 1), protect self and others from harm; 2), stop the spill/release of material; 3), contain the spill/release if possible; and, 4), notification of governmental agencies if the spill/release could threaten human health or the environment and reportable.

Whenever an emergency occurs, or is discovered by an employee, the discoverer of the incident will take measures to protect personal safety and the safety of others, and as appropriate, to stabilize conditions, and then immediately notify the Lead ORT of the incident by vocal command (person-to-person, telephone, or radio). If help from the USAGYPG IRT is required, the Lead ORT, in turn, shall immediately contact Range Operations Control (by radio or telephone at 328-5111) who will notify the USAGYPG DES and clear the way for their access. The area will be cleared immediately. If the Lead ORT is unavailable, the employee discovering the emergency will immediately notify Range Operations Control.

In most cases, the initial observer will know what material is involved and should be aware of the safety precautions required. If there is any doubt, the initial observer will remove himself from danger and await further instructions from the USAGYPG DES. Individuals working around any of these substances are well informed and instructed concerning safety measures and handling procedures specifically applicable to the substances they may be required to respond to. The initial response actions outlined below, and summarized in Permit Attachment 10A, Figure 10A-2, can prevent a small incident from becoming a major event if trained personnel carry them out in a prompt and efficient manner.

10.5.1 Protect Self and Others from Harm

Any individual who discovers an emergency (that is, an actual or imminent release, explosion, or fire) should protect themselves and others from harm. This protection can be accomplished by notification of the Lead ORT and all other OB/OD MTF personnel within the facility, evacuation of the area, upwind of the release/spill, using appropriate clothing, and removing or eliminating sources of potential ignition.

Emergency medical technicians (EMT's) are not required to be on-site during OB/OD operations However, ORT's are certified in first aid and CPR and can provide these medical services until more qualified first responders (EC, USAGYPG DES, etc. arrive.)

10.5.2 Stop the Release of Material

Once the spill/release, etc. is discovered, and others are safe from harm, an attempt should be made to stop the release of material or otherwise control the source of material causing the emergency situation. Only individuals who have been properly trained in handling the material should attempt this.

10.5.3 Contain the Release If Possible

If the release of material has stopped, an attempt should be made to contain the material to prevent further contamination of the environment. Only individuals properly trained in handling the released substances should attempt this. Releases might be contained by actions such as placing absorbent substances around the release or covering/dampening sources of wind blown contamination.

10.5.4 Notification

If not already notified, the Lead ORT or, as appropriate, the initial observer, will contact Range Operations Control (by radio or at 328-5111) and report the incident. The Lead ORT or initial observer, as subsequently directed by the EC or Alternate EC, will also provide input to reports or records as detailed in Permit Attachment 15 (Records & Reports).

10.6 INSTALLATION RESPONSE TEAM MOBILIZATION PROCEDURES

The Lead ORT technician makes the determination that the ORT technicians can manage an incident, which could threaten human health or the environment, or not. If not, the lead ORT makes the initial notification to Range Operations Control.

Mobilization of the IRT is triggered when the USAGYPG DES is notified of an emergency incident or situation at the OB/OD MTF through Range Operations Control. The Lead ORT or initial discoverer of the incident or situation at the OB/OD MTF makes initial notification to Range Operations Control per Permit Attachment 10 Section 10.2.1.5.

The Fire Chief or Assistant Fire Chief on duty immediately assumes the role of EC and takes command of the incident response actions. The EC shall determine what key response elements need to be notified and commence mobilization procedures after receiving cursory information and/or reviewing the situation.

Accidental explosions and fires are of particular concern at the OB/OD MTF. There is only a low probability of accidental explosion at the OB/OD MTF, due to the safety incorporated through adherence to Army regulations and SOPs on packaging and handling ordnance. In the event of an unplanned explosion of munitions, the immediate area will be evacuated of all personnel in order to minimize the risk of injury. The area will remain cleared until the explosion(s) have ceased. The EC will ensure that trained personnel authorized to perform those functions mitigate any explosion or fire hazards.

10.6.1 Immediate Notification Procedures

Security personnel and personnel involved in the operation of the OB/OD MTF are linked through USAGYPG's Range Control Communication Center. Whenever there is an incident, which could threaten human health or the environment, the EC, or alternate, must immediately:

1. Notify USAGYPG Emergency Services Branch, Range Operations Control, and OB/OD MTF personnel of the initial IRT response action to be taken;

2. Notify other IRT elements needed for the initial response; at a minimum, to include the EnvC;

3. Evacuate all personnel other than response personnel from the affected area;

4. Notify all appropriate state or local agencies with designated response roles, if their help is needed; and

5. Determine the character, exact source, degree, and extent of the incident, which could threaten human health or the environment, and make this information known to the emergency response personnel.

10.6.2 Assessment of Possible Hazards to Human Health or the Environment

Whenever there is a release, fire, or explosion, the EC must immediately identify the character, exact source, amount, and area extent of any released materials. The EC may do this by observation or review of OB/OD facility records or manifests, and, if necessary, by chemical analysis or monitoring.

The EC has access to monitoring equipment and personnel to assist in characterizing released materials (soils, water, and air). The USAGYPG DES personnel provide support and equipment to the EC. The information gathered from ORTs at the site and collected monitoring data will help in the characterization process. The EC will assess whether any toxic, irritating, or asphyxiating gases were generated or whether there were solids or liquids released to the environment. If needed, the EC will also consult with other USAGYPG entities as well as local, State, and national sources.

Concurrent with the characterization of a release, the EC must assess possible hazards to human health or the environment that may result from the release, fire, or explosion. This assessment must consider both direct and indirect effects of the release, fire, or explosion. This includes the effects of any toxic, irritating, or asphyxiating gases that are generated, or the effects of any hazardous surface water run-off from water or chemical agents used to control fire and heat induced explosions. The assessment of possible hazards to human health and the environment will be conducted based on such information as records of munitions transfers to the facility; typical chemical components identified in the Waste Analysis Plan (Permit Attachment 3); interviews with ORTs at the site; consultations with other USAGYPG, local, State, and national resources; and published reference materials. If it is determined that the OB/OD MTF has a fire, explosion, or release that could threaten human health or the environment outside the USAGYPG facility boundary, or if evacuation of the surrounding vicinity is advisable, the EC or designee must immediately notify local and other authorities as noted in the following section.

10.6.3 Assessment of Possible Hazards Outside of the USAGYPG Facility Boundary

The EC must work with the Emergency Response personnel to determine the fastest and safest means of containing any releases or fires. The EC and the IRT members have authority and resources to respond to possible threats to human health or the environment in the USAGYPG areas outside the OB/OD MTF and USAGYPG facility boundary as well as within the Facility. As warranted by the assessment of the threat presented by an emergency, the EC will direct the USAGYPG DES, as well as other USAGYPG groups/personnel supporting the IRT, to extend necessary evacuation or mitigation measures beyond the OB/OD MTF into surrounding USAGYPG areas, and areas beyond the USAGYPG facility boundary.

There should be no reasonable potential for an incident at the OB/OD MTF to reach a magnitude that would impact communities outside the USAGYPG facility boundary. This is due to the distance to such communities (and even to properties such as the KOFA National Wildlife Refuge) and because of the operational limits placed on the hazardous materials managed at the OB/OD MTF. However, hazardous waste regulations applicable to the management of the Facility dictate that specific actions are taken were such an incident to occur. It is recognized that the USAGYPG is subject to these requirements.

If the EC determines that the OB/OD MTF has a release, fire, or explosion that could threaten human health or the environment outside the USAGYPG facility boundary, or if evacuation of surrounding vicinity outside USAGYPG is advisable, the EC must immediately notify appropriate local authorities. Permit Attachment 10B, Table 10B-5 provides a reference list for offsite emergency contacts. USAGYPG would depend on the “911” emergency telephone number system to make contacts not identified in the table. It will be the responsibility of the local authorities to contact the Arizona Highway Patrol to block off the Castle Dome Road leading to the mining museum if they determine that action is appropriate. In addition to the notification of local authorities, the EC, or designee, must immediately notify, or report to, the ADEQ Emergency Hotline and either the on-scene coordinator for the geographical area (in the applicable regional Contingency Plan under 40 CFR 1510) or the NRC (see Permit Attachment 10B, Table 10B-6)). All possible attempts will be made to inform the Director, Environmental

Sciences or EnvC, however this report will not be delayed. This report will contain the following information:

1. Name and telephone of the reporter;
2. Name and address of the OB/OD facility;
3. Time and type of incident;
4. Name and quantity of material(s) involved, to the extent known;
5. Extent of any injuries; and
6. Possible hazards to human health or the environment outside U.S. Army Garrison Yuma Proving Ground.

10.6.4 Mitigation and Control Procedures

The discovery of a release requires that immediate action be initiated to prevent the spread of contamination of an oil or hazardous material. Initial response actions (see Section 10.6 (Initial Emergency Response Procedures)) should be taken immediately when the person who discovers the release assesses the situation. Of primary concern is personnel safety. Release containment and cleanup are of secondary importance when compared to the health and safety of personnel. After reviewing the situation, the EC will determine what key response elements need to be notified.

Response to releases of hazardous material or hazardous waste will vary depending on the physical and chemical characteristics of the released substances, the quantity released, and the environment to which the substances were released. The U.S. Department of Transportation (DOT) 2016 Emergency Response Guidebook and U.S. Department of Defense (DoD) explosives safety procedures will govern response actions based on the constituents of concern. The ORTs operating the OB/OD facility have detailed knowledge of explosives handling procedures through the training described in the training plan (Permit Attachment 12). Permit Attachment 10C (Emergency Response Procedures) provides multiple emergency response procedure references for the mitigation and control of releases and fires involving the typical types of wastes and materials that could be found at the OB/OD MTF. The information presented is taken from the DOT 2016 Emergency Response Guidebook (ERG). The types of waste and materials addressed in the referenced procedures include the following (any other materials that might ever be present at the OB/OD MTF should be covered by the DOT Guidebook or other reference materials):

1. Explosives – Division 1.1, 1.2, 1.3, 1.5, or 1.6, Class A or B – such as ammonium nitrate-fuel oil mixtures and blasting agents;

2. Flammable Solids - Toxic (Wet/Desensitized Explosives) - such as (wetted) nitrocellulose, nitroguanidine, nitroglycerine, PETN, or TNT solutions;

3. Non-PEP Flammable Liquids (Non-Polar/Water Immiscible) – including diesel fuel, gasoline, and oils (from equipment);

4. Flammable Solids – including nitrocellulose mixtures, charcoal, red phosphorus, sulfur, smokeless powder for small arms, and desensitized solid explosives not otherwise specified in the 2016 DOT ERG;

5. Water Reactives (Emitting Flammable Gases) – including magnesium pellets, zinc dust, and aluminum powder (uncoated);

6. Oxidizers – including potassium nitrate and potassium perchlorate;

7. Oxidizers (Toxic and Solid) – Generally barium, beryllium, lead, mercury, and thallium based oxidizers, such as barium nitrate and lead perchlorate;

8. Oxidizers (Unstable) – such as ammonium perchlorate and guanidine nitrate;

9. Toxic Substances (Non-Combustible) – including waste residues containing lead or mercury; and

10. Toxic Substances (Combustible) – including dinitrotoluenes (DNTs) and nitrotoluenes;

Response guidelines for materials unlikely to be present at the OB/OD MTF are presented in this document as a conservative measure because the response that would be involved in the event of an emergency includes some unique and important actions should their presence ever be suspect. For example:

1. No liquids (such as diesel fuel) or water reactive materials (such as magnesium fines) are permitted to be treated at the OB/OD MTF. However, because treatment of military munitions used in training exercises are exempt from the permit, there is a remote chance that some normally unpermitted materials could be treated at the facility. The water-use precautions inherent with fighting fires involving water reactive metals are an example of the unique response actions required.

2. It is unlikely that toxic flammable solids such as wetted nitroglycerine will be managed at the OB/OD MTF, though item (nitroglycerine) is a component of materials identified for treatment at the Facility.

3. White phosphorous (air reactive), reactive cyanide- and sulfide-bearing hazardous wastes, and other material are also prohibited from treatment at the OB/OD site.

However, the associated 2016 DOT ERG guide number is listed in Permit Attachment 10C for conservatism.

10.6.5 Procedures to Prevent Fires, Explosions, or Release from Occurring, Recurring, or Spreading

During an emergency, the EC must take all reasonable measures necessary to ensure that releases, fires, and explosions do not occur, recur, or spread to other hazardous waste or other areas of the OB/OD MTF. These measures should include, when applicable, stopping processes and operations at the OB/OD MTF in order to prevent or contain the release of hazardous wastes due to an explosion or fire. Operations will not resume until necessary cleanup has occurred and the existing condition has been evaluated to ensure that there is no remaining threat to human health or the environment.

All operations near a hazardous waste release, fire, or uncontrolled explosion site will be suspended until cleared by EC, the Director, Environmental Sciences, and the Chief, Ammunition Management Division. Prior to restarting OB/OD MTF operations, process and structural equipment will be inspected for leaks, cracks, and other potential problems. Released waste will be properly collected and containerized. Containers of hazardous waste generated will be properly managed [IAW A.A.C. R18-8-262.A (40 CFR § 262.34)].

The EC and OB/OD MTF personnel will conduct a review of the cause of an accident or incident. The operation that caused the accident or incident will not be restarted until adequate corrective and preventive measures have been determined and implemented. Any release that necessitates implementing this OB/OD MTF Contingency Plan will be followed by a written report documenting review of the incident and necessary follow-up actions and will become part of the operating record. Additional details on documenting incidents is provided in Permit Attachment 10, Section 10.3.

10.6.6 Request for Additional Assistance

USAGYPG provides emergency response services to the OB/OD MTF. The Emergency Services Division (of which the EC is part) acts as first responder in the event of an emergency and this Division includes the USAGYPG Police and Fire branches. The police and fire branches, as part of the USAGYPG command structure, are thus available to provide support, as needed, to the OB/OD MTF in the event of an emergency. In addition, the emergency equipment available at USAGYPG, including that at the OB/OD facility and at other USAGYPG locations (as described in Section 10.9 (Emergency Equipment) of this plan) is accessible to the EC and should be adequate to support any emergency responses that could reasonably be expected as a result of incidents at the OB/OD facility. It is not anticipated that USAGYPG would have an incident requiring outside emergency response other than a range fire emergency.

However, during an emergency response, the EC must constantly evaluate needed resources (support services and equipment) against those available within the USAGYPG base. In the event off-site (that is, off- USAGYPG property) assistance is to be requested, they would be asked, while on the USAGYPG base, to provide a supporting role to the primary USAGYPG DES functions. The following steps will be used for assistance during a major disaster or when the situation exceeds USAGYPG capability:

1. The EC has implemented a response and anticipates lacking some or all of the needed resources.

2. The EC estimates the resources necessary to respond to the release and consults with the USAGYPG staff to determine the availability of assets, considering all those held at the USAGYPG base. Permit Attachment 10B, Tables 10B-1 and 10B-7 through 10B-9 contains lists of the representative response equipment and supplies available at the USAGYPG base for response actions.

3. If the EC requests assistance from the National Response Center (NRC) via the Director, Environmental Sciences, the request may be for technical assistance, manpower, transportation, equipment, or other resources.

4. If the EC requests non-USAGYPG assistance, the EC will ensure the USAGYPG DES personnel meet offsite responders at the guard gate at the entrance to the Kofa Support Facilities area.

The agencies listed in Permit Attachment 10B, Table 10B-6 are identified as having either "Support" or "Notification" involvement in USAGYPG contingency planning. Those identified as a support organization may be contacted to provide support through allocation of information, resources, equipment, and/or personnel. USAGYPG does not maintain Mutual Support Agreements or Memorandums Of Understanding with these agencies.

Agencies identified with "notification" involvement in Permit Attachment 10B, Table 10B-6 are those USAGYPG may, depending on the incident, have responsibilities to notify. This latter group of agencies are not expected to ever be requested to provide resources or other physical support measures in the event of any incident at the OB/OD MTF.

10.6.7 Identifying the RCRA Hazardous Wastes

The OB/OD MTF will involve limited numbers and types of waste PEP. The records of materials transferred to the site are very detailed and available in ammunition accountability records (see Permit Attachment 3 (WAP) and Permit Attachment 6 (OB/OD Operations). The site operating personnel will know the detailed descriptions and amounts of the items at the site for that operation. In the event that the material cannot be identified, a worst-case situation will be assumed and commensurate response procedures will be initiated.

10.6.8 Storage and Treatment of Released Material

Immediately after an emergency, the EC or the EnvC (if the site has been sufficiently stabilized for the EC to relinquish control) will provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material resulting from the emergency. Wastes generated from cleanup of released materials that are unable to be treated at the OB/OD facility will be containerized in appropriate compatible containers.

Structural devices and equipment will be decontaminated in accordance with applicable procedures described in the Closure Plan (Permit Attachment 14) and per U.S. Army policies and requirements. All decontamination solutions and contaminated disposable equipment will be containerized, appropriately labeled, and stored pending a hazardous waste classification/determination in accordance with regulations and the Waste Analysis Plan (Permit Attachment 3) and Quality Assurance Project Plan (Permit Attachment 13).

Any explosives emergency that required an item to be blown in place and any release emergencies that require soil decontamination and/or sampling cleanliness verification shall be recorded in accordance with the recordkeeping in Permit Attachment 15 (Records & Reports). A running log of all soil locations decontaminated (including method of decontamination, such as BIP with excavation) shall be kept with the operating record and made available to ADEQ upon request.

10.6.9 Monitoring

Due to the nature of operations in an open-air facility, there is little reason to suspect any conditions where pressure buildup could present problems. However, during an emergency, the EC is responsible for monitoring the location for pressure buildup or leaks that might be associated with adjacent burn pans, equipment, containers, etc. left in an unstable, compromised, or otherwise threatened position when routine activities were halted by the emergency. Leaks and gas generation will be monitored visually.

10.6.10 Incompatible Waste

The EC, EnvC or Alternate EnvC will ensure that waste that may be incompatible with the released material will not be treated, stored, or otherwise managed in the area in which the incident occurred until cleanup procedures are completed. No waste treatment or storage actions will be started in affected areas until cleanup is completed. Two examples of potential chemical incompatibility at the site include:

1. Dinitrotoluene (DNT) and nitrates; and
2. Petroleum fuels and oxidizers (perchlorates, nitrates, etc.).

10.6.11 Post-Emergency Equipment Maintenance and Personnel Decontamination

Prior to operations resuming, all emergency equipment used in responding to a spill, fire, explosion or release will either be: (1), decontaminated and if necessary, repaired; or (2), replaced, with the original damaged/spent item undergoing a hazardous waste determination prior to disposal.

The EC must ensure that all emergency equipment is cleaned and fit for its intended use before operations are resumed.

The Guide for Decontaminating Buildings, Structures, and Equipment at Superfund Sites (U.S. EPA, March 1983) and Section 15-5 of the U.S. Army Technical Manual TM-9-1300-214 (Military Explosives) will guide procedures during cleaning, removing, and treating equipment and structures.

After decontamination and cleanup are completed in the affected areas of the OB/OD MTF, USAGYPG will notify the ADEQ that:

1. Cleanup of the affected areas has been completed so that OB/OD MTF operations may resume without risk of incompatible material being exposed to the released material.

2. All emergency equipment is cleaned and ready for its intended use. In addition, the ADEQ will be notified of the cleanup operation before OB/OD MTF operations resume.

10.7 EVACUATION PLAN

In the unlikely event that an evacuation resulting from OB/OD MTF activities should take place, personnel assigned to OB/OD MTF activities will be instructed in evacuation signals, procedures, and routes from the OB/OD MTF. Permit Attachment 10A, Figure 10A-3) shows evacuation routes from the OB/OD MTF.

Site evacuation procedures are as follows:

1. The USAGYPG EC or Lead ORT or designee will make the decision to evacuate.

2. Upon direction to evacuate, the USAGYPG EC or Lead ORT or designee will notify all personnel in the area of an evacuation by a vocal command.

3. The USAGYPG EC or Lead ORT will identify the evacuation route from the OB/OD MTF based on the type of incident and prevailing wind. If evacuation is to be through the East gate (the gate not used for normal entry/exit control), the EC or Lead ORT will ensure the gate is unlocked, or otherwise opened for emergency egress. The primary evacuation route will be through the West gate with the Assembly Point at the entrance to the facility. The alternate route will be through the East gate along the North side of the facility with the Assembly Point again at the entrance to the facility.

4. OB/OD MTF personnel will evacuate using the determined evacuation route.

The USAGYPG EC or Lead ORT will utilize the day's entry control list (per Permit Attachment 8 (Security Procedures)), along with verbal communication with ORTs to verify that all assigned personnel and any visitors have been accounted for, and evacuated.

The USAGYPG EC or designee will contact the Range Operations Control by phone or radio and indicate the number of personnel requiring transportation from the OB/OD MTF assembly point as necessary. Range Operations Control will, as appropriate, transmit the request to the DES, or other USAGYPG services and facilitate their access to the arranged assembly point.

If required, transportation will be provided for all personnel at the designated assembly point. Injured personnel or those who may have been exposed to hazardous chemicals will be taken immediately to the local hospital.

10.8 EMERGENCY EQUIPMENT

The following types of emergency equipment are maintained at USAGYPG for emergency response:

1. Fire protection equipment;

2. Spill control equipment;

3. Communications and alarm system; and

4. Decontamination equipment.

The emergency equipment that are required to be in place pursuant to this plan are included in Section 10.8.1 (Required Emergency Equipment). Emergency equipment that may be required (but not by this plan) are mentioned in Permit Attachment 10 Section 10.8.2.

Note: Due to the nature of the events at the USAGYPG OB/OD MTF, it is not necessary to maintain soil sampling and air monitoring equipment as part of the emergency equipment. If extensive sampling is required during implementation of the Contingency Plan, a site assessment plan/quality assurance program plan (SAP/QAPP) will be prepared at that time.

10.8.1 Required Emergency Equipment

Equipment for emergencies will depend greatly on the type of emergency.

In the case of process wastes or other emergencies not involving explosion hazards, equipment for spill control, personal protection, decontamination, monitoring, and fire control will be available at the safety bunker and in each ORT vehicle and MHE to respond to emergencies. Permit Attachment 10B, Table 10B-1 lists this emergency equipment. These quantities and items are considered the minimum required. Since only ORT personnel conduct OB/OD activities and ORT escort must be provided for any other personnel, there will always be an ORT vehicle present at the OB/OD MTF when there are people onsite. Each operational vehicle used by the ORT personnel in transporting PEP is required to carry two fire extinguishers. Personal protective equipment and firefighting equipment, such as fire extinguishers and shovels, are also available in ORT trucks when they are at the site. Furthermore, emergency response reference material, including this Contingency Plan and the DOT Emergency Response Guidebook (described in Permit Attachment 10 Section 10.6.4), are maintained at the OB/OD MTF. In addition, fire extinguishers are required to be present on any Material Handling Equipment (MHE), such as excavators, used at the OB/OD MTF. An excavator or other equipment could be used to smother a potential fire with soil.

10.8.2 Potential Additional Emergency Equipment

Additional emergency supplies and equipment, maintained within USAGYPG, are available to the OB/OD MTF, as needed, in the event of an emergency incident. However, these items as discussed below are neither dedicated to, nor part of the OB/OD MTF and, accordingly are not part of any operational preparedness checklists maintained under the Facility's RCRA operating permit. The additional emergency equipment shall be maintained within USAGYPG, and be available, if needed, to assist emergency response actions at the OB/OD MTF.

For example, the OB/OD MTF operations team may include other items in their ORT vehicles for their convenience. Additionally, the USAGYPG DES, DPW, and Logistics have committed to maintaining a minimum inventory of emergency response supplies and equipment as part of USAGYPG site-wide contingency planning.

Supplies and equipment that may be of use to the OB/OD MTF include, but are not necessarily limited to, those items discussed below:

1. USAGYPG DES maintains a HAZMAT Command Vehicle for use in responding to spills, releases, and other such incidents throughout USAGYPG. Items maintained on this vehicle that may be of use in response to incidents at the OB/OD MTF include those shown in Permit Attachment 10B, Table 10B-7.

2. Emergency response reference material, including this Contingency Plan and the DOT Emergency Response Guidebook (described in Permit Attachment 10 Section 10.6.4, are maintained on the USAGYPG DES emergency response vehicle.

3. The USAGYPG Directorate of Public Works (DPW) maintains a wide variety of emergency supplies and equipment that can be used in support of emergency responses. These items are maintained at the DPW complexes at USAGYPG (See Permit Attachment 10, Table 10B-8).

4. The USAGYPG Logistics group maintains a wide variety of emergency supplies and equipment that can be used in support of emergency responses. These items are maintained at the USAGYPG HAZMART site southwest of the OB/OD MTF (See Permit Attachment 10, Table 10B-9).

5. USAGYPG maintains adequate supplies of emergency equipment in the Ammunition Recovery Branch complex. This equipment will be transported to the scene if an explosive emergency occurs. The basis for this action is that, in the event of an explosive materials emergency, the site would be evacuated.

6. No pressurized water system for fire control is available at the OB/OD MTF. The nearest location for water access is approximately 3 miles south of the access road to the OB/OD MTF. This water is from a tanker filling station on the USAGYPG water distribution system. The USAGYPG DES is equipped to combat brush fires that might erupt and can refill units at this location.

7. USAGYPG maintains a small helicopter fleet that may be used for medical evacuation.

No emergency operations will be conducted at night.

10.9 COORDINATION AGREEMENTS

10.9.1 Police

The USAGYPG DES police branch provides support to the site in the event of an emergency. It is part of the command structure of the operator and does not require coordination agreements.

10.9.2 Fire

The USAGYPG DES fire branch provides support to the site in the event of an emergency. It is part of the command structure of the operator and do not require coordination agreements.

10.9.3 Emergency Response Teams

TheUSAGYPG DES is the designated First Responder in the event of an emergency. Response to hazardous material releases is conducted in accordance with this plan.

10.9.4 Aviation Operations

USAGYPG maintains a small helicopter fleet that may be used for medical evacuation. They are part of the command structure of the operator and do not require coordination agreements.

10.9.5 Local Hospitals

USAGYPG has a long established relationship with Yuma Regional Medical Center, approximately 35 miles (56 kilometers) south of the site by road. A formal coordination agreement is not necessary.

10.10 LOCATION OF CONTINGENCY PLAN

Copies of the OB/OD MTF Contingency Plan will be maintained as Permit Attachment 10 of the RCRA Permit, of which a copy will be stored at the facility and in the Operating Record, including any amendments made to the plan. The "official" Contingency Plan will be maintained at the USAGYPG Central Fire Station and a copy of this plan (at the most recent revision level) will be maintained in the logbook located at the OB/OD MTF.

A copy of the plan and all revisions to the plan will also be provided to all USAGYPG installation emergency facilities as part of the overall USAGYPG installation contingency planning.

10.11 REFERENCES

The following documents were used in the preparation of this Contingency Plan, and provide additional supporting data and guidance:

U.S. Army Policies and Requirements

U.S. Army Regulation (AR) 360-51, Community Relations

USAGYPGs OB/OD MTF AzHWMA/RCRA Operating Record

USAGYPGs AzHWMA/RCRA Operating Permit

U.S. Dept. of Defense (DoD) explosives safety procedures

U.S. Dept. of Transportation (DOT) 2016 Emergency Response Guidebook

U.S. Environmental Protection Agency Guide for Decontaminating Buildings, Structures, and Equipment at Superfund Sites, March 1983.

U.S. Geological Survey (USGS) North American Datum (NAD) 27, 7.5-Minute Quadrangle Map.

ATTACHMENT 10A

FIGURES

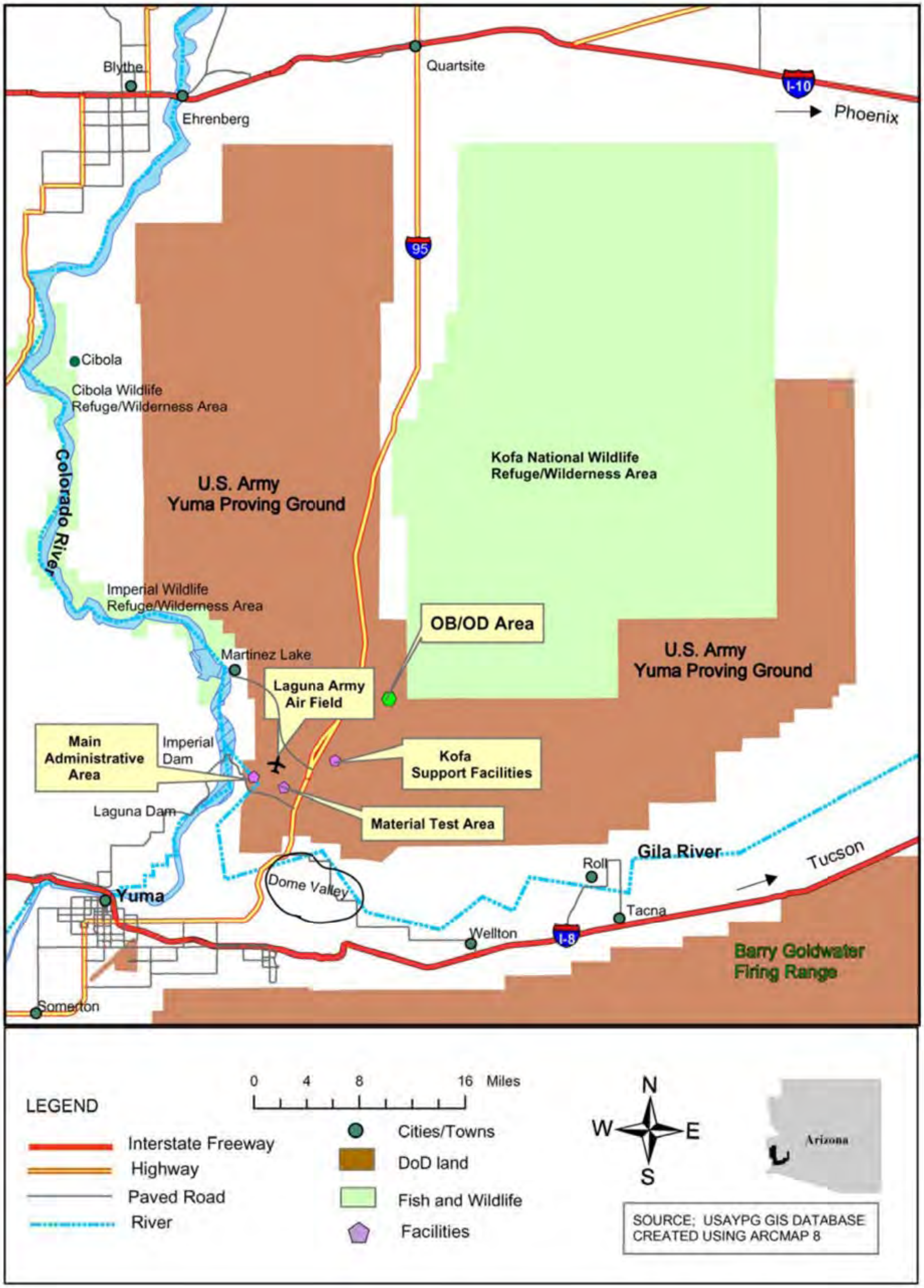

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FIGURE 10A-1

LOCATION OF U.S. ARMY GARRISON YUMA PROVING GROUND OB/OD MUNITIONS TREATMENT FACILITY

YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION

JULY 2016

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L:\Shared\home\Public\bonderson\YUMA\DRAWINGS\FIGURE 10A-1 (MUNITIONS TREATMENT FACILITY).dgn

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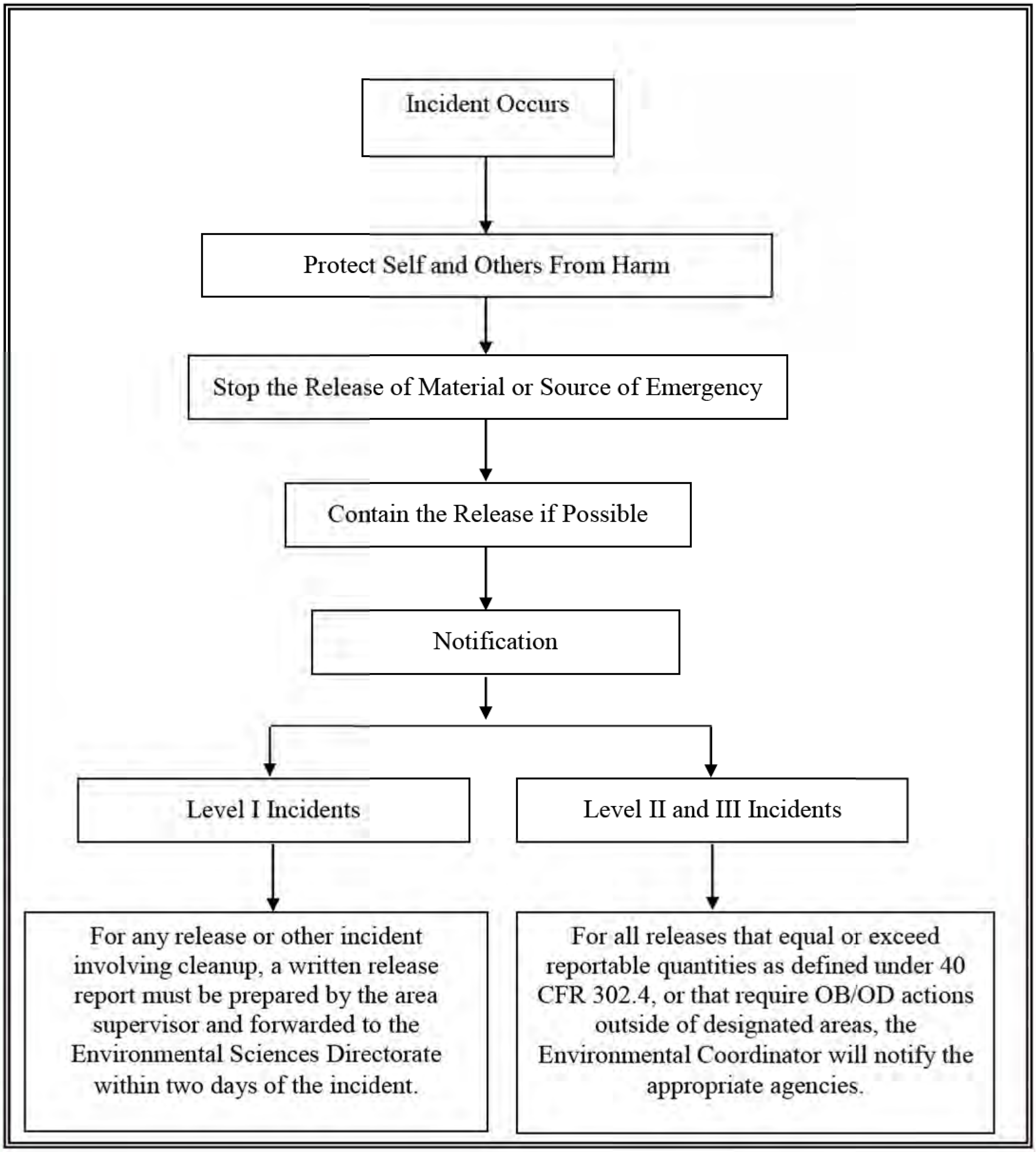

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FIGURE 10A-2
INITIAL RESPONSE AND NOTIFICATION PROCESS
YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION

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L:\Shared\home\Public\bonderson\YUMA\DRAWINGS\FIGURE 10A-2 (INITIAL RESPONSE).dgn
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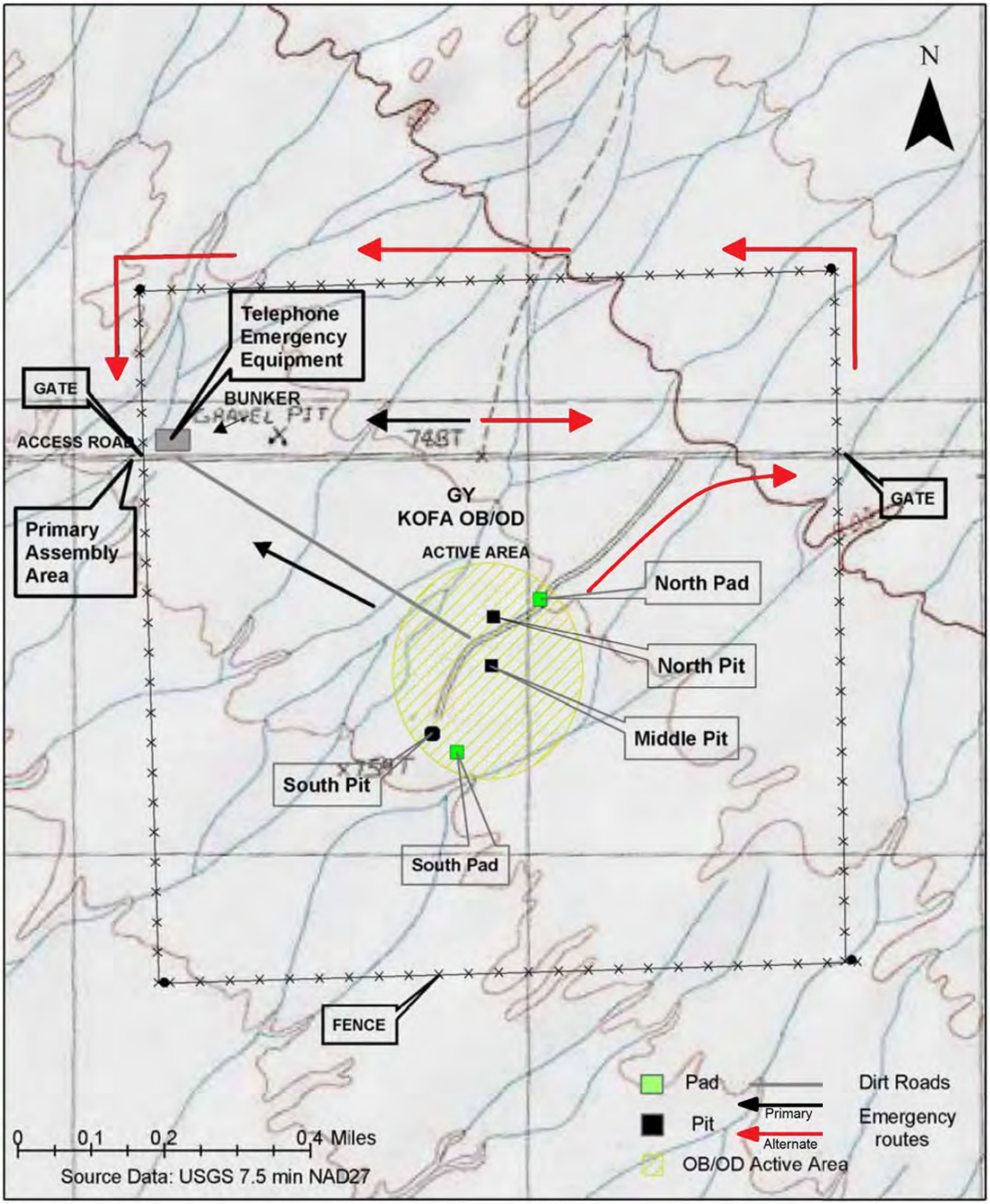

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FIGURE 10A-3

EVACUATION ROUTES FROM THE OB/OD MTF

YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION

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L:\Shared\home\Public\bonderson\YUMA\DRAWINGS\FIGURE 10A-3 (EVACUATION ROUTES).dgn

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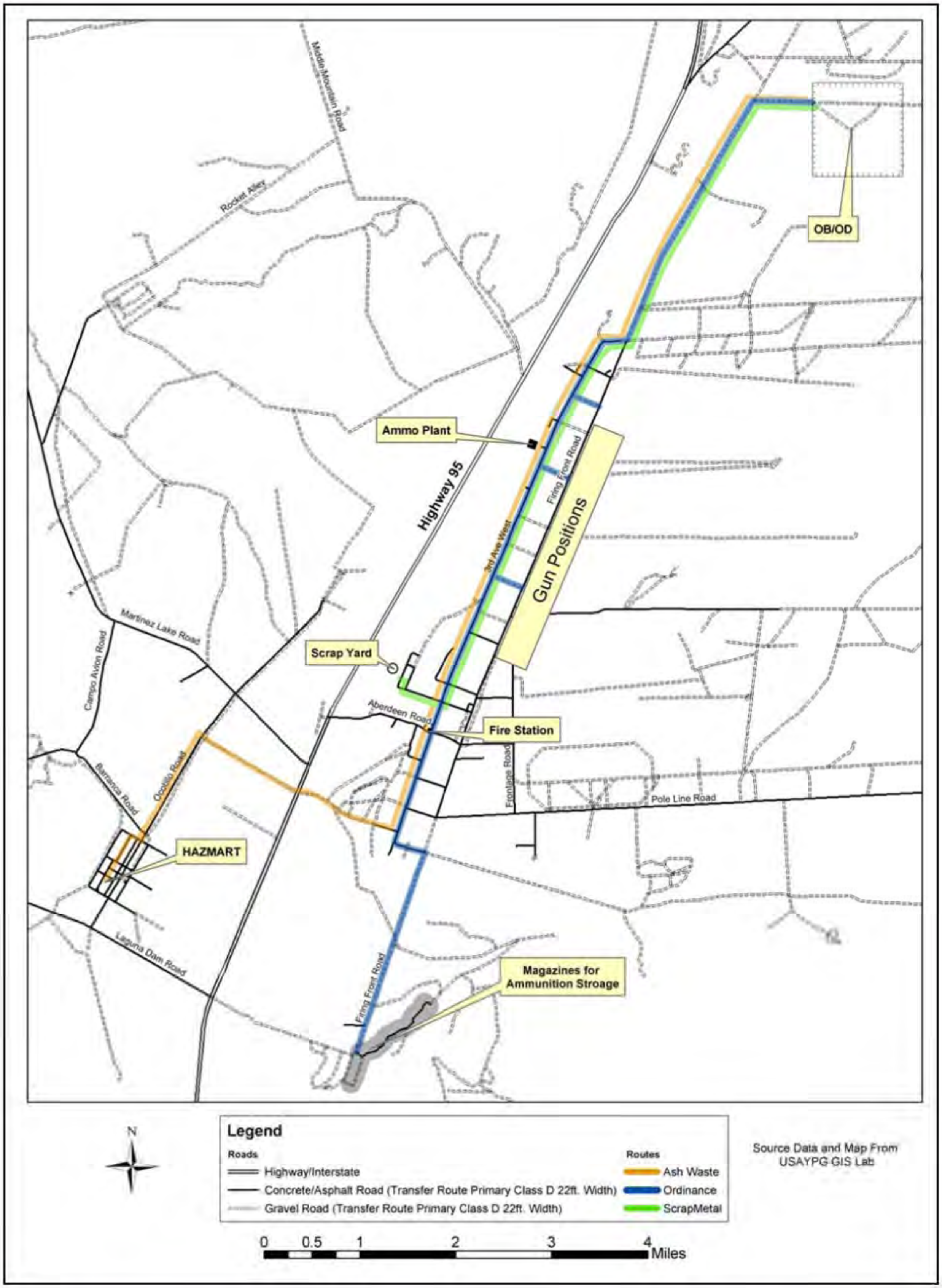

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FIGURE 10A-4
TRAFFIC PATTERNS & ROADS TO THE OB/OD MTF

YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION

JULY 2016

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L:\Shared\home\Public\bonderson\YUMA\DRAWINGS\FIGURE 10A-4 (TRAFFIC PATTERNS).dgn

8.5"x11"

ATTACHMENT 10B

TABLES

Table 10B-1. U.S. Army Garrison Yuma Proving Ground OB/OD MTF Operations Emergency Equipment

Equipment	Capability / Description[1]	Quantity[2]	Equipment Location
Wired telephone	Emergency Communication Standard wired telephone in a weather resistant enclosure.	1	Entrance To Facility
2-way radio and/or portable cellular phones	Emergency Communication US Army issued radios and/or commercially available cellular phones	1	Each ORT Individual
Emergency Signaling Devices (smoke grenade for day, flare for night)	Emergency Communication US Army issued smoke grenades and standard road flares	2	Each ORT Vehicle
Hand tools • Shovels • Brooms • Dust pans • Spray bottles	Small Spill Cleanup Typical hand-tools available from any hardware supplier	 2 2 2 2	Safety Bunker (Operational Shield) Area
Waste Management • Plastic Bags • Container • Labels	Small Spill Cleanup Heavy duty bags up to approx. 30-gallon size, container up to 55-gallon size, hazardous waste labels	 2-3 1 ---	Safety Bunker (Operational Shield) Area
Location Markings • Yellow Flags • Red Flags • Blue/Green Flags • Wooden Lathe • Colored Ribbon	Communication of Small Spills, Danger, or Surveyed Former Problem Area Flags of varying sizes and shapes, pole for displaying flags, colored ribbon tape for area marking	 5 5 5 5 2 1	Safety Bunker
Emergency reference material, Contingency Plan, 2016 USDOT ERG	References for spill cleanup measures, compatibility, personnel protection ---	---	Safety Bunker (Operational Shield) Area

Table 10B-1. U.S. Army Garrison Yuma Proving Ground OB/OD MTF Operations Emergency Equipment

Equipment	Capability / Description[1]	Quantity[2]	Equipment Location
Portable Eye Wash	Personnel Response Portable plastic unit typically holding up to 10 gallons of water.	1	Safety Bunker (Operational Shield) Area
Surgical gloves	Personal Protection Latex Gloves	---	Each ORT Vehicle
First aid kit	Personal Protection Field kit for minor injuries only (cuts, bites, minor burns, etc.)	1	Each ORT Vehicle
Fire extinguisher	Handheld 10 lb. Class B & C Various makes/models, including CO_2 and/or dry-chemical units	2	Each ORT Vehicle
Fire extinguisher	Handheld 10 lb. Class B & C Various makes/models, including CO_2 and/or dry-chemical units	1	Each MHE Vehicle

Notes:

1 – Provided descriptions are intended to be general only. There can be considerable variation in item sizes, configurations and makes/models. When no description is given (denoted by '---'), the item name and capability are sufficient to describe the item.

2 – Quantities given should be considered as minimums. Additional items can be carried at the discretion of OB/OD MTF personnel. When no quantity is given (denoted by '---'), the item is generally available in packages/boxes with various amounts of the item.

Table 10B-2. U.S. Army Garrison Yuma Proving Ground Emergency Coordinators and Alternates with Home Addresses and Phone Numbers

Name and Title	Home Address	Phone Numbers
Emergency Coordinators		
1. Gerald Ball Fire Chief, USAGYPG	10771 Baja Street Yuma, AZ 85367	(928) 920-4045 – Cell (928) 210-3275 – Home
2. John Staggs Assistant Fire Chief, USAGYPG	11587 E. 27th Pl. Yuma, AZ 85367	(928) 920-3446 – Cell (928) 726-6633 – Home
Alternate Emergency Coordinators*		
1. Benjamin Wallace, Ordnance Lead	8530 E. 25th St. Yuma, AZ 85365	(928) 750-3999 –Cell

* Alternates are also Ordnance Recovery Technicians (ORT). One or more of the ORTs on this list will be on-site during all OB/OD activities.

Table 10B-3. U.S. Army Garrison Yuma Proving Ground Environmental Coordinators Home Addresses and Phone Numbers.

Environmental Coordinator Name, Title, and Office Address	Home Address	Phone Numbers
Environmental Coordinator		
1. John GloverActing Chief IMYM-PWE Building 307 Yuma, AZ 85365	10315 E. 38th Ln. Yuma, AZ 85365	(928) 328-2024 – Work (928) 919-1583 – Cell
Alternate Environmental Coordinator		
1. Michael Stover IMYM-PWE Building 307 Yuma, AZ 85365	6721 E. Mission St. Yuma, AZ 85365	(928) 328-5003 – Work (928) 341-8472 – Home

Table 10B-4. U.S. Army Garrison Yuma Proving Ground IRT Support and Advisory Personnel

Title	Phone number
Installation Commander CSTE-DTC-YP-CO Building 2105	(928) 328-2163
Commander Yuma Test Center CSTE-DTC- YT Building 2105	(928) 328-6226
Range Operations Control CSTE-DTC-YP-YT-R Building 2105	(928) 328-3333 or notify by radio
Garrison Manager CSTE-DTC-YP-CS Building 2607	(928) 328-3468
Director of Safety CSTE-DTC-YP-S Building 3519	(928) 328-2660
Installation Safety Director Building 2100	(928) 328-7719
Industrial Hygienist MCXK-YC Building 990	(928) 328-2201
Fire Protection and Prevention Services IMSW-YMA-ESF Building 3013	(928) 328-2316
Emergency Services IMSW-YMA-PL Building 304	(928) 328-2041
Public Affairs Officer CSTE-DTC-YP-PA Building 2100	(928) 328-6189
Installation Anti-terrorism Officer CSTE-DTC-YP-CS-LE (EOC) Building 304	(928) 328-2499
Training Exercise Management Office CSTE-DTC-YP-YT-T Building 2105	(928) 328-3171
Directorate of Public Works CSTE-DTC-YP-CS-PW Building 302	(928) 328-2933
Command Judge Advocate CSTE-DTC-YP-JA Building 452	(928) 328-2608

Table 10B-5. Offsite Emergency Contacts

Organization	Phone Number
Wellton Fire Department Wellton Police Department Emergency Dispatch	(928) 785-3340 (928) 785-4700
City of Yuma Fire Department	911 (for emergency only) (928) 783-4461 (non-emergency)
Yuma County Health Department	(928) 317-4550
Local Emergency Planning Commission	(928) 783-5960
Kofa Wildlife Refuge	(928) 783-7861
Imperial Wildlife Refuge	(928) 783-3371
Bureau of Land Management Wild Land Fire	(928) 317-3200 (928) 317-3285
U.S. Army Environmental Command, West Division	(210) 466-1590
U.S. Army Center Public Health Center, Hazardous and Medical Waste Management Program	(410) 436-3651
State of Arizona ADEQ Emergency Hotline	1-800-234-5677 Ext 2330
National Response Center	1-800-424-8802
U.S. EPA Region IX	(415) 947-8000
Other, not specified, emergency contacts	911

Table 10B-6. Offsite Resource Support Agencies and Emergency Contacts

Organization or Facility	Involvement	Address	Phone Number(s)
Yuma Regional Medical Center	Support	2400 S. Avenue A Yuma, AZ 85364	(928) 336-7100 (Emergency Room)
Local Emergency Planning Commission	Notification	1 City Plaza Yuma, AZ 85364 P.O. Box 13013 Yuma, AZ 85366-13013	(928) 373-1093 Ext. 1740 (928) 458-6537 – Cell
Yuma County Health Department	Notification	2200 W. 28th Street Yuma, AZ 85364	(928) 317-4550
State of Arizona ADEQ Emergency Hotline	Notification	1011 W. Washington St. Phoenix, AZ 85007 Emergency Response Unit Manager	1-800-234-5677 Ext. 2330
National Response Center	Notification	C/O United States Coast Guard (G-OPF) 2100 2nd Street, SW Room 2611 Washington D.C. 20593-0001	1-800-424-8802
U.S. EPA Region IX	Notification	75 Hawthorne Street San Francisco, CA 94105	(415) 947-8000
U.S. Army Environmental Command	Notification	Commander U.S. Army Environmental Command ATTN: IMAE-C Building 2264 Fort Sam Houston, TX 78234-2686	Hazardous and Medical Waste Management Program (210) 466-1590
U.S. Army Public Health Center	Notification	Telephone Only	Hazardous and Medical Waste Management Program (410) 436-3651

Table 10B-7. U.S. Army Garrison Yuma Proving Ground Emergency Services Selected Emergency Equipment (in HAZMAT Van)

Equipment/ Supplies	Minimum on Hand	Use	Limitations
55-Gallon Drum Pump	1	Transfer of liquid	Compatibility with liquid pumped
Advantage Respirators • Cartridges	4 16	PPE for emergency response, for use when oxygen is adequate and dust or contaminants are within cartridge capabilities	Cartridges are one time use
Black Rubber Gloves	7	PPE for emergency response, hand protection	One-time use
Boots	7	PPE for emergency response, foot protection	One-time use
Box Of Nitrile Gloves	1	PPE for emergency response, hand protection	One-time use
Chem Lights	2	Emergency light source	One-time use
Cloth Overboots	16	PPE for emergency response, contamination control	One-time use
Complete SCBA	6	PPE for emergency response, for use with potentially toxic vapors or oxygen deficient atmospheres	Limited air supply
Combustible Gas Detector	1	Air monitoring for combustible gases	Sensor expiration/batteries
Decon Pools	3	Decontamination of personnel and/or small equipment	Limited capability
Decon Shower	1	Decontamination of personnel	Limited capability
Disposable Coveralls	7	PPE for emergency response, contamination control	One-time use
Emergency Blankets	4	Treatment of injured personnel	
Foam Extinguisher	1	Small localized fire fighting	Must be trained to use
Foam Nozzle	1	Component for foam extinguisher	Must be trained to use
Gastec Pumps And Dragger Tubes	2	Air monitoring for toxic/ hazardous constituents (tube specific)	Dragger tubes are one-time use and have limited shelf life
Green Rubber Gloves	12	PPE for emergency response, hand protection	One-time use
Ground Cable Reel	1	Emergency grounding capability	
Ground Cables	1	Emergency grounding capability	
Honda Generator	1	Electricity for power equipment (lights, power tools, etc.)	Limited fuel/power supply
Metal Overpack Drum	1	Repackaging of a leaking or damage drum	One-time use, material compatibility
Portable Radios	6	Communications between emergency response workers	Limited communications
Rubber Overboots	24	PPE for emergency response, foot protection	One-time use
Silver Shield Gloves	24	PPE for emergency response, hand protection	One-time use
Tool Box/Non-Sparking	2	Hand tools for use in potentially flammable or explosive conditions	Limited quantity

Table 10B-8. U.S. Army Garrison Yuma Proving Ground Public Works Selected Emergency Equipment (Within the Kofa Complex)

Equipment/Supplies	Minimum on Hand	Use	Limitations
Spill Control and Cleanup Supplies			
Tyvek Coveralls	10	PPE for emergency response, limited protection of clothing and some skin	Chemical compatibility for this item must be checked prior to use
55-Gallon Metal Drums 20-Gallon Metal Drums	5 2	Waste containment, overpack for leaking containers	Chemical compatibility for this item must be checked prior to use
65 And 80-Gallon Metal Drums	2 each	Waste containment, overpack for leaking containers	Chemical compatibility for this item must be checked prior to use
5-Gallon Poly Pails With Lids	10	Waste containment, overpack for leaking containers	Chemical compatibility for this item must be checked prior to use
Heavy Equipment for Spill Control and Cleanup			
Compressor	1	Operation of air power tools	
Backhoe	1	Digging trenches	There must be adequate room and protection for workers
Bulldozer (D4 or D8)	1	Moving earth and debris	
Dump truck	1	Moving contaminated soil/debris	
Excavator	1	Digging	
Loader	1	Moving soil	
Grader	1	Moving soil and grading staging areas	
Water trucks	1	Dust control	

Table 10B-9. U.S. Army Garrison Yuma Proving Ground Logistics Selected Emergency Equipment (HAZMART Site)

Equipment/Supplies	Minimum on Hand	Use	Limitations
All Terrain Forklift	1	Moving drums, supplies, and equipment over rough terrain	Gasoline or diesel fueled vehicles are not suitable for use in explosive atmospheres
Truck With Lift Gate	1	Lifting and moving supplies and equipment	Gasoline or diesel fueled vehicles are not suitable for use in explosive atmospheres
Drum Truck, Drum Grabbers, Assorted Slings And Cables	1	Moving drums	Gasoline or diesel fueled vehicles are not suitable for use in explosive atmospheres
1-Cubic Yard Supersacks	1	Container for contaminated soil	Check manufacturer's guidance for compatibility information
85-Gallon Poly Overpack Drum	2	Waste and contaminated PPE containers	Check manufacturer's guidance for compatibility information
55-Gallon Metal Drums	4		
55-Gallon Plastic Drums	4		
30-Gallon Metal Drums	4		
30-Gallon Plastic Drums	2		

ATTACHMENT 10C

EMERGENCY RESPONSE PROCEDURES

EMERGENCY RESPONSE PROCEDURES

This Attachment presents selected emergency response procedures taken from the USDOT *2016 Emergency Response Guidebook* (ERG) and guidance from NIOSH and NFPA. The specific procedures were selected as being potentially applicable to emergency incidents at the OB/OD Treatment Facility due to the types of materials undergoing treatment at this location. The guidebook procedures are presented here in order to provide review material and a quick reference to potential emergency responders.

The emergency response procedures from the USDOT 2016 ERG included are as follows:

- Guide No. 112: Explosives: Division 1.1, 1.2, 1.3 or 1.5, Class A or B - such as ammonium nitrate-fuel oil mixtures and blasting agents.

- Guide No. 113: Flammable Solids (Toxic - Wet Desensitized Explosives) – such as (wetted) nitrocellulose, nitroguanidine, nitroglycerin mixture, pentaerythrite tetranitrate (PETN) mixture, or trinitrotoluene (TNT) solutions.

- Guide No. 128: Flammable Liquids (Water Immiscible) – including diesel fuel, gasoline, and oils (from equipment)

- Guide No. 133: Flammable Solids - including nitrocellulose mixtures, charcoal, red phosphorus, sulfur, smokeless powder for small arms, and desensitized solid explosives not otherwise specified in the USDOT 2016 ERG.

- Guide No. 138: Water Reactive Substances (Emitting Flammable Gases) – including magnesium pellets, zinc dust, and aluminum powder (uncoated).

- Guide No. 140: Oxidizers – including potassium nitrate and potassium perchlorate.

- Guide No. 141: Oxidizers (Toxic) – Generally barium, beryllium, lead, mercury, and thallium based oxidizers, such as barium nitrate and lead perchlorate.

- Guide No. 143: Oxidizers (Unstable) – such as ammonium perchlorate and guanidine nitrate.

- Guide No. 151: Toxic Substances (Non-Combustible) – including waste residues containing lead or mercury.

- Guide No. 152: Toxic Substances (Combustible) - including dinitrotoluenes (DNTs) and nitrotoluenes.

NOTE:

Even though it is unlikely the following materials may be treated at the OB/OD MTF, the associated USDOT 2016 ERG guides below are listed (but not attached) for quick reference in the unlikely case there is an emergency action involving this material:

- Guide No. 114: Explosives – Division 1.4 or 1.6, Class C.
- Guide No. 134: Flammable Solids - Toxic and/or Corrosive – such as beryllium powder.
- Guide No. 135: Spontaneously Combustible Substances – such as aluminum powder (pyrophoric), nitrocellulose-based plastic (self-heating), sodium sulfide (anhydrous), and titanium or zirconium powder (dry).
- Guide No. 136: Spontaneously Combustible Substances - Toxic and/or Corrosive (Air-Reactive) – such as white or yellow phosphorus.
- Guide No. 153: Toxic and/or Corrosive Substances (Combustible) – such as cyanide (CN), 2-chlorobenzalmalononitrile (CS), Sarin (GB), distilled mustard (HD), mustard, piperazine, sodium azide, sodium sulfide (hydrated), and toluidines.
- Guide No. 158: Infectious Substances – such as biological agents and regulated medical waste.
- Guide No. 159: Substances (Irritating) – such as tear-producing non-explosive ammunition and tear-gas grenades.
- Guide No. 170: Metals (Powders, Dusts, Shavings, Borings, Turnings, or Cuttings, etc.) – such as ferrous metal borings, shavings, turnings, or cuttings, and wetted titanium powder.

This Attachment also presents guidance from NIOSH and NFPA-10-1990 (*Standard for Portable Fire Extinguishers*) concerning use of fire extinguishers. The vehicles and MHE used at the site contain sodium bicarbonate (BC) fire extinguishers. These extinguishers contain a carbon dioxide extinguishing agent which is basically an inert gas that discharges as a cold white smoke leaving no residue. For a 10 pound extinguisher, the discharge horizontal range is 3 to 8 feet with a discharge time of 8-12 seconds. ORT vehicles each contain two 10 pound BC fire extinguishers. See the attached NIOSH figure for guidance on proper use of the extinguisher.

ATTACHMENT 10D

INCIDENT REPORTING FORM

INCIDENT REPORTING FORM

Name, Address, And Telephone Number Of The USAGYPG Authorized Representative[1]
Name, Address, And Telephone Number Of The Facility[1]
Date, Time, And Type Of Incident (e.g., Fire, Explosion, Release)[1]
Name And Quantity Of Material(s) Involved[1]
The Extent Of Injuries[1]
An Assessment Of Actual Or Potential Hazards To Human Health Or The Environment, Where This Is Applicable[1]

ARIZONA HAZARDOUS WASTE MANAGEMENT PERMIT

EPA I.D. NO. AZ5213820991

U.S. ARMY GARRISON YUMA PROVING GROUND

PERMIT ATTACHMENT 11

INSPECTION PLAN

TABLE OF CONTENTS

CONTENTS PAGE

ATTACHMENTS

INSPECTION, MONITORING, AND MAINTENANCE PLAN

This attachment addresses the schedule and documentation requirements for inspections, monitoring, maintenance, and testing of: the U.S. Army Garrison Yuma Proving Ground (USAGYPG) Open Burn/Open Detonation Munitions treatment Facility (OB/OD MTF), emergency and safety equipment available for OB/OD operations, and structural equipment to be used during OB/OD operations. Inspections will deter malfunctions and detect deterioration, human errors, and spills that may cause or lead to the release of hazardous waste to the environment or pose a threat to human health.

During OB/OD Treatment Facility operations, periodic inspections will be conducted as described in the Inspection Schedule provided in Permit Attachment 11, Permit Attachment 11A. This Inspection Schedule details what items are to be inspected, how often, and the problem areas to be checked.

To meet the requirements of Title 40 of the Code of Federal Regulations (CFR) sections 264.15(b)(2) and 264.15(d), the inspection schedule and all inspection records are maintained by and at the office responsible for the operation of the OB/OD MTF, as described in Permit Attachment 15 (Recordkeeping and Reporting), Permit Attachment 15A Table 15A-1. Keeping any inspection records at the OB/OD MTF is not practical as the facility has no buildings or structures that can be used for record storage. The timeframes for maintaining all inspections records are also provided in Permit Attachment 15A Table 15A-1.

Any deficiencies noted during inspections will be documented, and corrective actions will be initiated by the OB/OD MTF Manager and tracked to completion. The OB/OD MTF inspected items will include operational and structural components, emergency response equipment, security, work area, waste storage areas, and other items relevant to human health and environmental protection. It should be noted that inspector access must follow security requirements in Permit Attachment 8.

11.1 INSPECTIONS

Treatment operations are conducted in accordance with the standard operating procedures. USAGYPG conducts periodic inspections of the OB/OD MTF and operating emergency equipment to ensure identification and correction of any deterioration, such that they will not lead to an environmental or human health hazard. Ordnance Response Team (ORT) personnel conduct inspection of the equipment and grounds including pits, pads and surrounding area in association with each use. Equipment damage or deterioration is documented and the equipment is repaired or replaced as needed. Any conditions determined to be detrimental to environmental safety and health compliance are corrected prior to the continuation of treatment operations. The OB/OD MTF grounds are inspected during re-entry after OB/OD treatment events to survey the area for DMM/munitions scrap. A large magnet is pulled over the grounds to gather DMM/munitions scrap not immediately visible.

The inspection frequency presented for items associated with the OB/OD MTF is based on regulatory compliance requirements, the rate of possible deterioration, and the possibility of an environmental or human health incident if deterioration, malfunction, or operator error goes unnoticed between inspections. The inspection frequency is established in Permit Attachment 11, Permit Attachment 11A for the minimum acceptable frequency, however inspections may occur at any time.

11.2 GENERAL REQUIREMENTS

The OB/OD inspection schedule specifies the items to be inspected, the frequency of inspections, the types of problems, and the locations.

NOTE: Some of the emergency equipment mentioned in the Contingency Plan (Permit Attachment 10, Tables 10B-1, 10B-7 – 10B-9), require inspections by USAGYPG personnel and records of the inspections per USAGYPG policy, but these inspections do not need to be recorded on a checklist in this Permit.

1. Daily (When Operating) Inspections - The operator will conduct inspections of the OB/OD MTF and support utility equipment on a Daily (when operating) basis using inspection checklists. The daily inspections are conducted both prior to the OB/OD operations and as soon as practicable after OB/OD operations but no later than 48 hours (weather and road conditions permitting). No daily inspection is required for OB/OD equipment that is not in use.

2. Weekly, or Longer Inspections - The USAGYPG Environmental Sciences Organization conducts Weekly/Monthly/Quarterly inspections to document compliance with ash residue cleanup, handling, and storage procedures, RCRA storage, containerization, and labeling requirements and ensures corrective actions are identified and completed for noted discrepancies.

Examples of Daily and Weekly & Longer OB/OD MTF Inspection Checklists are provided in Permit Attachment 11, Permit Attachment 11B-1 and 11B-2. The checklists may be reproduced or modified in a local format as required to support operations. The examples note the minimum inspection points and may be changed to increase the minimum requirements. All daily inspections are documented in summary form on the Consolidated Inspection Checklist in Permit Attachment 11, Permit Attachment 11B-3.

11.3 TYPES OF ISSUES

The inspection points are noted in the Inspection Schedule. The types of issues looked for during inspection of the OB/OD facility include, but are not limited to: observations of improper pad/pan conditions, presence of ash residue, presence of storm water accumulation, unlabeled or open satellite accumulation area container, labeling, integrity of and damage to equipment, signs of tampering with security devices or records, ineffective communications systems, damaged structural integrity, and misplaced or low capacity emergency response equipment.

If the presence of storm water is discovered, the following activities are conducted:

1. Precipitation discovered during the next pre-operation inspection or next weekly routine inspection which exists in the OB pad retention basin at a level that is 3 inches or more above the floor of the basin. The OB pads with retention basin are designed to contain a 100-year 24-hour rain event (4.2 inches) plus a nominal freeboard and an extra allowance. As discussed in the Permit Attachment 3 (WAP), stormwater in the basin must be characterized and removed if hazardous when it exceeds this extra allowance equivalent to a water level in the basin that is 3 inches or more above the floor of the basin and a 100-year storm is forecasted.

2. Precipitation discovered during the next weekly routine inspection which exists in the OD pits at a level that is 1 foot or more above the pit base. Any accumulated precipitation in the OD pits which exceeds this level will be characterized and, if hazardous, removed in accordance with the Permit Attachment 3 (WAP) and the procedures in Permit Attachment 6 (OB/OD Operations).

These activities are also briefly discussed in Permit Attachment 2 Section 2.2.2.8 and in Permit Attachment 6 (OB/OD Operations).

11.4 SPECIFIC PROCESS INSPECTION REQUIREMENTS

OB/OD process equipment systems and support utility systems will be inspected for damage and for impaired or improper operations prior to first use on days when OB/OD operations occur. The Lead ORT will assess the compatibility of tools and equipment with the waste being treated prior to operations in accordance with the SOP's in Permit Attachment 6 (OB/OD Operations). The inspection schedule and types of problems that will be looked for during the OB/OD-specific process inspection are listed in Permit Attachment 11, Permit Attachment 11A.

11.5 SCHEDULE OF REMEDIAL ACTION

Remedial actions are undertaken as problems are identified. They are prioritized based on severity, safety concerns, regulatory requirements, budget, and time constraints. Except for those requiring a Contingency Action as defined in Permit Attachment 10 (Contingency Plan), most remedial actions will require actions under operational activities in Permit Attachment 6 (OB/OD Operations).

ATTACHMENT 11A

INSPECTION SCHEDULE

US ARMY YUMA PROVING GROUND - OB/OD MUNITIONS TREATMENT FACILITY INSPECTION SCHEDULE

ITEM/EQUIPMENT/AREA INSPECTED	NO.	LOCATION	CD	P	WP/T	ACD	D	AS	W	M/Q	S+	POTENTIAL PROBLEM INSPECTED FOR
WARNING/SECURITY CONTROLS												
Warning Signs ("Danger - Keep Out" Signs)	1	West Gate	X	PTO			D					Missing, Damaged, Not Visible, Not in-place, Legible from 25 feet (7.6 m)
Warning Signs ("Danger - Keep Out" Signs)	1 each	East Gate & West Gate	X						W			Missing, Damaged, Not Visible, Not in-place, Legible from 25 feet (7.6 m)
Warning Signs ("Danger - Keep Out" Signs)	every 50m	Perimeter Fence	X							Q		Missing, Damaged, Not Visible, Not in-place, Legible from 25 feet (7.6 m)
Warning Signs ("No Smoking" Signs)	1	Bunker and West Gate	X	PTO			D					Missing, Damaged, Not Visible, Not In-place
Warning Signs ("No Smoking" Signs)	1 each	Bunker, East Gate & West Gate	X						W			Missing, Damaged, Not Visible, Not In-place
Warning System (Flashing Lights)	1	West Gate	X	PTO			D		W	Q		Missing, Damaged, Not Visible, Not In-place, Operational
Warning System (Red Flags)	1	West Gate	X	PTO			D		W	Q		Missing, Damaged, Not Visible, Not In-place
Gate	1	West Gate	X	PTO			D					Gate Secured, Structural Integrity, Signs of Tampering, Closes Safely
Gate	1 each	East Gate & West Gate	X						W			Gate Secured, Structural Integrity, Signs of Tampering, Closes Safely
Gate	1	East Gate	X							Q		Gate Secured, Structural Integrity, Signs of Tampering, Closes Safely
Lock	1	West Gate	X	PTO			D					Secured, Signs of Tampering, Unable to Lock, Lock Operational
Lock	1 each	East Gate & West Gate	X						W			Secured, Signs of Tampering, Unable to Lock, Lock Operational
Lock	1	East Gate	X							Q		Secured, Signs of Tampering, Unable to Lock, Lock Operational
Fence	1	Perimeter Fence	X							Q		Broken/Down Fence Lines, Loose Wires
Fence	1	Perimeter Fence	X							Q		Infusion, Obstructed by Vegetation
COMMUNICATION SYSTEMS (see Table 9A-1 and Table 10B-1)												
Two-Way Radio and/or Portable Cellular Phone	1 each	ORT Personnel	X	PTO			D		W			Operable
Two-Way Radio and/or Portable Cellular Phone	1 each	ORT Vehicle	X	PTO			D		W			Operable
Emerg. Signaling Device (smoke grenade & flare)	1 each	ORT Vehicle	X	PTO								Present, Good Condition
Telephone (Land Line or Mobile)	1	Safety Bunker	X	PTO			D		W			Operable, Accessible for all personnel
Telephone (Spare; Land Line or Mobile)	1	Near Bunker (see Dwg. 2)	X	PTO			D		W			Operable, Accessible for all personnel
Telephone (Barricade) (Land Line or Mobile)	1	Barricade (see Dwg. 2)	X	PTO			D		W			Operable, Accessible for all personnel
SAFETY/ROUTINE EQUIPMENT (see Table 9A-1 and Table 10B-1)												
Contingency Plan and 2016 U.S. DOT ERG	1	Safety Bunker (Tbl 10B-1)	X	PTO								Present, Good Condition, Complete
Shovel	2	Safety Bunker (Tbl 10B-1)	X	PTO			D		W			Not Present, Residue, Non-Operational, Non-Accessible, Poor Condition
Location Markings (Lathe, Flags, & Ribbons)	5 each	Safety Bunker (Tbl 10B-1)	X	PTO								Present
Broom	2	Safety Bunker (Tbl 10B-1)	X	PTO			D		W			Not Present, Residue, Non-Operational, Non-Accessible, Poor Condition
Dust Pan	2	Safety Bunker (Tbl 10B-1)	X	PTO			D		W			Not Present, Residue, Non-Operational, Non-Accessible, Poor Condition
Wet/Dry Vacuum	1	Safety Bunker	X	PTO			D		W			Not Present, Residue, Non-Operational, Non-Accessible, Poor Condition
Spray Bottle	2	Safety Bunker (Tbl 10B-1)	X	PTO			D		W			Not Present, Residue, Non-Operational, Non-Accessible, Poor Condition
Plastic Bags and Labels	2 to 3	ORT Vehicle	X	PTO								Present, Capable of containing ash residue, Good Condition
Surgical Gloves (pair)	3 each	ORT Truck	X	PTO			D		W			Not Present, Residue, Non-Operational, Non-Accessible, Poor Condition
Personal Protective Equipment (PPE) (Table 9-1)	1	each person	X	PTO			D					Not Present, Not per SOP, Poor Condition, Not Functional, Not Accessible
Drinking Water	1 gal/4 hrs	each person (Table 9-1)	X	PTO								Present
Portable Eyewash	1	Safety Bunker	X	PTO			D		W			Poor Condition, Not operable, Not Readily Accessible
First Aid Kit	1	Safety Bunker	X	PTO			D					Not Present, Does not Contain all Items
First Aid Kit	1 each	ORT Truck	X	PTO			D					Not Present, Does not Contain all Items
First Aid Kit	1 each	MHE Vehicle	X	PTO			D					Not Present, Does not Contain all Items
First Aid Kit	1 each	Transport Vehicle	X	PTO			D					Not Present, Does not Contain all Items
Fire Extinguisher (Handheld 10 lb. BC)	2 each	ORT Truck	X	PTO			D		W			Not Present, Not Fully Charged, No Inspection Tag, Not Accessible (see Note 5).
Fire Extinguisher (Handheld 10 lb. BC)	2 each	MHE Vehicle	X	PTO			D		W			Not Present, Not Fully Charged, No Inspection Tag, Not Accessible (see Note 5).
Fire Extinguisher (Handheld 10 lb. BC)	2 each	Transport Vehicle	X	PTO			D		W			Not Present, Not Fully Charged, No Inspection Tag, Not Accessible (see Note 5).
OPEN BURNING (OB) OPERATING AREAS												
Pan	6 (3/pad)	Open Burn Pad Area	X	PTO		ACD	D	AS	W			No storm water present in Pan
Pan	6 (3/pad)	Open Burn Pad Area	X	PTO		ACD	D		W			Pan has no Leaks, Bulges, Other Damage, or Structural Integrity impaired

US ARMY YUMA PROVING GROUND - OB/OD MUNITIONS TREATMENT FACILITY INSPECTION SCHEDULE												
ITEM/EQUIPMENT/AREA INSPECTED	**NO.**	**LOCATION**	**CD**	**P**	**WP/T**	**ACD**	**D**	**AS**	**W**	**M/Q**	**S+**	**POTENTIAL PROBLEM INSPECTED FOR**
Pan	6 (3/pad)	Open Burn Pad Area	X	PTO		ACD	D		W			No Ash is present in Pan
Pan	6 (3/pad)	Open Burn Pad Area	X	PTO		ACD	D		W			Pan has no cracked or broken welds
Pan	6 (3/pad)	Open Burn Pad Area	X	PTO		ACD	D		W			Pan has no excessive Corrosion
Pan Cover	6 (3/pad)	Open Burn Pad Area	X	PTO		ACD	D		W			Pan cover has complete closure over pan with < 0.5 inch gaps
Pan Cover	6 (3/pad)	Open Burn Pad Area	X	PTO		ACD	D		W			Pan cover has Leaks, Bulges, Other Damage (e.g., chains not intact)
Pan Liner (Bricks)	6 (3/pad)	Open Burn Pad Area	X	PTO		ACD	D		W			No cracks or gaps > 0.25-inches
Pan Liner (Refractory)	6 (3/pad)	Open Burn Pad Area	X	PTO		ACD	D		W			No cracks or gaps > 1/8"
Pan Support	6 (3/pad)	Open Burn Pad Area	X	PTO		ACD	D		W			Pan Support has Structural Integrity
Pan Grounding	6 (3/pad)	Open Burn Pad Area	X	PTO			D		W			Proper Connection, Wire & Clamp Integrity
Pan Grounding	6 (3/pad)	Open Burn Pad Area	X								S	Proper Connection, Proper Resistance (Electrical Test)
Pan/Pad Periphery and Load/Unload Areas	n/a	Open Burn Pad Area	X		WTT	ACD	D		W			No Spills, Splatter, Debris, Ash, Soil Stains, Stressed or Fire-Hazard Vegetation
OB Pad	2 pads	Open Burn Pad Area	X	PTO		ACD	D	AS	W			No storm water present on Pad (excludes sump)
OB Pad (surrounding OB pans)	2 pads	Open Burn Pad Area	X	PTO		ACD	D		W			No Ash, Splatter
OB Pad (underneath OB pans)	2 pads	Open Burn Pad Area	X						W			No Ash, Splatter underneath Pans as best able to remove with broom/vacuum.
OB Pad (underneath OB pans)	2 pads	Open Burn Pad Area	X							Q		Move pans and clean underneath if post-op cleaning is ineffective.
OB Pad Sump	1/pad	Open Burn Pad Area	X					AS	W			< 5" stormwater acceptable in sump, but no large debris; sump sealant intact
OB Pad Sump	1/pad	Open Burn Pad Area	X							Q		Completely cleaned of water and debris once each quarter (90 days)
OB Pad Sump Grate	1/pad	Open Burn Pad Area	X					AS	W			In good condition
OB Pad Sump Pipe Inlet (Pipe to Basin)	1/pad	Open Burn Pad Area	X					AS	W			Outlet is clear and visible; Check no heat damage to PVC pipe at outlet.
OB Pad Sump Pipe Inlet (Pipe to Basin)	1/pad	Open Burn Pad Area	X								5y	Hydrostatic Test every five years.
OB Pad Sump Intersticial Monitor Cap	1/pad	Open Burn Pad Area	X						W			Cap is in place
OB Pad Sump Intersticial Monitor Cap	1/pad	Open Burn Pad Area	X								1y	Each time there is a > 2-inch precip., check no water in intersticial pipe
OB Pad Containment	2 pads	Open Burn Pad Area	X	PTO		ACD	D		W			No cracks or chips
OB Pan/Pad Periphery	2 pads	Open Burn Pad Area	X		WTT	ACD	D		W			No Spills, Splatter, Debris, Ash, Soil Discolorization, Stressed Vegetation
OB Pan/Pad Load/Unload Areas	2 pads	Open Burn Pad Area	X		WTT	ACD	D		W			No Spills, Splatter, Debris, Ash, Soil Discolorization, Stressed Vegetation
Retention Basin	2 basins	OB Retention Basin	X					AS	W			Accumulated Water
Retention Basin	2 basins	OB Retention Basin	X					AS	W			Accumulated Debris
Retention Basin	2 basins	OB Retention Basin	X					AS	W			Structural Integrity Impaired
Retention Basin	2 basins	OB Retention Basin	X					AS	W			Erosion
Retention Basin	2 basins	OB Retention Basin	X					AS	W			< 3" accumul H2O in basin (not sump)
Retention Basin	2 basins	OB Retention Basin	X					AS	W			Date storm water accumulation began
Retention Basin	2 basins	OB Retention Basin	X		WPO							Date storm water removed
Retention Basin	2 basins	OB Retention Basin	X						W			No cracks or chips
Retention Basin	2 basins	OB Retention Basin	X						W			Sealant has complete tight coating
Retention Basin Sump	1/basin	OB Retention Basin	X						W			If basin is empty, < 5 inches debris
Retention Basin Sump Intersticial Monitor Cap	1/basin	OB Retention Basin	X						W			Intersticial Monitor Cap in place
Retention Basin Sump Intersticial Monitor Cap	1/basin	OB Retention Basin	X							M		Each month there is water in the basin, check there is no water in pipe
Retention Basin Sump Grate	1/basin	OB Retention Basin	X						W			Good Condition
OPEN DETONATION (OD) PIT AREA												
Pit	5 pits	OD Pits 1, 2E, 2W, 3N, 3S	X	PTO		ACD	D	AS	W			Storm Water
Pit	5 pits	OD Pits 1, 2E, 2W, 3N, 3S	X	PTO		ACD	D		W			Debris, Scrap Metal, PEP, or OE/UXO
Pit	5 pits	OD Pits 1, 2E, 2W, 3N, 3S	X	PTO		ACD	D	AS	W			Erosion, Integrity Impaired
Pit Load/Unload Area	5 pits	OD Pits 1, 2E, 2W, 3N, 3S	X		WTT		D		W			Spills, Soil Discolorization
Pit Periphery	5 pits	OD Pits 1, 2E, 2W, 3N, 3S	X	PTO		ACD	D		W			Debris, Scrap Metal, PEP, or OE/UXO
Periphery	5 pits	OD Pits 1, 2E, 2W, 3N, 3S	X					AS	W			Erosion
GENERAL AREA & ROADWAY												

US ARMY YUMA PROVING GROUND - OB/OD MUNITIONS TREATMENT FACILITY INSPECTION SCHEDULE												
ITEM/EQUIPMENT/AREA INSPECTED	**NO.**	**LOCATION**	**CD**	**P**	**WP/T**	**ACD**	**D**	**AS**	**W**	**M/Q**	**S+**	**POTENTIAL PROBLEM INSPECTED FOR**
General Area	n/a	All Other Areas	X				D		W			Spills, Soil Discolorization, Debris, or Not Passable by Vehicles
Roadway	n/a	Roadways	X		WTT		D		W			Spills, Soil Discolorization, Debris, or Not Passable by Vehicles
Prevention Berms	1	All	X					AS	W			Structural Integrity, Erosion
Elevated Soil around Pad/Basin	n/a	All	X					AS	W			Erosion (Soil is to prevent run-on onto pad/basin)
WORK TABLE AT BLAST SHIELD												
Work Table	1 table	Safety Bunker	X							Q		Erosion
Work Table	1 table	Safety Bunker	X		WPO		D		W			Debris, or Waste; Inadequate Aisle Space
Work Table Tools & Equipment	1 per table	Safety Bunker	X		WPO		D		W			Proper Operation, Compatible with Materials, HW Residue, Poor Condition
Work Table Periphery	1 table	Safety Bunker	X							Q		Erosion
Work Table Periphery	1 table	Safety Bunker	X						W			Debris, or Waste from Operations
Work Table Periphery	1 table	Safety Bunker	X						W			Spills, Soil Discolorization, or Stressed Vegetation
Work Table Grounding Rod	1 per table	Safety Bunker	X	PTO			D		W			Properly Connected, Free of Coatings, Present
Work Table Grounding Rod	1 per table	Safety Bunker	X								S	Proper Resistance to Ground (Routine Insp. by Electrical Personnel)
HW GENERATOR ACCUMULATION AREA AT BLAST SHIELD												
Containers	optional	SAA or <90-Day HWAA	X		WPO[6]		D[6]					Containers have HW Markings and Labels not Affixed or not Legible
Containers	optional	SAA or <90-Day HWAA	X		WPO[6]		D[6]					Containers are not USDOT-approved
Containers	optional	SAA or <90-Day HWAA	X		WPO[6]		D[6]					Containers have Leaks, Bulges, Corrosion, or Other Damage
Containers	optional	SAA or <90-Day HWAA	X		WPO[6]		D[6]					Containers are not in Upright Position, Stacked > 2 high
Containers	optional	SAA or <90-Day HWAA	X		WPO[6]		D[6]					Containers are not Tightly Closed
Containers	optional	SAA or <90-Day HWAA	X				D[6]					Note %Full, and if HWAA or SAA (If SAA, problem if > 55-gallon drum.)
Container Pallets	optional	SAA or <90-Day HWAA	X				D[6]					4-foot Aisle Space between Pallets, Pallets in good condition
Container Area	1	SAA or <90-Day HWAA	X		WPO[6]		D[6]	AS				Presence of Accumulated liquids
Container Load/Unload Area	1	SAA or <90-Day HWAA	X		WTT		D[6]					Evidence of Spills, Presence of Debris, Soil Discolorization
Surrounding Area	1	Safety Bunker	X				D[6]			Q		Vegetation cleared to reduce grass fires
OPERATIONAL EQUIPMENT												
Transport Vehicle	optional	n/a	X	PTU			D					Satisfactory for Explosive Operations IAW DA PAM 385-64 & SOP
Heavy Equipment (MHE): Forklift & Attachment	1	n/a	X	PTU			D					Satisfactory for Explosive Operations IAW DA PAM 385-64 & SOP
Heavy Equipment (MHE): Front End Loader	1	n/a	X	PTU			D					Satisfactory for Explosive Operations IAW DA PAM 385-64 & SOP
Heavy Equipment (MHE): Bulldozer	1	n/a	X	PTU			D					Satisfactory for Explosive Operations IAW DA PAM 385-64 & SOP
Heavy Equipment (MHE): Backhoe	1	n/a	X	PTU			D					Satisfactory for Explosive Operations IAW DA PAM 385-64 & SOP
Operation Tools required by SOP or case-by-case	optional	n/a	X				D					Present; In-working order, Satisfactory for Explosives Operations
MISCELLANEOUS												
Operating Record	1	ESD Amm. Mgmt. Office	X	PTU	WPO				W			Records Secure/Locked in Fireproof Cabinets
Operating Record	1	ESD Amm. Mgmt. Office	X		WPO					Q		Operating Record complete IAW Section 8

NOTES:

(1) DA PAM 385-64 inspects for items such as low air pressure and punctures in tires (non-conducting rubber tires are not recommended to be used), MHE protective shields, etc.

(2) There is no requirement that MHE or other equipment or tools have explosion proof motors.

(3) Abbreviations: CD (Current Design - X indicates item(s) in place, FD (Future Design) indicated items to be built), P (Prior to....), PTO (Prior to OB/OD operations), PTU (Prior to use), WP/T (When Performing/transporting or treating), WPO (When Performing Operations), WTT (When transporting or treating), ACD (After Cool Down), AS (After a storm with flowing water), D (Daily), W (Weekly), M (Monthly), Q (Quarterly), S (Semi-Annually), S+ (Semi-Annually or greater), 1y (once every year), and 5y (once every 5 years).

(4) Daily (D) inspections (including PTO, PTU, WPO, WTT, and ACD) need only be performed when that OB/OD operations or related activity is performed.

(5) Fire extinguishers are checked annually by the U.S. Army Garrison Yuma Fire Department.   Seals are not required due to the harsh environement.

(6) Only when wastes are present at the accumulation areas.

ATTACHMENT 11B

INSPECTION CHECKLISTS

11B-1 Daily Inspection Checklist

11B-2 Weekly/Longer Inspection Checklists

11B-3 Daily Consolidated Inspection Checklist

11B-1 Daily Inspection Checklist

MTF DAILY INSPECTION CHECKLIST Inspection Date: ___________

DAILY INSPECTION		Results (Satisfactory/ Unsatisfactory)	Corrective Action		Person Correcting Initials
Inspection Item	Procedures		Action	Date	
WARNING, SECURITY, & EMERGENCY EQUIPMENT					
Warning Signs And System (At Entrance Gate)	Visually inspect for missing or damaged signs				
	Visually inspect that signs are in place and are legible				
	Inspect that warning/security equipment is operational				
Gates (West Gate)	Inspect the integrity of gate				
	Inspect for signs of tampering				
	Inspect ability to close gate safely				
Locks (West Gate)	Inspect to ensure all locks are secured				
	Inspect for signs of tampering				
	Inspect ability to lock				
Communication	Inspect communications systems operable and accessible for all personnel (telephone and radios)				
Emergency Equipment	Inspect to ensure all items present (Contingency Plan, Table 10B-1)				
	Inspect for operation and accessible to personnel				
	All items functional and accessible to personnel				
	Fire Extinguishers present and charged				
General Area And Roadway	Inspect road and all areas for signs of debris, spills, soil discoloration, passable by transport vehicles				
GENERATOR WASTE STORAGE AREAS					
Satellite Accumulation Area Or <90-Day Accumulation Area	Inspect that waste inventory is correct (NOTE AMOUNT IN % FULL)				
	Inspect containers for leaks, bulges, or other damage; containers stored the upright position and tightly closed				
	Inspect loading/unloading area for signs of spills, debris, soil discoloration				
	Inspect containers are DOT approved and to ensure that hazardous waste labels are affixed and legible				
	Inspect drum storage for 4-foot aisle space between pallets				

DAILY INSPECTION		Results (Satisfactory/ Unsatisfactory)	Corrective Action		Person Correcting Initials
Inspection Item	Procedures		Action	Date	
OPEN BURNING OPERATING AREAS					
North Burn Pad	Inspect that NO water is present in pans or on pad (< 5 inches water acceptable in sump)				
	Inspect burn pan covers for leaks, bulges, or other damage; covers should have a complete closure over the burn pan NOT exposing inner surfaces of pans to weather				
	Inspect sumps for outlet pipe clear and visible. < 5 inches water and debris is satisfactory				
	Inspect interstitial monitor cap in place				
	Sump grate in good condition				
	Inspect pad for containment, no cracks, or chips				
	Inspect periphery outside pad for splatter, debris and ash				
	Inspect pads and pans for no accumulated ash				
	Inspect pan refractory for cracks or gaps >1/4"				
	Inspect pans for cracked or broken welds				
	Inspect pans for excessive corrosion				
	Inspect pan support for integrity				
	Inspect pan grounding for proper connection				
	Inspect pan loading/unloading areas for evidence of spills / soil discoloration				
Nortth Burn Pad Retention Basin	Date storm water accumulation began		Date storm water removed		

DAILY INSPECTION		Results (Satisfactory/ Unsatisfactory)	Corrective Action		Person Correcting Initials
Inspection Item	Procedures		Action	Date	
OPEN BURNING OPERATING AREAS					
South Burn Pad	Inspect that NO water is present in pans or on pad (< 5 inches water acceptable in sump)				
	Inspect burn pan covers for leaks, bulges, or other damage; covers should have a complete closure over the burn pan NOT exposing inner surfaces of pans to weather				
	Inspect sumps for outlet pipe clear and visible. < 5 inches water and debris is satisfactory				
	Inspect interstitial monitor cap in place				
	Sump grate in good condition				
	Inspect pad for containment, no cracks, or chips				
	Inspect periphery outside pad for splatter, debris and ash				
	Inspect pads and pans for no accumulated ash				
	Inspect pan refractory for cracks or gaps >1/4"				
	Inspect pans for cracked or broken welds				
	Inspect pans for excessive corrosion				
	Inspect pan support for integrity				
	Inspect pan grounding for proper connection				
	Inspect pan loading/unloading areas for evidence of spills / soil discoloration				
South Burn Pad Retention Basin	Date storm water accumulation began		Date storm water removed		

DAILY INSPECTION		Results (Satisfactory/ Unsatisfactory)	Corrective Action		Person Correcting Initials
Inspection Item	Procedures		Action	Date	
OPEN DETONATION OPERATING AREAS					
Pit #3 (Northwest)	Inspect that NO storm water present in pit				
	Inspect loading/unloading area for signs of spills				
	Inspect periphery for debris from operations				
	Inspect pit for debris from operations				
	Inspect pit and periphery for signs of erosion				
Pit #2 (Middle)	Inspect that NO storm water present in pit				
	Inspect loading/unloading area for signs of spills				
	Inspect periphery for debris from operations				
	Inspect pit for debris from operations				
	Inspect pit and periphery for signs of erosion				
Pit #1 Surface Operations (South)	Inspect that NO storm water present in pit				
	Inspect loading/unloading area for signs of spills				
	Inspect periphery for debris from operations				
	Inspect pit for debris from operations				
	Inspect pit and periphery for signs of erosion				
WORK TABLE AREA					
Work table at Operational Shield	Inspect table and periphery for signs of erosion				
	Grounding rod properly connected and free of coatings				
	Inspect loading/unloading area for signs of spills				
	Inspect periphery for debris or waste from operations				
	Inspect table for debris or waste from operations				
	Inspect tools and equipment for compatibility with materials in use and proper operation				

DAILY INSPECTION		Results (Satisfactory/ Unsatisfactory)	Corrective Action		Person Correcting Initials
Inspection Item	Procedures		Action	Date	
OPERATIONAL EQUIPMENT					
Transport vehicle	Satisfactory for explosive operations per DA PAM 385-64; 1 fire extinguisher, first aid kit (Contingency Plan Table 10B-1)				
Operation Tools required by SOP and operation specific	Inspect that tools are present and in working order				
Material Handling Equipment	Satisfactory for explosive operations per DA PAM 385-64 and SOP (Contingency Plan Table 10B-1)				

Observations:

Inspection Completed By: ____
Signature Date Time

11B-2 Weekly/Longer Inspection Checklists

MTF WEEKLY INSPECTION CHECKLIST **Inspection Date: ___________**

WEEKLY INSPECTION		Results (Satisfactory/ Unsatisfactory)	Corrective Action		Person Correcting Initials
Inspection Item	Procedures		Action	Date	
Last Burn/Detonation Amount and Dates:					
SAFETY EQUIPMENT/SECURITY CONTROLS					
Warning Signs	Visually inspect for missing or damaged signs				
	Visually inspect that signs are in place and are legible				
	Inspect that warning/security equipment is operational				
Gates	Inspect the integrity of gate				
	Inspect for signs of tampering				
	Inspect ability to close gate safely				
Locks	Inspect to ensure all locks are secured				
	Inspect for signs of tampering				
	Inspect ability to lock				
Communication	Inspect communications systems operable and accessible for all personnel (telephone and radios)				
Emergency Equipment	Inspect to ensure all items present (Contingency Plan, Table 10B-1)				
	Inspect for signs of waste residue				
	Inspect for operation and accessible to personnel				
	Fire Extinguishers present and charged				
General Area And Roadway	Inspect road and all areas for signs of debris, spills, soil discoloration, passable by transport vehicles				
Storm Water Prevention Berms	Inspect berms for structural stability/erosion				
GENERATOR WASTE STORAGE AREAS					
Satellite Accumulation Area Or <90-Day Accumulation Area	Inspect that waste inventory is correct (NOTE AMOUNT IN % FULL)				
	Inspect containers for leaks, bulges, or other damage; containers stored the upright position and tightly closed				
	Inspect loading/unloading area for signs of spills, debris, soil discoloration				
	Inspect containers are DOT approved and to ensure that hazardous waste labels are affixed and legible				
	Inspect drum storage for 4-foot aisle space between pallets				

WEEKLY INSPECTION		Results (Satisfactory/ Unsatisfactory)	Corrective Action		Person Correcting Initials
Inspection Item	Procedures		Action	Date	
OPEN BURNING OPERATING AREAS					
North Burn Pad	Inspect that NO water is present in pans or on pad (< 5 inches water acceptable in sump)				
	Inspect burn pan covers for leaks, bulges, or other damage; covers should have a complete closure over the burn pan NOT exposing inner surfaces of pans to weather				
	Inspect sumps for outlet pipe clear and visible. < 5 inches water and debris is satisfactory				
	Inspect interstitial monitor cap in place				
	Sump grate in good condition				
	Inspect pad for containment, no cracks, or chips				
	Inspect periphery outside pad for splatter, debris and ash				
	Inspect pads and pans for no accumulated ash				
	Inspect pan refractory for cracks or gaps >1/4"				
	Inspect pans for cracked or broken welds				
	Inspect pans for excessive corrosion				
	Inspect pan support for integrity				
	Inspect pan grounding for proper connection				
	Inspect pan loading/unloading areas for evidence of spills / soil discoloration				
North Burn Pad Retention Basin	Inspect retention basin for <3 inches of accumulated water				
	Inspect basins for collected water, accumulated debris, structural integrity/erosion				
	Inspect containment, no cracks, or chips				
	Date storm water accumulation began		Date storm water removed		
	Inspect sealant for complete tight coating				
	Inspect sump for <5 inches debris (if retention basin empty)				
	Inspect interstitial monitor cap in place				
	Sump grate in good condition				
	Inspect interstitial space following removal of liquid from retention basin and upon observance of cracks on pads				

MTF WEEKLY INSPECTION CHECKLIST **Inspection Date: ___________**

WEEKLY INSPECTION		Results (Satisfactory/ Unsatisfactory)	Corrective Action		Person Correcting Initials
Inspection Item	Procedures		Action	Date	
OPEN BURNING OPERATING AREAS					
South Burn Pad	Inspect that NO water is present in pans or on pad (< 5 inches water acceptable in sump)				
	Inspect burn pan covers for leaks, bulges, or other damage; covers should have a complete closure over the burn pan NOT exposing inner surfaces of pans to weather				
	Inspect sumps for outlet pipe clear and visible. < 5 inches water and debris is satisfactory				
	Inspect interstitial monitor cap in place				
	Sump grate in good condition				
	Inspect pad for containment, no cracks, or chips				
	Inspect periphery outside pad for splatter, debris and ash				
	Inspect pads and pans for no accumulated ash				
	Inspect pan refractory for cracks or gaps >1/4"				
	Inspect pans for cracked or broken welds				
	Inspect pans for excessive corrosion				
	Inspect pan support for integrity				
	Inspect pan grounding for proper connection				
	Inspect pan loading/unloading areas for evidence of spills / soil discoloration				
South Burn Pad Retention Basin	Inspect retention basin for <3 inches of accumulated water				
	Inspect basins for collected water, accumulated debris, structural integrity/erosion				
	Inspect containment, no cracks, or chips				
	Date storm water accumulation began		Date storm water removed		
	Inspect sealant for complete tight coating				
	Inspect sump for <5 inches debris (if retention basin empty)				
	Inspect interstitial monitor cap in place				
	Sump grate in good condition				
	Inspect interstitial space following removal of liquid from retention basin and upon observance of cracks on pads				

MTF WEEKLY INSPECTION CHECKLIST **Inspection Date: ___________**

WEEKLY INSPECTION		Results (Satisfactory/ Unsatisfactory)	Corrective Action		Person Correcting Initials
Inspection Item	Procedures		Action	Date	
OPEN DETONATION OPERATING AREAS					
Pit #3 (Northwest)	Inspect that NO storm water present in pit				
	Inspect loading/unloading area for signs of spills				
	Inspect periphery for debris from operations				
	Inspect pit for debris from operations				
	Inspect pit and periphery for signs of erosion				
Pit #2 (Middle)	Inspect that NO storm water present in pit				
	Inspect loading/unloading area for signs of spills				
	Inspect periphery for debris from operations				
	Inspect pit for debris from operations				
	Inspect pit and periphery for signs of erosion				
Pit #1 Surface Operations (South)	Inspect that NO storm water present in former pit area				
	Inspect loading/unloading area for signs of spills				
	Inspect periphery for debris from operations				
	Inspect pit area for debris from operations				
	Inspect pit area and periphery for signs of erosion				
WORK TABLE AREA					
Work Table At Safety Bunker	Grounding rod properly connected				
	Inspect loading/unloading area for signs of spills				
	Inspect periphery for debris or waste from operations				
	Inspect table for debris or waste from operations				
	Inspect tools and equipment for proper operation				

MTF WEEKLY INSPECTION CHECKLIST **Inspection Date: ___________**

WEEKLY INSPECTION		Results (Satisfactory/ Unsatisfactory)	Corrective Action		Person Correcting Initials
Inspection Item	Procedures		Action	Date	

Observations:

Operator: ____
Signature Date Time

Inspector: ____
Signature Date Time

MTF QUARTERLY OR LONGER CHECKLIST **Inspection Date: ___________**

QUARTERLY OR LONGER INSPECTION		Results (Satisfactory/ Unsatisfactory)	Corrective Action		Person Correcting Initials
Inspection Item	Procedures		Action	Date	
QUARTERLY REQUIREMENTS (OCT, JAN, APR, JUL)					
Warning Signs	Visually inspect for missing or damaged signs on perimeter fence				
	Visually inspect that signs are in place and are legible				
Fences	Visually inspect for broken or down fence lines and/or loose wires				
	Visually inspect for infusion or obstruction by vegetation				
East Gate	Inspect gate secured, lock operational				
Operating Record	Inspect that Operating Record is complete				
	Inspect that Operating Record is secured				
SEMI-ANNUAL REQUIREMENT (JAN & JUL)					
South Pad	Inspect pan grounding for proper connection				
North Pad	Inspect pan grounding for proper connection				

Observations:

NOTES: The OB pan grounding electrical resistance test, the OB pad/basin underground double-walled pipe hydrostatic test, and a soil investigation is required every five-years.

Operator: ____
Signature Date Time

Inspector: ____
Signature Date Time

11B-3 Daily Consolidated Inspection Checklist

Inspection Areas	SAT	UNSAT
1. Safety Equipment		
2. Waste Storage Area		
3. North Burn Pad		
4. South Burn Pad		
5. OB/OD Pit 3 (North or South)		
6. OB/OD Pit 2 (East or West)		
7. OB/OD Surface area (Pit 1)		
8. Work Table		
9. Operational Equipment		
10. Other:		

Note: The table above is a list of the major inspection areas. This checklist is to be used in conjunction with the daily inspection checklists. Any observed deficiency from the daily inspection checklists will be documented on this form.

Comments or Deficiencies: ______________________________

Corrective Action: ______________________________

______________________ Facility Operator

______________________ Time/Date

ARIZONA HAZARDOUS WASTE MANAGEMENT PERMIT

EPA I.D. NO. AZ5213820991

U.S. ARMY GARRISON YUMA PROVING GROUND

PERMIT ATTACHMENT 12

TRAINING PLAN

TABLE OF CONTENTS

CONTENTS PAGE

ATTACHMENTS

TRAINING PLAN

12.1 TRAINING PROGRAM

The U.S. Army Garrison Yuma Proving Ground (USAGYPG) Open Burn/Open Detonation Munitions Treatment Facility (OB/OD MTF) training program will provide facility personnel with the necessary knowledge and skills to perform hazardous waste duties safely and efficiently, and will ensure that hazardous activities are conducted in an environmentally sound manner. The purpose of this training program is to prepare personnel for OB/OD MTF operational responsibilities, with emphasis on reducing potential risks that could threaten human health or the environment. This will be accomplished by ensuring that OB/OD facility personnel handling hazardous waste are thoroughly familiar with and can properly perform their assigned duties and responsibilities. In addition to providing training in the mechanics of OB/OD MTF operations, this training program will provide facility personnel with an understanding of facility operations, including safety and emergency response operations.

This training program meets the requirements of A.A.C. R18-8-264.A [Title 40 of the Code of Federal Regulations, Section 264.16 (40 CFR 264.16)] by:

1. Providing training specific to the various OB/OD MTF hazardous waste management positions;

2. Ensuring that personnel complete their training program within 6 months of their assignment to the OB/OD MTF or to a new position associated with the facility;

3. Ensuring that the training program is directed by qualified personnel trained in hazardous waste management procedures;

4. Providing training that ensures that OB/OD MTF personnel are able to respond effectively to emergencies;

5. Providing annual review of initial training;

6. Maintaining the name, job title, and job description for each position of the OB/OD MTF located at the (USAGYPG);

7. Maintaining training records on current OB/OD MTF personnel until closure of the OB/OD MTF located at the USAGYPG;

8. Maintaining training records on former OB/OD MTF personnel for at least 3 years from the date the employee last worked at the facility;

9. Ensuring that OB/OD MTF personnel do not work unsupervised until they complete the requisite training; and

10. Ensuring that OB/OD MTF personnel do not engage in waste management operations until they have completed the requisite health and safety training [29 CFR 1910.120].

12.2 OB/OD MTF PERSONNEL

OB/OD MTF personnel will consist of: (1) personnel supplied by the Ammunition Recovery Branch who will perform hands-on operations of the facility; (2) Lead ORT's who act as alternate emergency coordinators; (3) the Fire Chief and assistant chiefs whom act as emergency coordinators; and (4) Environmental Sciences Division personnel for regulatory oversight. OB/OD MTF personnel will complete training specific to the facility activity and site training required by the USAGYPG. The OB/OD MTF personnel will consist of:

1. Chief, Environmental Sciences;
2. Chief, Ammunition Management Division;
3. Emergency Coordinator;
4. OB/OD MTF Manager;
5. Lead Ordnance Recovery Technician;
6. Ordnance Recovery Technician (ORT);
7. Environmental Specialist;
8. Sampling Technician;
9. Training Director;
10. Munitions Handler;
11. Operating Record Data Manager; and
12. Environmental Coordinator (including the assistant environmental coordinator)

Positions identified in the organization chart (Permit Attachment 12A, Figure 12A-1) that are required to be addressed in this plan are shaded for identification.

The operating record data manager noted above is not included on the organizational chart, and may be assigned to either Environmental Sciences Directorate or Ammunition Management Division.

Job titles, duties, and minimum qualifications required to fill the OB/OD MTF personnel positions are provided in Permit Attachment 12, Permit Attachment 12C.

In Figure 12A-1, the positions that are shaded perform work under the direction of other shaded personnel, which meet the State of Arizona character background check requirements (A.A.C. R18-8-270.J) as indicated by double-lined bordered rectangles on the organization chart. An example is the munitions handlers that perform work for the facility manager when at the OB/OD MTF, or the Environmental Technical Support personnel that perform efforts for the Environmental Sciences Chief when at the facility. It should be noted that when an employee who has not completed the background check process is to assume the duties of a shaded position, that person must first submit the necessary ADEQ character background check forms to ADEQ with a request for a class 1 permit modification (prior ADEQ approval required).

12.3 OB/OD FACILITY VISITORS, CONTRACTORS, OUTSIDE AGENCY INSPECTORS, OBSERVERS, & NON-ROUTINE WORKERS

During OB/OD MTF activity, certain personnel might be present who will not actively or routinely engage in hazardous waste treatment or handling operations. These personnel might be visitors such as regulatory agency inspectors; inspectors/observers; independent contractor data collectors, observers, and inspectors; and non-routine workers such as mechanics and fitters needed to repair equipment or perform structural repairs and emergency response personnel summoned for response to hazardous incidents.

These types of personnel will, at a minimum, receive general OB/OD MTF personnel training. This training provides an overview of facility operations, operational zone requirements, hazards communication, and specific emergency response actions, including roles, responsibilities, and procedures, prior to gaining access to the facility. In addition, these personnel might also attend a daily safety briefing, as applicable and other training on the OB/OD MTF and its operation, depending on the level of participation or work activity to be conducted during operations. See Permit Attachment 12, Permit Attachment 12D for the description of courses.

Permit Attachment 12, Table 12B-1 identifies the categories of, describes potential duties of, and identifies required training for: visitors, inspectors, observers, data collectors, and non-routine workers. Independent contractor personnel and some non-routine workers are categorized by level of potential duties during OB/OD MTF operations (Level 1 or 2). Training records for OB/OD MTF visitors, inspectors, observers, data collectors, and non-routine workers will be maintained by the operator and will be kept on file until closure of the facility.

The remaining portions of this attachment focus on the training requirements and implementation for the OB/OD MTF personnel because they are primarily responsible for conducting activities and performing hands-on hazardous waste operations.

12.4 OUTLINE OF TRAINING PLAN

12.4.1 General

In general, OB/OD MTF personnel will receive the following training commensurate with their job duties and responsibilities:

1. Hazardous Waste Operations and Emergency Response (HAZWOPER; per 29 CFR 1910.120);

2. Communications and alarm systems;

3. Health hazard communication (per 29 CFR 1910.1200);

4. HW management procedures, including use, inspection, repair, replacement of emergency and monitoring equipment; container management; labeling and weekly inspections of waste storage areas; sampling and waste determinations;

5. Contingency plans and emergency response procedures, including response to fires or explosions, first aid (including blood-borne pathogens) and cardiopulmonary resuscitation (CPR);

6. Protective clothing and equipment;

7. Shutdown of operations;

8. Response to soil and groundwater contamination; and

9. Medical surveillance

The OB/OD MTF training program will incorporate training required by the Resource Conservation and Recovery Act (RCRA), Occupational, Safety and Health Administration (OSHA), Department of Transportation (DOT), and the U.S. Army [munitions and explosives of concern (MEC)]. This will comprise both initial training and continuing training. Training will encompass instructions on specific duties and responsibilities relative to an individual's hazardous waste activities, including specific instructions pertaining to operation of the OB/OD MTF, treatment process, and handling of process wastes for offsite disposition. Training will be augmented with an annual drill simulating a possible emergency at the facility.

12.4.2 Initial Training

Initial training for OB/OD MTF personnel will be provided in three phases:

1. Compliance training;

2. Ammunition recovery, OB/OD qualification training; and

3. Site-specific training.

Initial training requirements must be met within the first 6 months of employment or new job assignment at the OB/OD MTF.

The following paragraphs describe the three phases of initial training for OB/OD MTF personnel.

12.4.1.1 Compliance Training Phase

Regulatory training provides an overview of applicable Federal, State, and local regulations and training on waste handling, contingency plans, emergency response, communications and alarm systems, and emergency response procedures. First aid/CPR and initial OSHA and health hazard communication training will also be provided. Compliance training can be provided by commercial vendors and/or USAGYPG instructors. All instructional providers will be certified acceptable by the training director. Outlines for the OB/OD MTF courses described for the above are provided in Permit Attachment 12D (Training Courses for OB/OD MTF Personnel).

12.4.1.2 Ammunition Recovery, OB/OD Qualification Training Phase

A brief course description of the ‘Ammunition Recovery, OB/OD Qualification’ Training is provided in Permit Attachment 12, Permit Attachment 12D. The ‘Ammunition Recovery, OB/OD Qualification’ Training consists of best methods and procedures for performing explosive ordnance reconnaissance, identification, access and recovery, and disposal of all conventional surface explosive ordnance. This training will be conducted in strict accordance with all applicable U.S. Army safety training requirements specific to ammunition operations.

12.4.1.3 Site-Specific Training Phase

Training will include operational, health, and safety requirements specific to the OB/OD MTF. Topics and courses include site-specific standing operating procedures, hazard communications, heat stress, hazardous vegetation and animals, and use of fire extinguishers.

Outlines for the OB/OD MTF courses described in the above sections are provided in Permit Attachment 12, Permit Attachment 12D.

12.4.3 Continuing Training

Continuing training includes all training beyond initial training and will include refresher courses (for example, OSHA training) and other applicable and appropriate hazardous waste management training.

Re-training and/or training refreshers will be conducted annually or sooner if regulations/procedures change, a new hazardous material is used, or operations/performance concerns deem it necessary.

12.5 TRAINING TECHNIQUES AND QUALITY

Training will be conducted using a variety of training techniques, including classroom instruction, demonstrations, drills, and on-the-job training. Whenever possible, on-site, site-specific training will be conducted, tailored to the working conditions and tasks assigned to personnel. Examinations will be given as appropriate to verify trainee comprehension of the subject matter. On-the-job training will include a performance checklist administered by the supervisor or designated representative. Continuing training will consist of a combination of classroom instruction, drills, and on-the-job training.

Training will be of a quality that meets the requirements of the associated regulations; however, most of the standards do not required accreditation or approval. Where consensus standards or regulatory guidance is available for course content, such as 29 CFR 1910.120 Appendix E, the USAGYPG will use them to the maximum extent possible.

The Training Director will have control and approval of all training providers. A determination of quality and qualifications for all instructors will be made by the Training Director based on regulatory requirements, references, and suitability of the material. The American National Standards Institute/American Society of Safety Engineers (ANSI/ASSE) Z490.1 standard requires a same level of training and competency in the subject.

12.6 OB/OD MTF TRAINING DIRECTOR

The OB/OD MTF Training Director will be responsible for training activities of facility personnel. The Training Director will be knowledgeable in all aspects of operation of the OB/OD MTF, hazardous waste management activities, and training principles. The responsibilities of the Training Director will be to:

1. Coordinate training of OB/OD MTF personnel in the proper operation of the facility in accordance with Federal, State, Army, and local environmental regulations.

2. Coordinate continuing training as necessary to inform OB/OD MTF personnel of new procedures, provide refresher training, and provide training for new personnel.

3. Identify and review vendors and other training resources to meet environmental requirements.

4. Review training materials and course content for conformance with regulations and associated guidance. The priority in training is to protect the health and safety of OB/OD personnel, the public, and the environment.

5. The Training Director will make determinations of student-to-trainer ratios based on training and staffing needs. The Training Director will examine all appropriate guidance when setting training ratios.

6. Ensure that training records are maintained in accordance with A.A.C. R18-8-264.A [40 CFR 264.16(d)].

7. Ensure that OB/OD MTF personnel are trained in hazardous waste management and contingency plan implementation, including emergency procedures.

8. Ensure that OB/OD MTF personnel receive training appropriate to their positions.

9. Ensure audits are periodically conducted on training courses to assure quality .

10. Coordinate an annual drill or exercise simulating an emergency operation at the facility with all appropriate USAGYPG activities. The Training Director will invite outside agencies identified in Contingency Plan Coordination Agreements (Permit Attachment 10C) to participate in order to provide a more realistic simulation and test the effectiveness of training. The Training Director will coordinate the after-action review of the exercise.

The qualifications of the OB/OD MTF Training Director are provided in Permit Attachment 12, Permit Attachment 12C.

12.7 RELEVANCE OF TRAINING TO JOB POSITION

The OB/OD MTF training program tailors course requirements to subject areas and levels of detail appropriate for each position. Permit Attachment 12, Table 12B-2 lists the training relevant for each OB/OD MTF position directly charged with the operations and/or decision-making of the facility.

12.8 TRAINING FOR EMERGENCY RESPONSE

Emergency response training will be provided to all OB/OD MTF personnel. At a minimum, the training program will be designed to ensure that OB/OD MTF personnel are able to respond effectively to emergencies by familiarizing themselves with facility emergency procedures, equipment, and systems, including:

1. Emergency Equipment - Procedures for using, inspecting, repairing, and replacing OB/OD MTF emergency equipment.

2. Communications and Alarms - Location and use of communications and alarm systems.

3. Contingency Plan - Implementation of the Contingency Plan (CP) and appropriate emergency notifications.

4. Shutdown Preparations - When the facility is in use normal shutdown operations will occur daily and at the conclusion of OB/OD MTF operations. Training for normal shutdown operations will include housekeeping duties and, if necessary, removing waste from the processing area and performing preventive maintenance checks and services.

5. Emergency Operations - OB/OD MTF operators will be trained to identify, contain, and mitigate the effects of an emergency condition.

6. Non-routine Operations - If a release of PEP is detected outside engineering controls (pans or pits), or if a leak is suspected, non-routine operational procedures will be implemented.

7. Response to Fires and Explosions - Training in response to fires and explosions will be provided as part of the general OB/OD MTF personnel training.

8. Response to Soil and Groundwater Contamination Incidents - Training in response to soil and groundwater contamination incidents, particularly for spill response, will be provided.

Certain operations under specific non-routine and emergency conditions will be examined to assess OB/OD MTF personnel training and performance of prescribed procedures. Emergency conditions will include serious injury or illness of a team member or fire in the OB/OD MTF area.

12.9 IMPLEMENTATION OF TRAINING PROGRAM

OB/OD MTF personnel will be required to complete training specific to their job assignments within 6 months of assignment to the OB/OD MTF at the USAGYPG installation, and will not work unsupervised until they have successfully completed training. Furthermore, OB/OD MTF personnel must complete the requisite training prior to engaging in any hazardous waste operations. The OB/OD MTF personnel course descriptions are provided in Permit Attachment 12, Permit Attachment 12D.

USAGYPG has informed ADEQ that some courses are taught by individuals who are trained DOD and not by accredited agency (e.g., American Red Cross). This is acceptable provided USAGYPG maintains proof of the instructors DOD training on that course in the record.

12.10 REFERENCES

The following U.S. Army documents provides additional training guidance and requirements for USAGYPG OB/OD MTF personnel:

U.S. Army Materiel Command Regulation (AMC-R) 350-4, Training and Certification Program for Personnel Working in Ammunition Operations.

U.S. Army Materiel Command, AMC-R, 385-100 Explosives Safety Manual, 1985.

ATTACHMENT 12A

FIGURES

12:40:45 PM
12/9/2016
L:\Shared\home\Public\banderson\YUMA\DRAWINGS\FIGURE 12A-1 (ORGANIZATION CHART).dgn

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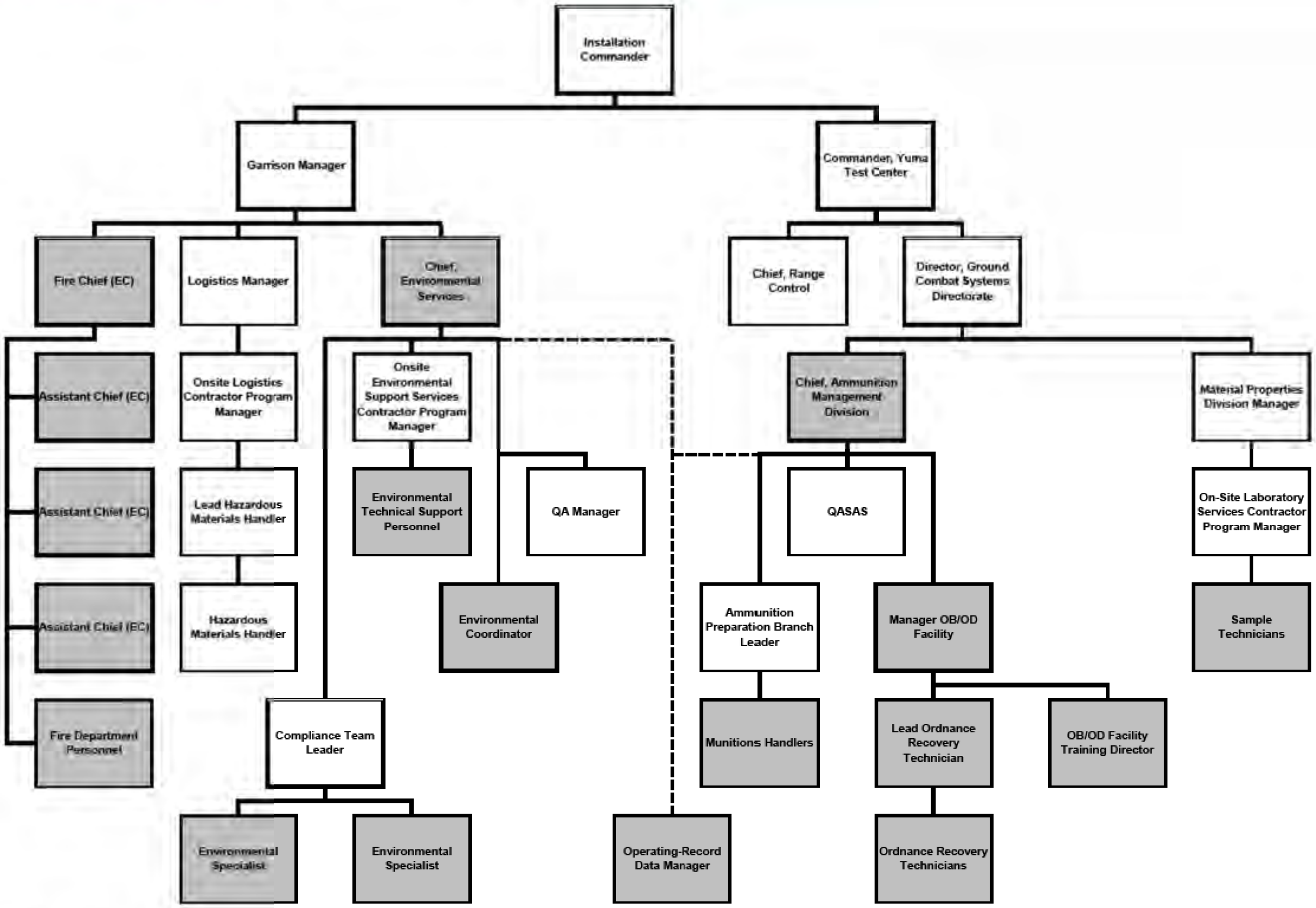

LEGEND:

OB/OD Treatment Facility Key Employee (does not require training specified in RCRA Training Plan)

OB/OD Treatment Facility Employee (requires training specified in RCRA Training Plan)

OB/OD Treatment Facility Key Employee (requires training specified in RCRA Training Plan)

Operating-Record Data Manager may be assigned to either the Director, Environmental Services Directorate or to the Ammunition Management Division.

NOT TO SCALE

CTI and Associates, Inc.
28001 Cabot Drive, Ste. 250
Novi, Michigan 48377
248.486.5100 (fax)248.486.5050
www.cticompanies.com

FIGURE 12A-1
US ARMY GARRISON YUMA PROVING GROUND - OB/OD MTE ORGANIZATION

YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION

JULY 2016

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ATTACHMENT 12B

TABLES

Table 12B-1. Training Requirement Overview for OB/OD MTF Visitors, Outside Agency Inspectors, Observers and Non-routine Workers[a]

Category[b]	Description of Potential Duties	Required Training
Visitors (regulatory agencies such as ADEQ; EPA; U.S. Army Garrison Yuma officials, contractors, and others).	Might observe hot operations remotely from safety bunker. Might observe and inspect waste treatment, storage, and handling areas in person during OB/OD Treatment Facility operations only as safety measures permit.[c]	• General OB/OD MTF Personnel
Contractor waste handlers.	Verify HW containers for shipment off site; transports hazardous waste containers off site. Might observe sample collection.	• General OB/OD MTF Personnel • Verification of qualifications in HAZWOPER or Hazardous Materials Shipping from employer.
Independent contractors, inspectors, observers, data collectors.	Level 1 – Observe, inspect, or collect data in person when hot operations have been completed and it is safe to do so.	• General OB/OD MTF Personnel
	Level 2 – Observe, inspect, or collect data in person dressed in appropriate PPE during hot operations. Does not perform any sampling or hands-on activities with waste material.	• General OB/OD MTF Personnel • 24-Hour HAZWOPER • Use of OSHA PPE[d]
Craftsmen and maintenance personnel making repairs to OB/OD MTF equipment or structures.	Might involve repairs to equipment suspected of HW contamination.	• General OB/OD MTF Personnel • Use of OSHA PPE[d]
Emergency response personnel such as the U.S. Army Garrison Yuma Fire Department, ADEQ emergency response unit, MCAS Search and Rescue helicopter personnel, etc.	Emergency responders from outside agencies supplementing the U.S. Army Garrison Yuma staff at the direction of the U.S. Army Garrison Yuma Emergency Coordinator.	• HAZWOPER certification and emergency response training commensurate with their role in the response • All medical response training applicable to their role or specialty • Use of PPE appropriate for their response role

a. No one identified in this table will be allowed unescorted access to the facility at any time.

b. Abbreviations: ADEQ = Arizona Department of Environmental Quality; EPA = Environmental Protection Agency; HAZWOPER = Hazardous Waste Operations and Emergency Response; HW = Hazardous Waste; OSHA = Occupational Safety and Health Administration; MCAS= Marine Corps Air Station; PPE = personal protective equipment.

c. Hot operations are defined as the handling, processing or treatment, and post-treatment cleanup of propellants, explosives, and pyrotechnics (PEP).

d. Will be trained in the PPE required to perform a task.

TABLE 12B-2. Training Requirements for Personnel Working At the OB/OD MTF

Regulatory Requirement		US Army Yuma Proving Ground Training Schedule											
Training	Refresher Training	Director, Environmental Sciences Directorate	Emergency Coordinator	OB/OD MTF Manager	Lead ORT	ORT	Environmental Specialist	Sampling Technician	Munition Handler	Operating-Record Data Manager	Training Director	Environmental Coordinator	Environmental Technical Support Personnel
COMPLIANCE TRAINING PHASE													
Cardiopulmonary Resuscitation	B				C	C			C		C		C
First Aid/Blood-borne pathogens	C				C	C			C		C		C
40-Hour TSDF HAZWOPER [OSHA 29 CFR 1910.120(p)]	D												C
24-Hour TSDF HAZWOPER [OSHA 29 CFR 1910.120(p)]	D, H			C	C	C	C	C	C		C	C	
8-Hour HAZWOPER Supervisor/Manager	A	C	C	C	C						C		C
8-Hour HAZWOPER Refresher	D, H		C	C	C	C	C	C	C		C	C	C
RCRA HW Management	C, F	C	C	C	C	C	C		C		C	C	C
Hazard Communication (HAZCOM)	C	C	C	C	C	C	C	C	C		C		C
Hazardous Materials Transportation	E			C	C	C			C		C		
AMMUNITION RECOVERY, OB/OD QUALIFICATION TRAINING PHASE													
Ammunition Demilitarization .	F, G			C	C	C							

TABLE 12B-2. Training Requirements for Personnel Working At the OB/OD MTF

Regulatory Requirement		US Army Yuma Proving Ground Training Schedule											
Training	Refresher Training	Director, Environmental Sciences Directorate	Emergency Coordinator	OB/OD MTF Manager	Lead ORT	ORT	Environmental Specialist	Sampling Technician	Munition Handler	Operating-Record Data Manager	Training Director	Environmental Coordinator	Environmental Technical Support Personnel
SITE-SPECIFIC TRAINING PHASE													
Forklift and Heavy Equipment Training	F, G				C	C			C				
Standard Operating Procedures	F, G	C	C	C	C	C	C		C		C	C	C
Recordkeeping and Record Retention	F, G		C	C	C	C	C		C	C	C		
Heat Stress .	C, G		C	C	C	C			C		C	C	C
Fire Extinguisher training .	C			C	C	C			C		C	C	C
Storm-water Management Awareness .	C, G		C	C	C	C	C		C		C	C	C

A. One time training required.
B. Biannual recertification required.
C. Annual refresher required.
D. Annual OSHA 8-hour refresher required; TSDF = Treatment, Storage, and Disposal Facility.
E. Triennial refresher required.
F. Annual equipment and procedural refresher required.
G. When new or changed.
H. Munitions Handlers Training includes 24 hour HAZWOPER and 8 hour refresher.

ATTACHMENT 12C

OB/OD MTF PERSONNEL ROLES, RESPONSIBILITIES & EDUCATION

OB/OD MTF PERSONNEL ROLES, RESPONSIBILITIES & EDUCATION

This section lists the positions that comprise the OB/OD MTF personnel. A description of the responsibilities of each position is provided in addition to the education, experience, and medical and physical requirements applicable to each job.

The U.S. Army Garrison Yuma Proving Ground Environmental Sciences Division has the authority to evaluate academic and job experience to determine an applicant's qualifications for any position at the OB/OD MTF. The decision to substitute education and/or experience requirements must be approved by the Chief, Environmental Sciences with concurrence from the Chief, Ammunition Management Division. This approval must be documented in writing in the individual's training record. At a minimum, each applicant must be trained and certified in accordance with the training requirements listed in Permit Section 12 (Training Plan) of the OB/OD MTF RCRA permit prior to performing his or her duties in an unsupervised status. Retraining will be conducted immediately whenever there is a change in the regulations, procedures, or the permit, or when the individual has been identified as needing retraining by the OB/OD Facility Manager. This training can be included in the documented monthly safety meetings as long as it is called out in the safety meeting plan or notes.

The positions of U.S. Army Garrison Yuma Proving Ground Commander, Yuma Test Center Commander, and Garrison Manager are filled by appointment from the headquarters level and are, therefore, not described in this permit. The positions of Chief, Environmental Sciences, and Chief, Ammunition Management Division job descriptions included herein only apply to functions related to this facility.

OB/OD MTF PERSONNEL ROLES, RESPONSIBILITIES & EDUCATION

CHIEF OF ENVIRONMENTAL SCIENCES

Job Description:	
Education:	B.S. degree or equivalent experience. Will possess English language proficiency sufficient to perform all duties and assist in emergency management related to the facility.
Experience:	Minimum of 10 years of progressive experience in hazardous waste management, including field operations experience.
Medical:	No special qualifications required
Equipment Used:	No specialized equipment used beyond normal office equipment

OB/OD MTF PERSONNEL ROLES, RESPONSIBILITIES & EDUCATION

CHIEF, AMMUNITION MANAGEMENT DIVISION

Job Description:

Education:	B.S. degree or equivalent experience. Will possess English language proficiency sufficient to perform all duties and assist in emergency management related to the facility.
Experience:	Minimum of 7 years of experience in explosives/weapons and hazardous waste management, including field operations experience.
Medical:	No special qualifications required
Equipment Used:	No specialized equipment used beyond normal office equipment

OB/OD MTF PERSONNEL ROLES, RESPONSIBILITIES & EDUCATION

EMERGENCY COORDINATOR

Job Description:	Supervises all the emergency response actions at the OB/OD MTF.
Education:	B.S. degree or equivalent experience. Will possess English language proficiency sufficient to perform all duties and assist in emergency management related to the task.
Experience:	Minimum of 7 years of experience in emergency management, including field operations experience.
Medical:	Satisfactory completion of a physical examination for hazardous waste site workers.
Equipment Used:	No specialized equipment used beyond normal office equipment

OB/OD MTF PERSONNEL ROLES, RESPONSIBILITIES & EDUCATION

OB/OD MTF MANAGER

Job Description:	Supervises all operations at the OB/OD MTF. Supports OB/OD MTF operations, training, and waste handling operations. Supervises decontamination of equipment when required.
Education:	B.S. degree or equivalent experience. Will possess English language proficiency sufficient to perform all duties and assist in management related to the task.
Experience:	Minimum of 15 years of experience in explosives/weapons and hazardous waste management, including field operations experience.
Medical:	Satisfactory completion of a physical examination for hazardous waste site workers.
Equipment Used:	No specialized equipment used beyond normal office equipment

OB/OD MTF PERSONNEL ROLES, RESPONSIBILITIES & EDUCATION

LEAD ORDNANCE RECOVERY TECHNICIAN

Job Description:	Supervises all ORTs during OB/OD MTF operations and training. The Lead Ordnance Recovery Technician additionally meets the definition of "explosive or munitions emergency response specialist (ERS)" under **40 CFR 270.1 (c)(3)**. Supports OB/OD MTF operations, training, and waste handling operations. Assists in waste handling and processing as required. Documents pre and post operational inspections. Supervises decontamination of equipment when required. Assists in removal of stormwater, when necessary. Declares scrap free from residue and acceptable for recycling. Must be able to stand for prolonged periods of time, lift a minimum of 60 pounds, and endure ambient temperatures of >100°, and < 40°.
Education:	B.S. degree or equivalent experience. Lead Ordnance Recovery Technicians will possess English language proficiency sufficient to perform all duties and assist in emergency management related to the task.
Experience:	Minimum of 7 years of experience in explosives/weapons and hazardous waste management, including field operations experience.
Medical:	Satisfactory completion of a physical examination for hazardous waste site workers.
Equipment Used:	Equipment used in this position may include: various pieces of heavy equipment, PPE appropriate to the task, inspection forms, cutting devices to open propellant overpacks shovels, explosives and detonators, radios, telephones, motor vehicles, knives, vacuum cleaners, decontamination supplies and equipment, brooms, plastic bags, and pumps.

OB/OD MTF PERSONNEL ROLES, RESPONSIBILITIES & EDUCATION

ORDNANCE RECOVERY TECHNICIAN

Job Description:	Responsible for all explosive and residue handling in accordance with established Standard Operating Procedures (SOPs). The Ordnance Recovery Technician additionally meets the definition of "explosive or munitions emergency response specialist (ERS) under 40 CFR 270.1 (c)(3). Performs receipt inspections. Performs transfer of PEP to OB/OD MTF. Unpacks PEP from overpacks. Moves PEP from transport vehicle to treatment unit. Removes hazardous waste from OB/OD treatment units when directed. Assists in hazardous waste handling/processing. Participates in recovery operations during emergency exercises/operations. Performs OB/OD MTF operator-level maintenance. Documents pre-operational inspections. Decontaminates equipment used in removal of hazardous waste and manages decontamination materials until they are analyzed or turned in for disposal. Must be able to stand for prolonged periods of time, lift a minimum of 60 pounds, and endure ambient temperatures of >100°, and < 40°.
Education:	Associate's degree or equivalent experience. Ordnance Recovery Technicians will possess English language proficiency sufficient to perform all duties and assist in emergency management related to their task.
Experience:	3 years of experience in explosives demolitions, hazardous waste operations, and operator-level maintenance.
Medical:	Satisfactory completion of a physical examination for hazardous waste site workers.
Equipment Used:	Equipment used in this position may include: various pieces of heavy equipment, PPE appropriate to the task, inspection forms, cutting devices to open propellant overpacks, shovels, explosives and detonators, radios, telephones, motor vehicles, knives, vacuum cleaners, decontamination supplies and equipment, brooms, plastic bags, and pumps.

OB/OD MTF PERSONNEL ROLES, RESPONSIBILITIES & EDUCATION

ENVIRONMENTAL SPECIALIST

Job Description:	Ensures compliance with all State, Federal, and DoD environmental rules, regulations, and laws during OB/OD MTF operations. Ensures that all hazardous waste is properly marked, handled, manifested, and disposed of in accordance with regulatory requirements. Ensures compliance with permit conditions. Performs weekly, quarterly other inspections of waste sites. Provides oversight for all hazardous waste-handling activities, including satellite and less-than-90-day waste storage areas. Must be able to stand for prolonged periods of time and endure ambient temperatures of >100°, and < 40°.
Education:	B.S. degree in Environmental Engineering, Biology, Chemistry, or chemical engineering-related field or equivalent work experience. The Environmental Specialist will possess English language skills sufficient to perform all duties related to the task.
Experience:	1 years of experience in environmental management and hazardous material/waste management.
Medical:	Satisfactory completion of a physical examination for hazardous waste site workers.
Equipment Used:	Computer, reference materials applicable to work, camera, inspection forms, surveyors tape, hand auger, soils and water sampling equipment, shovels, and a motor vehicle.

OB/OD MTF PERSONNEL ROLES, RESPONSIBILITIES & EDUCATION

SAMPLING TECHNICIAN

Job Description:	Samples wastes and suspect environmental media for analysis. Must be able to stand for prolonged periods of time and endure ambient temperatures of >100°, and < 40°.
Education:	B.S. degree in Environmental Engineering, Biology, Chemistry, or chemical engineering-related field or equivalent work experience. The Environmental Specialist will possess English language skills sufficient to perform all duties related to the task.
Experience:	1 year of experience in environmental sampling.
Medical:	Satisfactory completion of a physical examination for hazardous waste site workers.
Equipment Used:	Computer, reference materials applicable to work, camera, logbooks, surveyors tape, hand auger, soils and water sampling equipment, shovels, and a motor vehicle.

OB/OD MTF PERSONNEL ROLES, RESPONSIBILITIES & EDUCATION

TRAINING DIRECTOR

Job Description:	Provides OB/OD MTF program-level training management support to the Ammunition Management Division Chief. Responsible for ensuring that job descriptions match the technical skills required. Responsible for preparing program master training schedule and ensuring all training is conducted in accordance with schedule. Ensures that training conducted meets applicable health and safety SOPs and regulatory requirements. Ensures compliance with permit conditions and all applicable regulations regarding personnel training. Initiates revision of the training plan immediately whenever there is a change in regulations, procedures, and/or this permit. Approves all lesson plans, course instructors, and training sessions; additionally, the Training Director regularly audits training sessions to assure quality. Ensures the proper maintenance of training records. Responsible for procurement and scheduling of all training. Coordinate an annual drill or exercise simulating an emergency operation at the facility with all appropriate U.S. Army Garrison Yuma Proving Ground activities. The Training Director will invite outside agencies identified in the contingency plan to participate in order to provide a more realistic simulation and test the effectiveness of training. The Training Director will coordinate the after-action review of the exercise.
Education:	B.A./B.S. degree. The Training Director will possess English language skills sufficient to perform all duties and assist in emergency management related to the task.
Experience:	Minimum 10 years progressive experience in the management and treatment of hazardous wastes. Experienced in the evaluation and maintenance of training programs.
Medical	There are no physical requirements for the Training Director’s position other than being fit for duty.
Equipment Used:	Computer, telephone, fax machine, reference materials applicable to work.

OB/OD MTF PERSONNEL ROLES, RESPONSIBILITIES & EDUCATION

MUNITION HANDLER

Job Description:	Responsible for all explosive and residue handling in accordance with established SOPs. Performs transfer of PEP to OB/OD MTF. Unpacks PEP from overpacks. Moves PEP from transport vehicle to treatment unit. Assists in hazardous waste handling under supervision of ORTs. Must be able to stand for prolonged periods of time, lift a minimum of 60 pounds, and endure ambient temperatures of >100°, and < 40°.
Education:	High School diploma or equivalent. Munitions Handlers will possess English language skills sufficient to perform all duties and assist in actions related to their task.
Experience:	No specific experience requirements.
Medical:	Satisfactory completion of a physical examination for hazardous waste site workers.
Equipment Used:	Equipment used in this position may include: Material handling equipment, PPE appropriate to the task, shovels, radios, telephones, motor vehicles, knives, vacuum cleaners, decontamination supplies and equipment, brooms, and plastic bags.

OB/OD MTF PERSONNEL ROLES, RESPONSIBILITIES & EDUCATION

OPERATING RECORD DATA MANAGER

Job Description:	Responsible for all proper administration of the operating record. Performs data entry into operating record with references to dates of operations and type of record (i.e., spill report, burn record, inspection record).
Education:	High School diploma or equivalent. The Data Manager will possess English language skills sufficient to perform all duties and assist in actions related to their task.
Experience:	No specific experience requirements.
Medical:	There are no physical requirements for the Data Manager's position other than being fit for duty.
Equipment Used:	Computer, telephone, fax machine, reference materials applicable to work.

OB/OD MTF PERSONNEL ROLES, RESPONSIBILITIES & EDUCATION

ENVIRONMENTAL COORDINATOR
(INCLUDING ALTERNATE ENVIRONMENTAL COORDINATOR)

Job Description:	The Environmental Coordinator (EC) or Alternate EC is responsible for cleanup operations, including the selection of personnel, equipment and procedures. The EC is responsible for interacting with Federal, State or local environmental regulatory agencies, including reporting releases and spills, which could threaten human health or the environment, to those agencies. It is the responsibility of the EC to select appropriate cleanup techniques or technologies consistent with environmental laws and regulations. The EC will make all decisions on necessary storage and disposal of wastes generated during response and cleanup activities.
Education:	B.S. degree or equivalent experience. Will possess English language proficiency sufficient to perform all duties and assist in emergency management related to the facility.
Experience:	Minimum of 10 years of progressive experience in hazardous waste management, including field operations experience.
Medical:	No special qualifications required.
Equipment Used:	Available equipment at the OB/OD MTF and Fire Department.

OB/OD MTF PERSONNEL ROLES, RESPONSIBILITIES & EDUCATION

ENVIRONMENTAL TECHNICAL SUPPORT PERSONNEL

Job Description:	Works at the direction of the Environmental Sciences Chief or designee. Must be a citizen of the United States of America. Ensures compliance with all State, Federal, and DoD environmental rules, regulations, and laws during OB/OD MTF operations. Samples wastes and suspect environmental media for analysis when required. Ensures that all hazardous waste is properly marked, handled, manifested, and disposed of in accordance with regulatory requirements. Ensures compliance with permit conditions. Performs weekly, quarterly or other inspections of waste sites. Provides oversight for all hazardous waste-handling activities, including satellite and less-than-90-day waste storage areas. Must be able to stand for prolonged periods of time, endure ambient temperatures of >100° Fahrenheit, and < 40° Fahrenheit, and be physically capable of using a hand auger and/or shovel.
Education:	B.S. degree in Environmental Science, Biology, Chemistry, or Physical Science-related field or equivalent work experience. The Environmental Technical Support Personnel will possess English language skills sufficient to perform all duties related to the task.
Experience:	1 year of experience in environmental compliance and hazardous material/waste management.
Medical:	Annual completion of a physical examination for hazardous waste site workers as required by 29 CFR 120.f.
Equipment Used:	Computer, reference materials applicable to work, camera, inspection forms, surveyors tape, hand auger, soils and water sampling equipment, shovels, and a motor vehicle.

ATTACHMENT 12D

TRAINING COURSES FOR OB/OD MTF PERSONNEL

TRAINING COURSES FOR OB/OD MTF PERSONNEL

EMPLOYEE TRAINING DESCRIPTION

The Compliance Training Phase consists of individual courses that satisfy the requirements of 29 CFR (OSHA), 40 CFR (RCRA), 49 CFR (DOT), and Army Regulation 385-100. The courses consist of:

- Cardiopulmonary Resuscitation (CPR)
- First Aid (including Blood-Borne Pathogens)

- 24-Hour Treatment, Storage, and Disposal Facility (TSDF) Hazardous Waste Operations and Emergency Response (HAZWOPER) Initial Training [OSHA 1910.120(p)]
- 8-Hour TSDF HAZWOPER Annual Refresher

- HAZWOPER Supervisor/Manager Training

- Resource Conservation and Recovery Act (RCRA) Compliance/Hazardous Waste Management Initial Training
- RCRA Compliance/Hazardous Waste Management Annual Refresher

- Hazards Communication (HAZCOM)
- HM 181/126F (Hazardous Materials Transportation)

The ammunition recovery, OB/OD qualification training phase consist of the following courses:

- Ammunition Demilitarization

The site-specific training phase consists of the following:

- Forklift and Heavy Equipment Training
- Standard Operating Procedures (SOPs) Training
- Recordkeeping and Record Retention
- Heat Stress Training
- Fire Extinguisher Training
- Stormwater Management

The courses listed above are described in detail on the following pages.

TRAINING COURSES FOR OB/OD MTF PERSONNEL

Title: Cardiopulmonary Resuscitation (CPR)/Standard First Aid (including Blood-Borne Pathogens)

Length: 8 - Hours

Course Description: This course demonstrates emergency action principles for heart attack, CPR, choking, bleeding, and shock, burns, eye and nose injuries, bites and stings, fractures, splints, and poisonings.

Course Topics:

- Blood-borne pathogens
- Wounds
- Shock
- Artificial respiration
- Poisoning
- Burns
- Ill effects of heat and cold
- Bandaging
- Head injury
- Internal injury
- Gunshot wounds
- Infection
- Tetanus
- Animal bites
- Immobilization
- Heart attack
- Apoplexy
- Simple fainting
- Epilepsy
- Foreign objects in the eye
- Air passages
- Food passages
- Rescue and transfer
- One-rescuer CPR
- Obstructed airway
- Review

Pupil/Instructor ratio: 25: 1

Instructional Approach:

This course is taught by instructors certified by an accredited agency such as U.S. Army Medical Command, American Red Cross, or American Heart Association. Successful completion of a hands-on exam is required for a certificate of completion.

TRAINING COURSES FOR OB/OD MTF PERSONNEL

Title: 24-Hour Treatment, Storage, and Disposal Facility (TSDF) Hazardous Waste Operations and Emergency Response (HAZWOPER) Initial Training [OSHA 1910.120(p)]

Length: 24 - Hours

Course Description: Persons shall take the initial training course pursuant to 29 CFR 1910.120(p)(7) standards. The course(s) provided will meet the standards of Appendix E to 29 CFR 1910.120 "Training Curriculum Guidelines". A grade of 75% or better on a written proficiency exam is required at the end of the course.

Personnel are not certified to work until they have completed 8 hours of on-the-job hazardous waste work supervised and documented by a qualified person.

In addition, the person shall also meet the requirements of the medical surveillance program specified in 29 CFR 1910.120(p)(3).

The above training shall include hearing protection and as applicable respiratory training in accordance with 29 CFR 1910.134. (YPG 2004c, 1st NOD Part 4, RTC 63(7))

TRAINING COURSES FOR OB/OD MTF PERSONNEL

Title: 8-Hour TSDF HAZWOPER Annual Refresher

Length: 8 hours

Course Description: Persons shall take the initial training course pursuant to 29 CFR 1910.120(p)(7) standards. The course(s) provided will meet the standards of Appendix E to 29 CFR 1910.120 "Training Curriculum Guidelines". A grade of 75% or better on a written proficiency exam is required at the end of the course.

In addition, the person shall also meet the requirements of the medical surveillance program specified in 29 CFR 1910.120(p)(3).

The above training shall include hearing protection and as applicable respiratory training in accordance with 29 CFR 1910.134. (YPG 2004c, 1st NOD Part 4, RTC 63(7))

TRAINING COURSES FOR OB/OD MTF PERSONNEL

Title: TSDF HAZWOPER Supervisor/Manager Training

Length: Initial Training - As specified in 29 CFR 1910.120(e)(4).
Annual Refresher - As specified in 29 CFR 1910.120(e)(8).

Course Description: Onsite managers and supervisors shall take the initial training course and as applicable, the annual refresher training to maintain current to 29 CFR 1910.120(e)(4,8) standards. The initial training consists of coursework, supervised field experience, and specialized training. The annual refresher shall consist of coursework, including critique of any related incidents and other relevant topics. All courses provided will meet the standards of Appendix E to 29 CFR 1910.120 “Training Curriculum Guidelines”.

TRAINING COURSES FOR OB/OD MTF PERSONNEL

Title: RCRA Compliance/Hazardous Waste Management Initial Training (40 CFR 264.16)

Length: 1-8 hours, This course may be included with the HAZWOPER training at the direction of the Training Director.

Course Description: This course provides the trainee with an overview of waste management operations (normal and emergency) and the regulatory framework that governs these operations. It also describes facility- and job-specific policies and procedures, including roles and responsibilities, waste-handling practices, emergency response and contingency plans, communications and alarm systems, responses to hazardous waste releases, and shutdown of operations.

Course Topics:

a. Regulatory overview
- Overview of RCRA and Arizona Administrative Code rules
- Hazardous waste generators
- Treatment, storage, and disposal facilities (TSDFs)
- Land disposal restrictions
- Empty containers
- Enforcement actions

b. Waste handling operations at OB/OD Treatment Facility
- Operational overview
- Other hazardous waste management activities
- Roles and responsibilities
- Visual identification of PEP
- Hazardous waste management procedures
- Documentation requirements
- Hazardous Waste Manifests
- Sampling and analytical methods

c. Waste handling practices
- Waste minimization
- Waste characterization, sampling, and analysis
- Waste tracking and labeling
- Waste packaging
- Waste segregation
- Incompatibility of wastes
- Waste disposal
- Empty containers
- Permit requirements and any unique permit conditions
- Inspection requirements
- Record keeping and retention

Title: RCRA Compliance/Hazardous Waste Management Initial Training (continued)

d. Emergency response and contingency plan
- Regulatory requirements for emergency response
- What events trigger a response

e. Emergency planning overview
- OB/OD Treatment Facility Contingency Plan
- Incident classifications
- Proper emergency response activities
- Security procedures

f. Emergency equipment, systems, and response procedures
- Hazardous waste management emergency equipment
- Communications and alarm systems
- Emergency contacts
- Evacuation plan
- Fire response
- Explosion response
- Hazardous waste release response
- Groundwater and soil contamination response
- Shutdown of operations
- Temporary (less-than-90-day and satellite) waste storage areas
- Miscellaneous issues

Pupil/Instructor ratio: 25/1 maximum dependent on classroom and instructor

Instructional Approach:

This course is delivered via lecture using slides and other visual materials and equipment as necessary (for example, maps, containers, and labels) or by computer-based training. Exercises and other trainee activities are incorporated to help ensure learning of material. A grade of 75% or better on the written examination is required for certification.

TRAINING COURSES FOR OB/OD MTF PERSONNEL

Title: RCRA Compliance/Hazardous Waste Management Annual Refresher (40 CFR 264.16)

Length: 1 - 4 hours. This course may be included with the HAZWOPER refresher training at the direction of the Training Director.

Course Description: This course provides a review of normal emergency operations of OB/OD Treatment Facility waste management activities and the regulatory framework that governs these operations, which was provided in the introductory course. As such, it will review the same topics as the introductory course with an emphasis on new or modified regulations and their impacts on operations, any new or modified operations and procedures, and a review of any incidents during the previous year and preventive solutions.

Course Topics:

a. Regulatory overview
- Review of RCRA and Arizona hazardous waste regulations
- Hazardous waste generators
- TSDFs
- Land disposal restrictions
- Empty containers
- Regulatory update
- Visual identification of PEP

b. Review of waste handling operations at OB/OD Treatment Facility
- Operational overview
- Other hazardous waste management activities
- Roles and responsibilities
- Hazardous waste management procedures
- Documentation requirements
- Effects of regulatory changes

c. Waste handling practices
- Waste minimization
- Waste characterization, sampling, and analysis
- Waste tracking and labeling
- Waste packaging
- Waste segregation
- Waste disposal
- Empty containers
- Inspection of scrap for residuals
- Waste incompatibility provisions
- Ignitability precautions

Title: RCRA Compliance/Hazardous Waste Management Annual Refresher (40 CFR 264.16) (Continued)

d. Emergency response and contingency plans
- Regulatory requirements for emergency response
- What events trigger a response

e. Emergency planning overview
- U.S. Army Garrison Yuma Integrated Contingency Plan
- Incident classifications
- Proper emergency response activities

f. Emergency equipment, systems, and response procedures
- Emergency equipment
- Communications and alarm systems
- Emergency contacts
- Evacuation plan
- Fire response
- Explosion response
- Hazardous waste release response
- Soil and groundwater contamination response
- Shutdown of operations
- Temporary (less-than-90-day and satellite) waste storage areas
- Miscellaneous issues

g. Review of incidents
- Descriptions
- Actions taken
- Preventive solutions

Instructional Approach:

This course is delivered via lecture using slides and other visual materials and equipment as necessary (for example, maps, containers, and labels) or by computer-based training. Exercises and other trainee activities are incorporated to help ensure learning of the material.

TRAINING COURSES FOR OB/OD MTF PERSONNEL

Title: Hazard Communication (HAZCOM) Training (29 CFR 1910.1200, 40 CFR 311.1, 49 CFR 172.700)

Length: 0.25 - 1 hour

Course Description: This course familiarizes employees with hazards and chemicals they could be exposed to at the work site. It specifically addresses chemicals that will be encountered during OB/OD Treatment Facility operations.

Course Topics:

- OSHA overview
- Container labeling
- Warning
- Material Safety Data Sheets (MSDSs)
- Protective measures
- Medical effects and potential routes of exposure
- Chemical and physical properties of chemical agents and industrial chemicals

Instructional Approach:

This course is taught by lecture using slides and other visual materials and equipment, as necessary, or by computer-based training.

TRAINING COURSES FOR OB/OD MTF PERSONNEL

Title: Hazardous Materials Transportation (49 CFR 172.700)

Length: 0.5 - 8 hours. This course may be included with the HAZWOPER refresher training at the direction of the Training Director.

Course Description: This course will provide training to personnel on all aspects of hazardous waste transportation appropriate to their duties.

Course Topics:

- Shipping papers
- Labeling
- Packaging and marking
- Loading and storage techniques
- Placarding
- Material Safety Data Sheets
- Hazardous Material Incident Reports
- Decontamination

Instructional Approach:

This course is taught via lecture utilizing instructional aides, as applicable and necessary (for example, equipment, labels), or by computer-based training.

TRAINING COURSES FOR OB/OD MTF PERSONNEL

Title: Ammunition Demilitarization (AMMO-45) in accordance with AMC-R 350-4 or CANTRAC Explosive Ordnance Disposal Basic

Course Description: These courses provide training for ammunition personnel in the various methods, techniques, and procedures for performing ammunition demilitarization with emphasis on open burning and open detonation operations. Either course will train personnel in accordance with U.S. Army regulations. The school is sanctioned at the Department of Defense (DOD) level and will follow the DOD curriculum and instructional requirements.

For additional information on these courses, see Permit Attachment 12E (CANTRAC Explosive Ordnance Disposal Basic Training) and Permit Attachment 12F (U.S. Army Material Command Regulation 350-4, Training and Certification Program for Personnel Working in Ammunition Operations).

Course Topics:

- Use of publications
- Applied physical principles
- Explosives and explosive effects
- Safety precautions
- Storage, handling, and transportation of explosives
- Explosive Ordnance Disposal (EOD) tools and equipment maintenance
- Basics of demolition
- Placed, projected, and dropped munitions and associated fuses
- Aircraft explosive hazards and guided missiles
- Inspection procedures for recyclable materials
- Standing Operating Procedures

Instructional Approach:

This course is taught via lecture utilizing instructional aides as applicable and necessary. It includes hands-on setup and initiation of demolition charges used to detonate unserviceable munitions.

TRAINING COURSES FOR OB/OD MTF PERSONNEL

Title: Forklift and Heavy Equipment Training

Length: 2 - 6 hours depending on the equipment and pupils' prior experience.

Course Description: This course covers the subject material for those employees required to operate and maintain power trucks (forklifts) and heavy equipment. This course is not required for occasional workers employed and certified by another employer or division. Equipment that may be used by Lead ORTs or ORTs at the facility includes:

- Forklifts
- Backhoes
- Bulldozers
- Tractors

Course Topics:

- Equipment-specific features
- Safety
- Fuel handling
- Emergency procedures
- Fundamentals of operation
- Acceptable traffic patterns at the OB/OD facility
- Loading/unloading of equipment
- Parking locations (temporary and overnight)

Instructional Approach:

This course is taught by Master Trainers registered with the U.S. Army Garrison Yuma Licensing Clerk (motor pool) via lecture and practical exercise. Workers will be trained on the specific piece(s) of heavy equipment used in their job duties. A driving test is administered to determine the ability to operate the vehicle in its intended fashion.

There are no certification standards for heavy equipment training other than crane operators. There is no standard written proficiency exam. Further, MHE or heavy equipment operators are not required to have a commercial driver license (CDL) unless they travel on a public roadway. However, the U.S. DoD has an extensive training and licensing program for operation of heavy equipment and material handling equipment (MHE). (YPG 2004c, 1st NOD Part 4, RTC 58, 61, and 65).

TRAINING COURSES FOR OB/OD MTF PERSONNEL

Title: Other Site-Specific Training

Course Description: This course will train personnel in the requirements specific to the U.S. Army Garrison Yuma as well as specific information needed to function safely and effectively while onsite at the U.S. Army Garrison Yuma installation. Each topic is a separate class.

Pupil/Instructor ratio: Varies depending on class size and subject. Fire extinguisher training will be 5/1.

Topics:

- Standing Operating Procedures
- Recordkeeping and Record Retention
- Heat Stress
- Portable fire extinguisher training and education
- Stormwater Management

Instructional Approach:

This course is taught via lecture using overhead slides, videotapes, handouts, demonstrations, and class questions and answers. Components of this material can be taught at the discretion of the Training Director during annual, monthly, or daily briefings with documentation of attendance and the material presented retained in training files.

ARIZONA HAZARDOUS WASTE MANAGEMENT PERMIT

EPA I.D. NO. AZ5213820991

U.S. ARMY GARRISON YUMA PROVING GROUND

PERMIT ATTACHMENT 13

QUALITY ASSURANCE PROJECT PLAN

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ATTACHMENTS

QUALITY ASSURANCE PROJECT PLAN

13.1 PROJECT MANAGEMENT

13.1.1 Project Organization

The U.S. Army Garrison Yuma Proving Ground (USAGYPG) operates the Open Burn/Open Detonation Munitions Treatment Facility (OB/OD MTF) at the USAGYPG military installation as a Resource Conservation and Recovery Act (RCRA) permitted treatment facility in accordance with A.A.C. R18-8-264.A and 40 CFR 264. The Environmental Sciences Directorate (ESD) will conduct waste sampling required to characterize waste treatment residues generated at the facility and assign duties to appropriate personnel as required. The purpose of this Quality Assurance Project Plan (QAPP) is to provide quality assurance structure for the characterization of waste treatment residues at the OB/OD MTF. This Plan also applies to characterization of the wastes resulting from the management of contingencies and from closure activities and to potentially contaminated soils that are to be left in place at the OB/OD MTF. The Project Supervisor is charged with the task of managing activities related to waste sampling actions, including the activities described in this QAPP. This QAPP was prepared in accordance with EPA publication QA/R-5. The project organizational structure is shown in Permit Attachment 13A, Figure 13A-1. The objective of this action will be to comply with Federal and State regulations and to obtain approval to operate from the ADEQ.

13.1.1.1 U.S. Army Garrison Yuma Proving Ground Environmental Sciences Director

The USAGYPG ESD Chief serves as the point of contact for the Garrison Commander who is the owner/operator of the facility for the U.S. government. This person is responsible for the review and approval of this QAPP.

The ESD Chief will evaluate project changes and nonconformance with the QAPP. The ESD Chief will oversee the implementation of the RCRA permit and ensure that all project documentation is maintained in accordance with A.A.C. R18-8-264.A (40 CFR 264.73 and 264.74). The ESD Chief will assign roles and work orders for positions including the Quality Assurance Manager and the Sampling Team. Personnel will be assigned as appropriate to perform duties in accordance with this QAPP. The ESD Chief will be responsible for ensuring that appropriate data are provided to State and Federal regulatory agencies as stipulated by the RCRA permit. Monitoring staff will be assigned to monitor the data-gathering activities related to OB/OD and to ensure compliance with environmental requirements. External quality assurance (QA) audits and surveillances, either announced or unannounced, will be conducted by the QA Supervisor as required. The QA Supervisor will be independent of the sampling team and all other sampling personnel. Additional external audits or surveillances will be conducted by other qualified organizations as requested by the ESD Director. All documents and data produced by the laboratories will be eligible for inspection. The environmental regulatory agencies will have access to these data to ensure that OB/OD MTF personnel are complying with permit requirements as they pertain to waste characterization and disposal operations.

13.1.1.2 Quality Assurance Manager

The QA Manager is responsible for the Quality Assurance/Quality Control (QA/QC) program for this project. The QA Manager will be an employee or subcontractor that is not directly involved in other work at the USAGYPG facility. The QA Manager is responsible for evaluating the project work for conformance with quality assurance elements of this QAPP. The QA Manager will review all field and lab data, ensuring that chemical data are validated in accordance with procedures identified in this QAPP. The QA Manager is responsible for overseeing the review of all field data for accuracy, completeness, and reasonableness, for overseeing the validation of analytical data and for transmitting validated data to the ESD Director. Permit Attachment 13 Section 13.1.6 provides qualification requirements.

13.1.1.3 Sampling Field Team

The USAGYPG ESD will supply (or contract) a Sampling Field Team. This group will provide a team to perform all field-sampling operations and the associated field duties. The Sampling Field Team will collect and document samples in accordance with this QAPP and the Waste Analysis Plan (WAP) (Permit Attachment 3). The Sampling Field Team will support preparation of the Sampling Reports based on the analytical data as directed by the ESD Chief. Permit Attachment 13 Section 13.1.6 provides qualification requirements.

13.1.1.3.1 Project Supervisor

The Project Supervisor (PS) is responsible for interfacing with the ESD Chief during all phases of the work, including reporting of any identified variances and non-conformance. The PS will act as the Field Team Leader (FTL) and provide technical guidance to the field team as needed. At the conclusion of the work, the PS will assist in preparation of the Sampling Report.

The PS will also coordinate and oversee the sampling activities and ensure that the sampling team meets the applicable requirements of this plan. The sampling oversight task includes the items listed below:

- Obtain sampling equipment and supplies;
- Supervise the collection of samples;
- Supervise the packing and shipping of samples;
- Check field documentation;
- Ensure that all sample control notation is completed accurately prior to transfer of samples to the laboratory;

- Track sample and analytical data status; coordinate with the QA Manager on any issues concerning data quality and completeness;
- Communicate problems, variances, and non-conformance to the ESD Director; and
- Interface and cooperate with the OB/OD operators to obtain OB/OD facility access, and coordinate sampling event scheduling.

Permit Attachment 13 Section 13.1.6 provides qualification requirements.

13.1.1.3.2 Sampling Technicians

Under the direction of the PS, the Sampling Technician(s) will collect and package samples consistent with the QAPP and WAP (Permit Attachment 3). The technicians will assist in preparing sample control documentation for the samples. Permit Attachment 13 Section 13.1.6 provides qualification requirements.

13.1.1.4 Ordnance Recovery Team

The Ordnance Recovery Team is comprised of lead, senior, and junior technicians from the Ammunition Recovery Branch. Junior and senior technicians are referred to as Ordnance Recovery Technicians (ORTs). The Lead ORT is responsible for ORTs who provide safety (avoidance) clearance at each location in conjunction with procedures described in the work plan, mostly by performing a visual clearance in advance of any fieldwork. Permit Attachment 13 Section 13.1.6 provides qualification requirements.

13.1.1.5 Contract Laboratory

Each analytical laboratory providing analytical services for this project will be certified by the Arizona Department of Health Services (ADHS) for the performance of the analyses described in this QAPP. Permit Attachment 13 Section 13.1.1.5 describes responsibilities of the laboratories (referred to in this document as the Contract Laboratory even though more than one laboratory may be involved). Duplicates will be sent for analyses to a second laboratory certified by ADHS for each method and each constituent stated herein. The labs will be required to maintain confidentiality for all tests, as indicated by each laboratory manager that acknowledges receipt of this plan and states that the lab will adhere to the procedures in this plan (see Permit Attachment 13, Permit Attachment 13H).

The Contract Laboratory will designate a Project Manager who will report directly to the ESD Chief or designee. The Laboratory Project Manager will be responsible for managing laboratory operations to provide services necessary to satisfy the requirements described in the QAPP and associated WAP (Permit Attachment 3).

The Contract Laboratory is responsible for performing chemical analyses requested by the ESD Chief. The Contract Analytical Laboratory will perform all analyses in accordance with contract requirements and federal, state, and local guidelines, using EPA-approved or other standard, approved analytical methods. The QA Manager for the Contract Laboratory will verify that the laboratory maintains documentation of sample handling, custody information, analytical data, and internal QC data. Additionally, the QA Manager will verify that the Contract Laboratory analyzes QC samples as indicators of analytical accuracy and precision in accordance with the requirements of this plan, method requirements, and internal laboratory quality assurance program requirements. The Contract Laboratory will report results from analysis of environmental and QC samples as requested by the ESD Chief.

13.1.1.5.1 Contract Laboratory Project Manager

Ensures laboratory resources are available, reviews final analytical reports produced by the laboratory, reviews and approves QAPP, coordinates scheduling of laboratory analyses, and supervises in-house chain-of-custody procedures.

13.1.1.5.2 Contract Laboratory Director

Oversees data review and preparation of analytical reports, and allocates the appropriate laboratory resources to meet project goals.

13.1.1.5.3 Laboratory QA Officer

Maintains laboratory QA procedures and QA/QC documentation. Conducts periodic internal laboratory audits and recommends corrective actions when necessary. Reviews and provides comment on the QAPP. The contract laboratory QA Officer (or Laboratory Director) shall submit a page to the USAGYPG stating that the QA Officer (or Laboratory Director) has reviewed this QAPP, found it acceptable, and that the laboratory will comply with its requirements. This page will be submitted by the USAGYPG to ADEQ as part of the subcontracting documents.

13.1.1.6 Arizona Department of Environmental Quality

The USAGYPG ESD team anticipates that the ADEQ will assign an individual, or individuals, to evaluate compliance with the USAGYPG RCRA permit. ADEQ personnel will assist in interfacing with EPA programs and requirements. Data generated and validated as described in the QAPP will be available to ADEQ personnel upon request as part of the OB/OD MTF operating record. This team will consist of the following members:

13.1.1.6.1 ADEQ Project Manager

Has overall responsibility for the direction of the scope of work to be performed for waste sampling and analysis actions. Provides final review and approval of documents, reports, plans, schedules, and other communications submitted pursuant to a Task Assignment. Provides coordination of the overall program, and provides consultant overview and direction.

13.1.1.6.2 ADEQ Project QA Officer

Responsible for review of quality assurance documents submitted pursuant to a Task Assignment. Provides comments and recommendations to the ADEQ Project Manager regarding appropriate methodologies, reporting limits, sampling and preservation techniques, Data Quality Objectives, and other chemistry- and laboratory-related issues. Performs data validation tasks or assigns and supervises ADEQ data validation tasks as requested by ADEQ Project Manager.

13.1.2 Problem Definition

The primary purposes of this QAPP are as follows:

1. The adequate characterization of waste to be shipped from the OB/OD facility during normal operations (e.g., ash and accumulated precipitation), in response to contingency plan implementation (e.g., contaminated soil) (Permit Attachment 10), and for closure-generated waste (e.g., treatment residues, contaminated equipment).

2. The adequate characterization of potentially contaminated soils for verification they can be left in place or, conversely, that they must be removed or treated. Soil characterization needs may also be applicable to normal operations (e.g., periodic sampling of OD pit soils), as well as for contingency plan implementation and closure where soil removal might be necessary.

This QAPP describes (or references) the sampling and testing methods that will be employed to document the presence or absence of hazardous constituents in wastes generated from OB/OD MTF activities or in soils potentially contaminated by those activities.

13.1.3 Project Description

Samples collected and managed per this QAPP fall under two primary categories: (1) sampling to support waste management; and (2) sampling to support in-place soil verification. The types of samples anticipated under each category are described in this Section.

13.1.3.1 Sampling to Support Waste Management

Samples of waste generated at the OB/OD MTF will be analyzed for hazardous constituents to determine the proper management of these waste materials. The sampling modes anticipated for the sampling and analysis program include the following:

- Waste ash sampling from the OB units. Waste ash sampling will be conducted on the ash and debris resulting from the burning of waste propellants and following the collection of such materials from the cleanup of the OB pans and pads.

- Liquid sampling from precipitation collected in sumps/drains. Rainwater will be sampled following rain events where there is sufficient accumulation to permit adequate representative samples to be collected.

- Soil sampling from excavated soil or from in-place soil targeted for removal. Soil sampling can support either disposal requirements or verification that it can be left in place, but in general, verification for leaving soil in-place is the more rigorous standard (see description of in-place soil characterization sampling below).

- Liquid or solids sampling of decontamination residues generated during closure actions.

Though less likely than the sampling described above, there is also potential that waste generated from sampling actions and miscellaneous closure-generated waste (including facility structures and equipment) may have to be sampled.

13.1.3.2 Sampling to Support In-Place Soil Verification

Soil samples will be collected to provide verification that soil can be left in-place without significant adverse impact to human health or the environment. Correspondingly, these soil samples may also be used to determine if soil removal actions are needed or if soil removal actions already completed are adequate. Results from these soil samples may also be used to determine appropriate disposal methods for removed soils as described in Permit Attachment 13 Section 13.1.3.1. The reverse may not be true because the list of parameters considered (or analyzed for) in the verification sampling is more extensive than that necessary for a hazardous waste determination.

13.1.4 Quality Objectives and Data Criteria

Data quality objectives (DQOs) are qualitative and quantitative statements developed by data users to specify the nature and quality of data needed from a particular activity. The EPA provides the basis for developing the DQOs. The process provides a systematic approach for defining the criteria that a data collection design should satisfy. The DQOs developed for the operation of the OB/OD Facility are summarized in this section.

The DQOs are the standards against which the data generated by a sampling effort can be evaluated. The DQOs for waste and soil sampling and associated data analyses include, but are not limited to:

- Determining if waste samples are representative of the wastes at the time the samples were taken;

- Sufficiently characterizing wastes that will be sent offsite to an approved HW TSDF;

- Determine if soil samples are representative of the soil area being investigated;
- Sufficiently characterize soil remaining at the OB/OD MTF to determine whether it is safe to human health and the environment; and
- Ensuring laboratory analytical results can be validated

13.1.4.1 Problem Statement

The first step in the DQO process is to clearly state the problem to be addressed in the context of OB/OD waste characterization and soil verification activities. The problem statement for this action is broken into primary and secondary issues.

13.1.4.1.1 Waste Characterization Problem Statement

Primary – A determination needs to be made as to whether OB/OD treatment residuals, collected precipitation, removed soils, and closure-generated wastes contain potentially hazardous constituents in sufficiently high concentrations to require their management as hazardous waste.

Secondary (hazardous) – require sufficient characterization information to meet the needs of the receiving TSDF, including such information as concentrations of underlying hazardous constituents.

13.1.4.1.2 Soil Verification Problem Statement

Primary – A determination needs to be made as to whether soils (in-place) at the OB/OD MTF contain potentially hazardous constituents and, if present, whether they are at concentrations below established action levels.

Secondary – In-place soils determined or assumed to contain hazardous constituents above action levels require sufficient characterization information to support expected requirements for treatment or removal with subsequent management as waste.

13.1.4.2 Decision

The second step in the DQO process is to identify the key question that the study hopes to answer and the alternate actions that might be taken depending on the answer to the key question. The key questions that waste characterization and soil verification attempt to address are:

Waste Characterization – Does waste generated from treatment processes at the OB/OD MTF, precipitation collected in burn pad sumps, soil removal actions, or closure qualify as hazardous waste under 40 CFR 260 et seq.?

Soil Verification – Does in-place soil, potentially contaminated by OB/OD MTF operations, contain hazardous constituents in excess of established action levels?

The alternate actions that may be taken upon resolution of the key question are as follows:

Waste Characterization

- If solid treatment residues collected from the OB/OD MTF do not qualify as hazardous waste based on laboratory analysis of representative samples, the waste residues will be disposed as solid waste in the USAGYPG landfill;

- If solid treatment residues collected from the OB/OD MTF do qualify as hazardous waste, they will be shipped to a licensed/permitted offsite TSDF for treatment, as appropriate, and disposal;

- If, based on laboratory analysis of representative samples, precipitation collected in burn pad sumps or retention basins do not qualify as hazardous waste, it will be evaluated/considered for use in dust suppression applications or may be allowed to evaporate;

- If precipitation collected in burn pad sumps either qualifies as hazardous waste or exceeds aquatic and wildlife standards, it will be shipped to a licensed/permitted offsite TSDF for treatment and disposal;

- If soil removed from the OB/OD MTF or waste (treatment residues, equipment, etc.) generated from its closure does not qualify as hazardous waste based on laboratory analysis of representative samples, the waste materials will be disposed as non-hazardous waste; or

- If soil removed from the OB/OD MTF or waste (treatment residues, equipment, etc.) generated from its closure does qualify as hazardous waste, it will be shipped to a licensed/permitted offsite TSDF for treatment as appropriate, and disposal.

Soil Verification

- If in-place soil, potentially contaminated by OB/OD MTF operations, does not exceed action levels based on laboratory analysis of representative samples, the soil will be left in-place; or

- If in-place soil, potentially contaminated by OB/OD MTF operations, exceeds any of the COPC action levels based on laboratory analysis of representative samples, the soil will be removed or otherwise remediated.

13.1.4.3 Decision Inputs

The third step of the DQO process is to identify the kind of information that is needed to resolve the decision statement and potential sources for that information. The informational inputs needed to resolve the decision statement in Permit Attachment 13 Section 13.1.4.2:

- Analytical laboratory data regarding the presence of hazardous constituents in the waste residues generated at the OB/OD MTF, in the precipitation collected on the OB pads, in closure-generated waste, and in removed or in-place soils. This data will be generated through sampling and analysis.

- Historical data on the composition of the propellant, explosive, and pyrotechnic (PEP) materials managed at the OB/OD facility in order to specify the analytical methods to be used in sample analysis. These data are available in records and process knowledge of waste materials treated in the OB/OD MTF and manufacturer or Army data on the chemical makeup of those materials. The most common PEP wastes treated at the OB/OD MTF are listed in Permit Attachment 4.

- Action levels are needed for comparison to analytical results to determine if detected constituents are present at levels of concern. Action levels will be established through use of regulatory thresholds such as hazardous waste toxicity characteristic levels.

13.1.4.4 Study Boundaries

This study is limited to the OB/OD MTF boundaries, as defined in Permit Attachment 2. The site fence defines these boundaries. The study boundary is further limited to treatment residue collected from OB burn pads, precipitation falling on burn pads and collected in burn pad sumps, soils potentially contaminated by OB/OD activities, and waste generated during actions to close the facility’s treatment units.

13.1.4.5 Decision Rule

The fourth step in the DQO process is defining the parameters or constituents to be included in the characterization effort, the action levels that will be used for comparison to the analytical results, and the manner in which the comparison will be made. The goal of this step is the development of “if-then” statements that describe the action or actions to be taken if one or more conditions are met. Each element of the decision rule step is discussed in the following paragraphs.

Constituents of Concern and Action Levels – The basis for development of the decision rule (that is, the basis for the “if-then” statements) is presented in the WAP (Permit Attachment 3) and will not be repeated here. The WAP describes the development of the list of COPCs associated with the OB/OD MTF and the analytical methods available to address those constituents. In the case of the waste characterization actions, the WAP also presents the COPCs and, as appropriate, waste characteristics that must be considered in sample analyses to determine if the waste qualifies as hazardous. In the case of soil verification samples, the WAP presents the various action levels [such as soil remediation levels (SRLs)] associated with the COPCs and the specific analyses that must be performed on the soil samples to determine if action levels are met.

Decision Rule ("if-then") Statements – Decision rules are developed by applying analytical results on COPCs and action level criteria as follows:

Waste Characterization:

- If any of the hazardous waste COPCs are detected at concentrations above the applicable regulatory limit, then the waste (treatment residue, accumulated precipitation, removed soil, or closure-generated waste) is to be considered hazardous with the appropriate hazardous waste code(s); or

- If any of the UHC COPCs are detected, then characterization information developed for the waste must include whether they meet the applicable treatment standards.

Soil Verification:

- If any of the action levels associated with soils to be left in place are exceeded, the applicable soil must be removed for off-site disposal or otherwise remediated.

13.1.4.6 Decision Error

The sixth step in the DQO process is recognizing sources of possible error and their potential outcome and establishing tolerable limits on those errors. Because measurement data from sampling and analysis can only estimate true values, there is a possibility that decisions based on measurement results will be in error. Decision errors can be attributed to either sampling error or measurement error. Sampling error occurs when incorrect sampling fails to adequately represent the true environment. Measurement error occurs when combinations of random or systematic errors inaccurately represent the true values. Decision errors can be classified into false positive or false negative errors. The consequences of making either type of decision error when performing sampling and analysis of OB treatment residues or accumulated precipitation are discussed below.

A false positive decision error will result if sample results indicate that hazardous waste constituent levels are above the decision rule criteria when the true value is below the criteria or, for potentially contaminated soil, the COPCs are above action levels when their true values are not. The consequence of this error will be unnecessary expense and precautions of disposing of the sampled material as hazardous waste rather than as solid waste or removing and disposing of soils rather than leaving it in-place.

False positive errors will be controlled through adherence to sampling procedures and use of laboratory control samples. In the case of wastes, they are generally generated at a slow rate and batches or containers are sampled before being sent to disposal. Therefore, any single false positive decision error would likely involve a relatively small amount of waste. In the case of soil verification efforts, a false positive decision error could potentially affect large volumes of soil. As a result, additional sampling may become necessary to better define hot spots or to rule out false positive detections.

A false negative error will result if sampling and analysis fail to indicate hazardous waste or soil constituent levels above the decision rule criteria when the true value is above the criteria. The consequences of a false negative decision error are possible threats to human health or the environment through mismanagement (improper handling and disposal) of a hazardous waste or contaminated soil.

The potential for false negative errors will be minimized through adherence to sampling procedures designed to obtain representative samples and use of laboratory performance criteria. As described above, any false negative decision error dealing with waste characterization would likely involve a relatively small amount of waste.

13.1.4.7 Design Optimization

The seventh and final step in the DQO process is optimizing the design for obtaining the data. The design of the sampling and analysis effort is discussed in detail in Permit Attachment 13 Section 13.2.

13.1.5 Data Quality Indicators

The key indicators of data quality (DQIs) are precision, bias, accuracy, representativeness, comparability, completeness, and sensitivity. These DQIs are defined in Permit Attachment 13B, Table 13B-1 with methods for their determination.

13.1.6 Training and Certification

For this work, USAGYPG will utilize appropriately trained personnel with adequate experience or supervision based on the assignment. The personnel may be directly employed by the contractor, the USAGYPG, or by its subcontractors depending on project requirements. All personnel will fully understand the assignment, the specific protocols to be used, and the potential hazards of the site. Permit Attachment 13B, Table 13B-2 summarizes the minimum training and qualifications of key personnel assigned to the project. The contractor or the USAGYPG at any time may rotate or replace personnel based on field requirements. All personnel assigned will be noted in the master project logs, which are retained in the operating record upon project completion.

Occupational Safety and Health Administration (OSHA) regulations covering Hazardous Waste Operations and Emergency Response require training of all site personnel in accordance with the standard. At a minimum, all personnel are required to be trained to recognize on-site hazards.

Before arrival on site, each employer will be responsible for certifying that his/her employees meet the requirements of pre-assignment training, consistent with OSHA 29 CFR § 1910.120(p). The employer will provide a document certifying that each general site worker has received 24 hours of instruction off the site. If an individual employee has work experience and/or training that is equivalent to that provided in the initial training, an employer may waive the 24-hour training [29 CFR § 1910.120(p)]. All personnel must also receive 8 hours of refresher training annually.

The training and experience noted above represents the minimum required and may be modified during the execution of this project. All waivers of the standard will be retained in the project files and noted in the final report.

13.1.7 Documents and Records

Every operation performed on site will be noted in a field logbook to establish field and legal documentation of each condition, activity, or involved personnel that may affect the project outcome or conclusions. The logbook will be completed in accordance with the ESD operating procedures

At the conclusion of the each operation described in this QAPP and associated WAP (Permit Attachment 3), a sampling report will be prepared detailing the results of this investigation relative to the performance standards described herein. The report will be prepared under the direction of the QA Manager. The ESD Chief and other USAGYPG personnel will review a draft copy of the report as necessary. The ESD Chief will approve the final version for entry into the operating record.

The Ammunition Management Division at the USAGYPG installation will maintain the OB/OD operating record to include the documents and records generated under this QAPP. All documents and records generated under this QAPP will be maintained through closure of the OB/OD MTF and will be dispositioned thereafter in accordance with requirements applicable to the closure approach implemented. The OB/OD operating record will be made available to ADEQ or other agencies upon request. Access to, retrieval from, and photocopying of archive information will be managed by ESD.

The report will include:

- A complete description of the field and sampling effort;
- A description of field observations and data collected during field activities;

- A map showing all topographic features, unit boundaries, project benchmarks, and for soil samples, the tape rule measurements for each soil sample location from the two benchmarks at each site, and the resulting location of the soil sample;

- Figures showing sample locations relative to project benchmarks;

- A description and photos, drawings, and sketches of all staining, distressed vegetation, and DMM found during project;

- summary tables of locations sampled, including tabulated sample ID, sample depth interval, sample soils type; and sample results (no detection samples will be presented as < numerical reporting value);

- Manifest and Land Disposal Restriction forms documenting hazardous waste disposal (if required);

- A summary of all deviations to the approved plan;

- Telephone and correspondence logs pertinent to the project;

- Laboratory reports;

- Recommendations for further evaluation or corrective actions, as needed; and

- Other information necessary to document characterization activities and conclusions derived from their results.

Active computer files will be stored on a server, which is backed up on a routine basis. The server is a secure system allowing only specific persons access to the portions of the main computer area that they need. The records will be retained until ultimate closure of the OB/OD facility is completed. Then these records will be stored with the facility closure records for their required retention period.

13.2 DATA GENERATION AND ACQUISITION

13.2.1 Sampling Process Design

Samples will be collected under a formal sampling process design. The sampling process design will present the general criteria for when (at what frequency or under what operational conditions) and how samples will be collected. For routine, recurring sampling, the sampling process design is documented in the WAP (Permit Attachment 3); for other types of sampling addressed by this QAPP, the formal sampling process design is either in the WAP or it will be documented in an action-specific sampling and analysis plan (SAP) developed before the sampling occurs.

13.2.2 Sampling Methods

Sampling, decontamination, and waste management methods needed to implement the sampling design (as described in the preceding section) will be performed in accordance with a formal plans and/or procedures. As with the sampling design, sampling methods for the characterization of routine, recurring waste streams are presented in the WAP (Permit Attachment 3). Sampling methods not included in the WAP will be documented either in procedures or in action-specific SAPs developed before the sampling occurs.

13.2.3 Sample Handling and Custody

Sample collection and custody records will be maintained to document the integrity of samples from the time of collection until the data is reported. All documentation will be legible, identifiable and recorded in permanent ink. Field personnel will complete field documentation in the Field Logbook at the job site, during, or immediately after sample collection. Errors on forms will be corrected by drawing a single line through the error such that the original text remains legible, and the correct information is entered along with the date and the person's initials. The following paragraphs briefly describe each component of the sample control and documentation process

13.2.3.1 Sample Identification Numbers

Each sample will be identified using a unique sample numbering system. The numbers shall adhere to the standard format established and used by the sampling organization at the time of the sampling event. The unique sample numbering system is used to track each sample through the entire process and ensure samples are not switched accidentally.

13.2.3.2 Sample Labels

All sample labeling operations will be in accordance with in the WAP (Permit Attachment 3).

13.2.3.3 Sample Collection Log

Field logbooks are standardized at the USAGYPG installation. The sampling team will record pertinent sample collection information for each sample. The information will be included in a field logbook. The log will be completed at the time of collection. The log will become part of the permanent record describing sample collection conditions and the disposition of the sample. Sample collection documentation may be supplemented with log sheets to record additional sampling details not entered in the logbook. Copies of the log and log sheets will be transferred to the operating record.

13.2.3.4 Temperature Blank

A temperature blank will be included with each shipment of samples.

13.2.3.5 Chain of Custody Records

A chain of custody record will be maintained from the time of collecting the sample to final disposition. Every transfer of custody will be noted and signed for. When samples are not under direct control of the individual responsible for them, the samples will be stored in a secure area.

13.2.3.6 Custody during Sampling, Storage, Packaging, and Shipping

Sealed containers will be placed in plastic coolers in the field immediately after sampling. The coolers shall be padded with absorbent material and their contents preserved with ice.

Samples will be stored in coolers during field sampling operations, in custody of the sampler. At the end of the day, or other appropriate intervals, the coolers will be transported to the office or other field laboratory locations as appropriate for shipping preparation or field screening. An internal Chain of Custody Record will accompany samples providing an unbroken chain of documentation for those samples. When transferring samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents sample custody transfer and identification.

Samples will be packaged properly for shipment and dispatched to the appropriate laboratory for analysis, with a separate Chain of Custody Record accompanying each shipment (one for each cooler or container). Shipping containers are to be sealed for shipment to the laboratory. The method of shipment, courier name(s), and other pertinent information will be entered in the "Remarks" section of the Chain of Custody Record. The original record will accompany the shipment, and a copy is to be retained by the PS. Freight bills, Postal Service receipts, and bills of lading will be retained as part of the permanent documentation.

All samples will be managed in accordance with A.A.C. R18-8-261.A [40 CFR 261.4(d)], for the exemptions from Hazardous Waste designation until the samples are of no analytical value.

13.2.3.7 Custody Seals

Custody seals will be affixed, immediately after packing, to each sample cooler intended for shipment to the analytical laboratory. Custody seals will be initialed and dated by a member of the sampling team. Upon receipt, the laboratory will document the condition of the samples, including custody seal condition.

13.2.3.8 Investigation–Derived Waste Management

All investigation-derived waste (IDW) will be managed in accordance with in the WAP (Permit Attachment 3).

13.2.3.9 Sample Receipt and Verification

Immediately after the samples have been received and their condition evaluated the laboratory will send to the USAGYPG by fax or e-mail a report of sample condition. This report will identify the samples received and contain a statement regarding each of the following: 1) Sample packaging, 2) Sample breakage, 3) Temperature blank reading, 4) Acceptability of samples for subsequent analysis.

13.2.4 Analytical Methods

Laboratory analyses will utilize EPA analytical methods including those published in Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846 as amended) as well as other Method Manuals (for Methods 314, 353.2, and 353.3) and laboratory specific methods for example (nitrocellulose, and the DI water extraction for perchlorates). Analytical procedures will follow established laboratory standard operating procedures (SOP) based on the referenced EPA method. In the event some unusual analyte cannot be evaluated through EPA methods, standardized methods published by other groups or agencies or, if necessary, even laboratory specific methods will be pursued. Analytical methods associated with OB/OD MTF COPCs are presented in the WAP (Permit Attachment 3). Analytical procedures will follow established laboratory standard operating procedures (SOPs) based on the referenced EPA (or other) method. The WAP also identifies the minimum requirements for sample size, container type, and holding times associated with the analytical methods to be used in sampling. The Laboratory will comply with requirements specified in ADEQ Policy 0154.000 on addressing spike and surrogate recovery as they relate to matrix effects (Permit Attachment 13, Permit Attachment 13F) and ADEQ Policy 0155.000 on one-point calibration and continuing calibration verification constraints (Permit Attachment 13, Permit Attachment 13G) to test for matrix interference.

The selected laboratory (ies) will be licensed by ADHS to perform the majority of the analyses listed in this plan. The laboratory selected in some cases may be required to subcontract some analyses due to licensee constraints. In this case the subcontracted firm will also be signatory to this QAPP. Any subcontracted laboratories will also be licensed by ADHS to perform the applicable analyses. The selected laboratory SOPs and QA manual for these methods will be approved by ADHS in the licensure process and be placed on file at the in the operating record.

The COPCs involved in this sampling, the analytical methods, the provisional and promulgated non-residential SRLs (A.A.C. R18-7-201 et seq.), and other applicable action level, as noted, are provided in the WAP (Permit Attachment 3). For soil samples, the practical quantitation limit (PQL) or method detection limit (MDL) will be below the regulatory level for each compound or element, as noted in the WAP.

For plan activities that require drinking water standards to be met (e.g., cleanup of contaminated groundwater, disposal of retention basin storm water on soil, etc.), the EPA's 500 series analytical methods for drinking water analysis will be used.

13.2.5 Field QC Samples

Field QC samples will, as appropriate, include field blank samples and field duplicate samples. If sampling is performed under an action-specific SAP, the SAP will identify the duplicate samples to be collected and rate or conditions under which blank samples will be collected. Duplicate samples will be collected at a minimum rate of one for every 20 samples. The field duplicate will be collected from the same location as the sample. Duplicate samples will be collected from those locations most likely to contain contaminants. When field decontamination of sampling equipment is necessary, equipment blank (or equipment rinsate) samples will be drawn from decontaminated sampling equipment at the rate of 1 per day or 1 in 20 samples, whichever is greater. The equipment blank samples will target analytes of concern for recent sampling performed by that equipment to verify decontamination.

In some actions covered by this QAPP, Field QC samples will be limited due to the nature of the sampling activities. Treatment residues might be sampled six or fewer times during the year and then only one sample might be collected at a time. The results of field duplicates in such cases could be related only to a single sample, decreasing their value. A field duplicate of treatment residues will, however, be collected at least once per year. Samples of accumulated precipitation are collected only on an as-needed basis, which is expected to be very seldom. No field duplicates are proposed for the accumulated precipitation samples. Each sampling action will be performed with single-use equipment (i.e., equipment will either be disposable or cleaned prior to use and used only once in the field); therefore, no equipment blanks are proposed as part of the sampling action. No volatile analyses are anticipated as part of these actions, so no trip blanks are planned.

Critical supplies and materials needed for field activities include sample bottles, materials for decontamination activities, deionized water, and site water. Critical field supplies and consumables will be inspected and accepted or rejected by the Project Supervisor. Certificates of purity or analysis for all items requiring cleanliness will be retained.

13.2.6 Laboratory Quality Control

The contract laboratory will subject samples to comprehensive testing within established and strict QA/QC protocols and analytical procedures described in this QAPP and the QA/QC manual of the contract laboratory. The laboratory will process the USAGYPG samples as soon as possible after receipt. To fulfill project requirements, analyses will be complete within the sample holding times specified in for the applicable method as identified in the WAP (Permit Attachment 3). Upon completion of analysis, the laboratory will report the results to the Project Supervisor by electronic mail. The laboratory will thereafter submit a written report on the results, to include QA/QC results and documentation. Level IV reports including data, QC results (duplicates, matrix spikes, matrix spike duplicates), and all raw data will be provided by the laboratory unless otherwise agreed upon. For example, if screening level analyses are used, it is likely that full Level IV reports would not be appropriate. The laboratory will use Arizona Data Qualifiers listed in Attachment 13C as appropriate (or in the case of screening level samples, as applicable).

All unused samples and sample residuals will be disposed of by the contract laboratory in accordance with ADEQ and local requirements. The Project Supervisor, however, may request certain unused samples be sent to a designated location.

13.2.6.1 Laboratory QC Samples

Laboratory QC samples will be analyzed with each sample submitted. The contract laboratory and its subcontractors will prepare and analyze all of the QC samples necessary to determine and document the required laboratory performance. Laboratory QC samples will include laboratory blanks, laboratory duplicates, laboratory spikes, and other samples as necessary. The laboratory will follow the established QC program described in its QA/QC program manuals. Permit Attachment 13B, Table 13B-3 summarizes the QC samples to be prepared. It is recognized that screening level samples, if utilized, may involve a different set of laboratory quality control samples than shown in the table.

13.2.6.1.1 Method Blank

Potential sample contamination contributed by the laboratory will be discerned through the evaluation of laboratory method blanks. Method blanks will be carried through sample preparation and analyzed at the beginning of each analytical method run and will be used to determine if internal laboratory sources of contamination have affected sample integrity.

13.2.6.1.2 Surrogates

Surrogates are chemically similar to the analytes of interest, but known not to be present in the environment. When available, they are added or “spiked” at a known concentration into the field samples and carried through sample preparation before analysis. Surrogate recovery is a measure of the method’s accuracy for the particular sample matrix.

13.2.6.1.3 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD samples are used to evaluate the accuracy and precision of the method as performed on the particular sample matrix. All MS/MSD samples must be spiked by the laboratory before addition of extraction fluid. At least one in every 20-field samples should be collected in an appropriate volume as specified by the laboratory, by the sampler to provide sufficient sample to perform the MS/MSD. The full compounds of the applicable analytical method must be included in the matrix spiking mixture.

13.2.6.1.4 Laboratory Control/Lab Control Duplicate (LCS/LCSD)

The LCS/LCSD samples are used to monitor the accuracy and precision of the method in a familiar matrix. The LCS/LCSD for each analytical method must consist of all target compounds reported by that method.

ADEQ Policy 0154.000 on addressing spike and surrogate recovery as they relate to matrix effects (Permit Attachment 13, Attachment 13F) may be used to salvage data in which spike and surrogate recovery samples fail to meet method acceptance criteria. This policy provides flexibility and data interpretation by providing additional QC information in the form of an LCS/LCSD, which can demonstrate that out of control events were indeed due to matrix effects and not the result of extraction or analysis problems.

13.2.6.1.5 13.2.6.1.5 Data Qualifiers

Qualified analytical results generated under this QAPP for submission to the ADEQ must be qualified using the Arizona Data Qualifiers, (10/2013, or current edition) (Permit Attachment 13, Attachment 13C).

13.2.6.1.6 QC Acceptance Criteria

Laboratory duplicate samples will be used to assess method bias and precision. Laboratory blank samples will be used to assess inadvertent contamination introduced at the laboratory. Method QC acceptance criteria will be followed. QC acceptance criteria will be calculated from historical laboratory data and included in the analytical data report. Permit Attachment 13B, Table 13B-4 includes default limits in the absence of laboratory historical data for compounds. The Contract Laboratory Project Manager, utilizing QC measures and acceptance criteria reported by the analytical laboratory, will perform data verification and validation.

If contamination is detected in any blank sample, all data associated with the blank will be evaluated to determine if there is an inherent variability in the data for the lot. In cases in which more than one blank is associated with a given sample, qualification will be based on a comparison with the blank having the highest concentration of the contaminant. Sample results greater than the CRQL (or MRL) but less than 5 times the amount detected in a blank will be reported with an explanation of the reasons for acceptance of the sample results. For a common laboratory contaminant (e.g., acetone, methylene chloride, toluene, methyl ethyl ketone [MEK], and common phthalate esters), the sample results will be reported with an explanation of the reasons for acceptance of the sample results when the analyte concentration is greater than the CRQL (or MRL) but less than 10 times the amount in any blank.

The contract laboratory will include the following data in their submittal of acceptance of QAPP conditions (Permit Attachment 13, Attachment 13H):

- The identity of required QC checks for the laboratory, for each all analytical methods such as continuing calibration verification (CCV), matrix spikes (MS), matrix spike duplicates (MSD), laboratory control samples (LCS) / laboratory control sample duplicates (LCSD), lab replicates, instrument and method blanks, surrogates, or second column confirmations.

- The acceptance criteria for quality control samples (initial and continuing calibration verification standards, matrix spikes recoveries, laboratory control spikes, relative percent difference for duplicates, etc.) must be documented. These acceptance criteria may be included in a table or may be referenced in the laboratory's quality assurance manual. If referencing the laboratory's quality assurance manual, then cite the pages where the quality control acceptance criteria are addressed for each of the target compounds and the associated matrix.

13.2.6.2 Document Control

Within the laboratory, document control procedures will be practiced as described in the contract laboratory QA/QC manual.

13.2.6.3 Laboratory Quality Control Checks

Laboratory QC checks will include application of internal QC methods, such as analysis of spike samples, split samples, internal standards, QC samples, calibration standards, and calibration devices. QC checks include demonstration of daily standards, system performance checks, multiple internal standards for sample analysis, and method blanks for control of system contamination. The frequency, control limits, corrective actions, and purpose of QC checks for the contract laboratory are largely implicit in the methods used.

13.2.6.4 Control Charts

Control charts will be used to monitor the trends and variations in the accuracy and precision of analyses. The control chart will contain the following information:

- Title, analyte, method number, and laboratory name;
- Spike concentration;
- Analysis date and/or code;
- Percent recovery (X charts) or range (R charts) along the ordinate;
- Upper and lower control limits; and
- Upper and lower warning limits.

13.2.6.5 Uncontrolled Conditions

Uncontrolled conditions for all project aspects will be investigated, and appropriate corrective actions will be promptly instituted. Areas in which operator error is normally associated with uncontrolled conditions include: (1) failure to achieve calibration, (2) record-keeping omissions, (3) improper sample storage and preservation, and (4) poor analytical protocols. The detection of uncontrolled conditions always warrants some type of corrective action. Permit Attachment 13 Section 13.3 of this plan provides protocols for documenting corrective action.

13.2.7 Instruments and Equipment

13.2.7.1 Testing, Inspection and Maintenance

For the project activities, testing, inspection, and preventive maintenance will have three principal objectives: ensure accuracy of measurement systems, minimize downtime, and maintain adequate critical spare parts, backup systems, and equipment. Preventive maintenance procedures outlined in individual laboratory SOPs will be followed. Calibration and maintenance schedules will be maintained in accordance with manufacturer recommendations in instrument operation manuals and with laboratory SOPs.

13.2.7.2 Instrument Calibration and Frequency

Field instruments are not planned for use in the project activities. Initial and daily calibrations of laboratory instruments will be conducted as stipulated in the procedures described in the contract laboratory QA/QC manual. At a minimum, before samples are analyzed, chemical calibration of a representative group of target analytes will be performed to ensure that analytical instrumentation is functioning within the established sensitivity range. Protocols defining the procedures and QC measurements for instrument calibration will be in accordance with criteria specified by EPA SW-846.

If the analytical method permits and the laboratory chooses, a one-point calibration may be performed providing the procedure is consistent with the requirements set forth in ADEQ Policy 0155.000 on one-point calibration and continuing calibration verification constraints (Permit Attachment 13, Permit Attachment 13G).

Initial calibrations for the methods to be used in this project will be performed routinely by the laboratory. Additional initial calibrations are not required unless the instrument fails the daily calibration procedure. Before an analysis is performed, each instrument will be calibrated to ensure that its response has not changed from the previous calibration. Analysis should be performed on the highest concentration standard. A response within two standard deviations of the mean response for the same concentration as determined from pre-certification, certification, and prior initial/daily calibrations will be deemed acceptable. Should the response fail that criterion, the daily standard will be reanalyzed. Failure of this reanalysis will necessitate that the instrument undergo initial calibration as specified in EPA SW-846.

All calibration solutions and standards used for this project will be prepared and maintained under the normal laboratory standards tracking system. This system will ensure that preparation, checking, documentation, storage, and disposal standards are performed according to specified procedures and schedules appropriate for each analyte of interest.

13.2.7.3 Supplies and Consumables

Critical supplies and materials needed for laboratory analysis include sample bottles, calibration gases, reagents, hoses, deionized water, and other materials. The inspection and acceptance/testing requirements, requirements for certificates of purity or analysis, and handling and storage requirements for critical supplies and consumables are identified in the contract laboratory QA/QC manual. The Laboratory QA Manager will document this information on receipt of critical supplies.

13.2.8 Data Management

The contract laboratory will transmit a laboratory report to the Project Supervisor. The report will be provided in electronic format (PDF file). The report will include a narrative summary of the analyses that details any data limitations and data qualifiers based on the data quality assessment performed by the contract laboratory Project Manager. The report will also include tables summarizing the analytical results, QA/QC results, and all original field and sample custody documentation.

The contract laboratory will provide all raw data, notes, and bench sheets (this is typically referred to as a level IV, CLP-like data package). These records shall include instrument tuning and calibration records, batch quality control sample data, control charts and calculations, sample tracking sheets, control documentation, raw analytical sample data, analytical results, and all other information necessary to completely detail the entire history of the analytical work. It is recognized that laboratory data packages associated with screening level analyses will likely involve less information than for analyses involving full method implementation. At the close of each sampling event, the Project Supervisor will inventory this information for storage at the USAGYPG installation in the OB/OD MTF operating record.

13.2.8.1 Data Reduction, Recording, and Tracking

Data will initially be collected, converted to standard reporting units, and recorded in standard formats by the project analysts. Project analysts will then use a variety of methods and procedures to conduct preliminary data analyses. Because many analytical instruments that will be used are microprocessor-controlled, some of the requisite analyses can be performed directly in the instrument's operating or output mode. Data requiring manual recording, integration, and/or analysis can be converted to a more appropriate format before subsequent analyses.

Data reduction frequently includes computation of analytical results from raw instrument data and summary statistics, including standard errors, confidence intervals, test of hypothesis relative to the parameters, and model validation. The procedures used will address the reliability of computations and the overall accuracy of the data reduction. The numerical transformation algorithms used for data reduction will be verified against a known problem set to ensure that the reduction methods are correct.

The equations and the typical calculation sequence that are followed to reduce the data to the acceptable format are instrument- and method-specific. When standard methods are modified, data reduction techniques will be described in the report accompanying the data.

Auxiliary data produced for internal records and not reported as part of the analytical data will include the following: laboratory worksheets, laboratory notebooks, sample tracking system forms, instrument logs, standard records, maintenance records, calibration records, and associated quality control. These sources will document data reduction and will be available for inspection during audits and for use in determining the validity of the data. The following calculation equations for quality data are used.

13.2.8.1.1 Precision

If calculated from duplicate measurements, relative percent difference is the normal measure of precision:

$$\text{RPD} = \frac{(C_1 - C_2) \times 100\%}{(C_1 + C_2) \div 2}$$

Where: RPD = relative percent difference
C1 = larger of the two values
C2 = smaller of the two values

If calculated from three or more replicates, use relative standard deviation instead:

$$\text{RSD} = (s/y) \times 100\%$$

Where: RSD = relative standard deviation
s = standard deviation
y = mean of replicate analyses

Standard deviation is defined as:

$$S = \sqrt{\frac{n\sum_{i=1}^{n} x_i^{\;2} - \left(\sum_{i=1}^{n} x_i\right)^2}{n(n-1)}}$$

Where: S = standard deviation
x_i = measured value of the ith replicate
n = number of replicates

For measurements such as pH, where the absolute variation is more appropriate, precision is usually reported as the absolute range, D, of duplicate measurements:

$$D = |m_1 - m_2|$$

Where: D = absolute range
m1 = first measurement
m2 = second measurement

13.2.8.1.2 Accuracy

For measurements where matrix spikes are used, the percent recovery is calculated as:

$$\%R = 100\% \times [(S-U)/C_{sa}]$$

Where: %R = percent recovery
S = measured conc. in spiked aliquot
U = measured conc. in unspiked aliquot
C_{sa} = actual concentration of spike added

When a standard reference material (SRM) is used:

$$\%R = 100\% \times [C_m/C_{srm}]$$

Where: %R = percent recovery
C_m = measured concentration of SRM
C_{srm} = actual concentration of SRM

13.2.8.2 Data Storage and Retrieval

The analyst will quantify each analyte in the method blank and spiked QC sample each day of analysis. Method blank data will generally be reported as less than the quantitation limit for each analyte. Values detected above the quantitation limit will be reported as determined, with entry into the data management system in terms of concentration. Values below the quantitation limit will be quantified and flagged as estimated values. Additional sample lots will not be processed until the results of the previous lot have been calculated and plotted on control charts as required and the entire analytical method is shown to be under control. All data will be entered into the data management system with correct method numbers and appropriate Arizona Data Qualifiers (Permit Attachment 13, Permit Attachment 13C).

13.3 ASSESSMENT AND OVERSIGHT

13.3.1 Assessments and Response Actions

13.3.1.1 Field Audits

Field audits will be used to determine if field procedures are being conducted in compliance with this QAPP. The field audits will include the following assessments: surveillance of field work in process, a management systems review, and a technical systems audit. Areas reviewed will include sample collection and handling, documentation, and sampling technique. Field sampling programs will be reviewed annually by the QA Manager and the review will include a determination of the need for a field audit (or audits). In the case of a significant, non-routine sampling event, such as that involved in the implementation of unit closure, a field audit will be performed.

The observation (surveillance) of actual work activities is the most effective technique for determining if performance of these activities is adequate. The primary goal during observation will be to obtain the most complete picture possible of the work performance. The observations will be put into perspective relative to the overall quality program. Before drawing conclusions, the auditor will verify the results through review of other project documentation.

All assessments and audits will follow the Technical Systems Audit Checklist in Permit Attachment, Attachment 13I, as appropriate. Nonconformance with the QAPP will be noted. Noted nonconformance's will be evaluated and reported as described in Permit Attachment 13 Section 13.3.2. A report of the field audits will be retained in project files at the USAGYPG installation.

13.3.1.2 Laboratory Audit

As a State-certified/licensed laboratory, the contract laboratory participates in the ADHS Laboratory Certification Program. This program evaluates laboratory procedures for the necessary QA and QC procedures. The laboratory QA officer or his designee will perform one laboratory audit during the analytical program as close to the beginning of the program as possible. The laboratory audit will include the following assessments: surveillance of laboratory work in process, a management systems review, and a technical systems audit. Nonconformance with the QAPP will be noted. Noted nonconformance's will be evaluated and reported as described in Permit Attachment 13 Section 13.3.2. A report of this audit will be retained in project files at the USAGYPG installation.

Laboratory programs associated with this QAPP will be reviewed annually by the ESD QA Manager and the review will include a determination of the need for an independent laboratory audit. All assessments and audits will follow the Technical Systems Audit Checklist in Permit Attachment 13G, as appropriate. In the event a laboratory audit is deemed necessary, it may be performed in combination with audits required by other USAGYPG projects.

13.3.2 Reports to Management

A nonconformance is any action or condition that does not meet the QAPP requirements. All identified instances of nonconformance will be documented, evaluated, and corrected to prevent recurrence. A letter report describing the nonconformance and evaluating the impact to the quality of the data will be prepared. The letter report will contain a description of the nonconformance with reference to the procedure or specification violated, an evaluation of the effects of the nonconformance, an evaluation of the cause of the nonconformance, and a recommendation for final disposition. The report will be transmitted to the Project Supervisor and ESD.

Whenever possible, immediate corrective actions shall be taken to rectify or prevent a nonconformance. The person(s) identifying the need for the action will document a corrective action. Disposition of nonconformance involving contract laboratory analyses will be approved prior to the performance of additional analyses. In cases of laboratory nonconformance, the contract laboratory should provide a written description of the cause of the nonconformance and a description of planned corrective action.

13.4 DATA VALIDATION AND USABILITY

13.4.1 Data Review, Verification, and Validation

13.4.1.1 Data Review

The data packages will be reviewed by the QA Manager or his designee to evaluate compliance with specified analytical, DQOs, QA/QC requirements, data reduction procedures and data-reporting requirements. The following items will be reviewed to validate the data:

- Sample holding times;
- Documentation that the analytical results are in control and within the certified range of the analysis;
- Qualitative and quantitative data used in determining the presence and concentration of the target compounds;
- Calibration data associated with specific methods and instruments;
- Routine instrument checks (calibration, control samples, etc.);
- Documentation on traceability of instrument standards, samples, and data;
- Documentation on analytical methodology and QC methodology;

- The potential presence of interferences in analytical methods (check of reference blanks and spike recoveries);
- Documentation of routine maintenance activity to ensure analytical reliability; and
- Documentation of sample preservation and transport.

Data assessment techniques will include routine QC checks and a system audit. Precision will be assessed from measurements of replicates at different times. Control charts will be maintained to provide a timely assessment of precision for measurement functions. Accuracy will be assessed from measurements of surrogate compounds and of samples spiked with known concentrations of reference materials. The assessment for accuracy will be independent of the routine calibration process (reference materials will be obtained from independent sources and will be prepared independently).

Ten percent of the data packages will be subject to in-depth review (all elements). If this review results in significant findings of noncompliance, all data packages will be subject to in-depth review. This review will be conducted using the guidelines of Permit Attachment 13, Permit Attachments 13D through 13G.

13.4.1.2 Data Verification

Data Verification is confirmation by examination and objective evidence that specified requirements have been fulfilled. It is the process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements. It precedes data validation and is a systematic process for evaluating whether data has been generated with acceptable quality control.

Virtually 100% of the data generated shall be verified. The documentation requirements for performing data verification are outlined in the Data Verification Checklist (Permit Attachment, Permit Attachment 13E). Note: If the attached checklist is not used, then an alternative checklist should be attached. Data Verification Checks will be performed by a chemist or other professional with data validation or analytical laboratory experience. The professional shall be familiar with the QC requirements specified for the analytical methods being reviewed.

An ESD representative or its designee will verify 100% of the data packages for completeness, including field-sampling logs. The DQO for completeness is 95%. The following shows calculation of completeness:

Completeness is defined as follows for all measurements:

$$\%C = 100\% \times [V/n]$$

Where: %C = percent completeness

V = total no. of measurements judged to be valid
n = total number of measurements necessary to achieve a specified level of confidence in decision making

13.4.1.3 Data Validation

Data Validation is confirmation by examination of the objective quality evidence that the particular requirements for a specific intended use are fulfilled. Data validation is an analyte- and sample-specific process that extends the evaluation of data beyond method requirements.

The facility will not initially provide ADEQ with any raw data, field or lab documentation, or data reports related to the data validation process, unless requested by ADEQ after its review of the initial data validation report associated with the following activities:

- The facility implements the contingency plan (Permit Attachment 10) in the event of a release;

- The facility has completed corrective action and a final report that the site has been remediated, with analytical results is submitted; or

- The facility is undergoing closure.

However, during data validation of these activities, the facility will document the data validation efforts using the “Data Validation Catalog Table” (See Permit Attachment 13A, Figure 13A-2) which summarizes the testing parameters assessed and the corresponding sample delivery group(s) that have been validated. This table, for each sample delivery group validated, documents the data validation group, project site and address, sampling dates, field sample identification number and corresponding laboratory identification number, and the nomenclature of the analyses performed. A copy of this table will be included with all associated data validation reports for a particular sample delivery group.

For those cases requiring data validation as stated above, approximately 10% of all organic and inorganic analyses shall be validated. There is no need to validate data generated through “wet chemistry” analyses (pH, flashpoints, turbidity, specific, gravity, etc) or methods for which the target compounds have no action levels. The percentage of data that undergoes full validation may be increased if substantial data quality issues are raised during the initial or subsequent assessments. ADEQ may require that a larger percent of the data be fully validated for various reasons including, but not limited to, determining the extent of the issue and/or if the issue has been corrected in subsequent analyses, or that additional data be made available for review.

Data validation shall be performed using the method-specific QC acceptance criteria rather than the QC acceptance criteria outlined in EPA Contract Laboratory Program National Functional Guidelines for Organic and Inorganic Data Review. In the absence of Method Specific QC acceptance criteria, data validation may default to QC criteria outlined in the EPA Functional Guidelines document or as established by the laboratory through historical data.

The data validation process will include a thorough review of all items listed as validation deliverables in the attached Data Validation Checklist (Permit Attachment 13C) The checklist reflects the documentation requirements for performing Data Validation and is consistent with USEPA Region IX "Laboratory Documentation Requirements for Data Validation," Document 9QA-07-97 (Permit Attachment 13, Attachment 13D). Note: If the attached checklist is not used, then an alternative checklist should be attached.

Data Validation Checks will consist of a review of sample and QC results, and all accompanying raw data (calibration curve data, chromatograms, spectra, etc.).

The ADEQ Project Manager will identify the compounds of concern, and the data validation will include a review of 100% of the QC data and sample data for these compounds in the laboratory report for a sample delivery group. Compounds not identified as contaminants of interest will not be validated unless requested by ADEQ's Project Manager.

Data validation will be conducted by the contractor's QA officer or an independent data validation contractor. The ADEQ QA Unit will validate data at the ADEQ Project Manager's request.

The results of a data validation effort should address each element reviewed, as required by EPA Region IX's "Laboratory Documentation Requirements for Data Validation" and discussed in the data validation report. The data validation report will be included in the sampling report, one original that shall be submitted to the ADEQ Project Manager.

13.4.2 Reconciliation with User Requirements

The Project Supervisor will conduct a review to reconcile all of the project information with the requirements of this QAPP. The review will include field sampling documentation and laboratory data. The results of the review will be included in the Closure Report.

Field sampling information generated under this QAPP will be verified for quality. The Project Supervisor will review, in detail, the sample collection log, custody forms, and other sample collection documentation. The documentation will be reviewed for accuracy, completeness, and reasonableness. The results of the field audits will be reviewed. Nonconformance issues and corrective responses will be evaluated. The Project Supervisor will determine if the quality of the sampling effort is sufficient to support the laboratory data generated under this QAPP.

Analytical data generated under this QAPP will be verified for quality. The Project Supervisor will review the reported analytical data in depth. Details of the data reduction, data validation, and reporting process will be confirmed. The results of the laboratory audit will be reviewed. Nonconformance issues and corrective responses will be reviewed. The Project Supervisor will determine if the quality of the data is sufficient to satisfy the applicable decision rule. If it is determined that the quality of the data is not sufficient to satisfy the decision rule, recommendations for providing the necessary quality of data will be made.

After the above, the Project Supervisor will evaluate analytical results to determine if the sampled material is hazardous waste or if the sample soil cannot be left in-place by using the appropriate decision rule described in Permit Attachment 13 Section 13.1.4.5. Based on results of the waste management evaluation, the waste will be managed either as hazardous waste or as solid waste. With respect to the accumulated precipitation, if it does not qualify as hazardous waste, an evaluation will be performed to determine its appropriateness for application as a dust suppressant. Results of the soil sample evaluation will determine whether the soil can be left in-place or if it must be removed or otherwise remediated.

13.5 REFERENCES

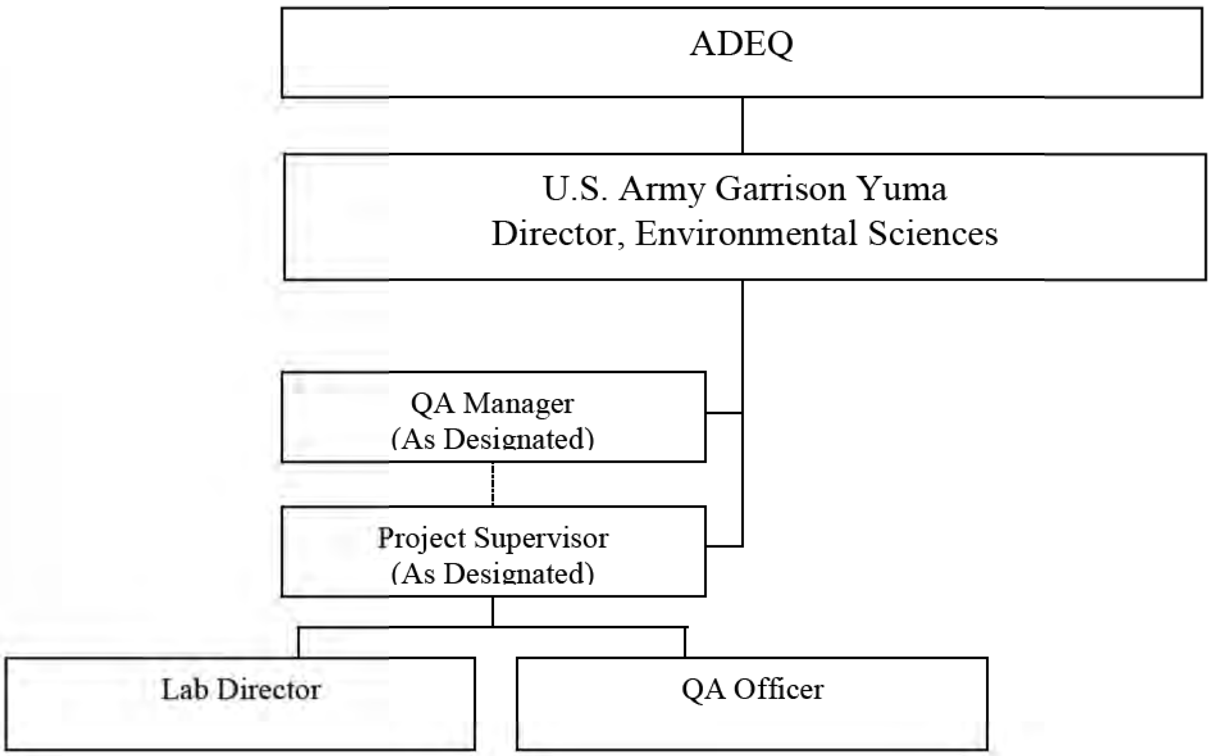
The following documents were used in the preparation of this QAPP, and provide additional supporting data and guidance:

EPA 1986	EPA, 1986, Office of Solid Waste. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, EPA publication SW-846, Third Edition, Final Updates I (1993), II (1995), IIA (1994), IIB (1995), III (1997), IIIA (1999), IIIB (2005), IV (2008), and V (2015).
EPA 1997	EPA, 1997, Laboratory Requirements for Data Validation, Washington, D.C.
EPA 1999	EPA, 1999, RCRA Facility Assessment, U.S. Army Proving Ground, Yuma Arizona, AZ5213820991, Region 9, San Francisco, California.
EPA 2000	EPA, 2000, The Data Quality Objectives Process for Hazardous Waste Sites (QA/G-4HW), EPA/600/R-00/007, Office of Environmental Information, Washington, D.C.
EPA 2000	EPA, 2000, Guidance on Technical Audits and Related Assessments for Environmental Data Operations, EPA QA/G-7, EPA/600/R-99/080, Office of Environmental Information, Washington, D.C.
EPA 2000	EPA, 2000, Policy and Program Requirements for the Mandatory Agency-wide Quality System, Washington, D.C.
EPA 2001	EPA, 2001, EPA Requirements for Quality Assurance Project Plans (QA/R-5) Final, EPA/240/B-01/003, Office of Environmental Information, Washington, D.C.

EPA 2006	EPA, 2006, Data Quality Assessment: A Reviewer's Guide (QA/G-9R), EPA/240/B-06/002, Office of Research and Development, Washington, D.C.
EPA 2006	EPA, 2006, Guidance on Systematic Planning Using the Data Quality Objectives Process (QA/G-4), EPA/240/B-06/001, Office of Research and Development, Washington, D.C.

ATTACHMENT 13A

FIGURES



CTI and Associates, Inc.
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FIGURE 13A-1

PROJECT ORGANIZATIONAL CHART

YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION

JULY 2016

1165010006.3

Data Validation Group: XYZ Consulting

Date Sampled: 7/25/16

Site Address: 1011 W. Washington, Phoenix, AZ 85007

PROJECT SITE:

SAMPLE DELIVERY GROUP:

Field Sample Identification	Laboratory Identification Number	Method 8260B	Method 6010B	Method 8270C	Method 8081A	Method 8015AZ Rev. 1
Chip 10	123456-01	X		X		
Chip 11	123456-02	X	X	X		
Chip 12	123456-03	X				
Chip 13	123456-03		X	X		
Chip 14	123456-04		X			
Chip 15	123456-05	X		X		
Chip 16	123456-06		X	X		
MW-1	7891011-10	X			X	X
MW-2	7891011-11	X			X	
MW-3	7891011-12		X	X	X	
MW-4	7891011-13	X	X		X	X
DM-SB1-5'	987654-23			X	X	
DM-SB1-10'	987654-24	X			X	
DM-SB1-15'	987654-25	X	X		X	
DM-SB2-10'	987654-13	X			X	X
DM-SB2-20'	987654-14	X			X	
DM-SB2-30'	987654-15				X	

CTI and Associates, Inc.
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FIGURE 13A-2

EXAMPLE DATA VALIDATION CATALOG

YUMA PROVING GROUND
MUNITIONS TREATMENT FACILITY
RCRA PERMIT RENEWAL APPLICATION

JULY 2016

1165010006.3

ATTACHMENT 13B

TABLES

Table 13B-1. Data Quality Indicators

Data Quality Indicator	Definition	Example Determination Methodologies
Precision	The measure of agreement among repeated measurements of the same property under identical, or substantially, similar conditions; calculated as either the range or as the standard deviation. May also be expressed as a percentage of the mean of the measurements, such as relative range or relative standard deviation (coefficient of variation).	Use the same analytical instrument to make repeated analyses on the same sample. Use same method to make repeated measurements of the same sample within a single lab or have two or more labs analyze identical samples with the same method. Split a sample in field & submit both for sample handling, preservation, storage, & analytical measurements. Collect, process, analyze collocated samples for information on sample acquisition, handling, shipping, storage, prep, analytical processes and measurements.
Bias	Systematic/persistent distortion of a measurement process causing error in one direction.	Use reference materials or analyze spiked matrix samples.
Accuracy	A measure of overall agreement of a measurement to a known value; includes a combination of random (precision) and systematic error (bias) components of both the sampling and analytical operations.	Analyze a reference material or reanalyze a sample to which a material of known concentration or amount of pollutant has been added; usually expressed either as percent recovery or as a percent bias.
Representativeness	Qualitative term that expresses "the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition." (ANSI/ASQC 1994)	Evaluate whether measurements are made and physical samples collected in such a manner that the resulting data appropriately reflect the environment or condition being measured or studied.
Comparability	A qualitative term that expresses the measure of confidence that one data set can be compared to another and can be combined for the decision(s) to be made.	Compare sample collection and handling methods, sample preparation and analytical procedures, holding times, stability issues, and QA protocols.
Completeness	A measure of the amount of valid data needed to be obtained from a measurement system.	Compare the number of valid measurements completed (samples collected or samples analyzed) with those established by the project's quality criteria (Data Quality Objectives or performance/acceptance criteria).
Sensitivity	The capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest.	Determine the minimum concentration or attribute that can be measured by a method (method detection limit), by an instrument (instrument detection limit), or by a laboratory (practical quantitation limit); compare this with the action level established during project planning.

Table 13B-2. Training Requirements

Job Title	Years of Experience	Specific Qualifications
ESD Chief	20+	Experience: In-depth knowledge of remedial investigations and other environmental sampling programs, multi media sampling efforts on large site characterization projects, development of site characterization plans for multi media contaminants including explosives, and project management with diverse disciplines in multiple locations. Experience in both on and off site laboratory methods and audits with an emphasis on quality programs. • OSHA HAZWOPER supervisor • ADHS Environmental Sampling Training • ADHS Laboratory Quality Control Training
Project Supervisor (synonymous with field team leader)	3-5+	Experience in multi-media sampling efforts and remedial investigation programs. • OSHA HAZWOPER supervisor • UXO Awareness level training • CPR and First Aid
Quality Assurance Manager	10+	Experience in the operations and management of analytical laboratory under NELAC / ADHS / ACOE / A2LA programs, familiar with ADHS and ADEQ data validation requirements. Experience as an analyst in organic and inorganic methods. Experience in data validation for organic and inorganic data packages for compliance samples. Firm understanding of the RCRA closure process. Experience in meeting defined goals by regulatory community.
Field Sampling Technicians	1+	• OSHA HAZWOPER • ADHS Environmental Sampling Training • UXO Awareness level training • CPR and First Aid
Ordnance Recovery Technicians	5+	Certified as Explosive Ordnance Technicians by attendance of joint services EOD School and certified by the U.S. Army Garrison Yuma organization for operations at the U.S. Army Garrison Yuma military installation.

Table 13B-3. Summary of Laboratory Quality Control Samples

Sample Description	Purpose	Frequency
Method Blank	Verify Method Validity	One Per Analytical Batch
Surrogates	Indicate Method Accuracy	All Field And QC Samples Per Method Requirements
Matrix Spike	Accuracy In Matrix	At Least 1 Per 20 Field Samples For At Least Those Analytes In Table 13-4
Matrix Spike Duplicate	Precision In Matrix	
Laboratory Control	Accuracy In Standard Matrix Or Blank	One Per Analytical Batch And Spiked For All Target Analytes.
Laboratory Control Duplicate	Precision In Standard Matrix Or Blank	

Table 13B-4. Default Quality Control Acceptance Criteria

QA Type	Control Limits[a]
Method Blank	Per Method Requirements
Surrogates	75-125% Recovery
Matrix Spike (MS)	75-125% Recovery
Matrix Spike Duplicates (MSD)	75-125% Recovery
MS/MSD	15% RPD
Laboratory Control Samples (LCS)	75-125% Recovery
Laboratory Control Sample Duplicate (LCSD)	75-125% Recovery
LCS/LCSD	15% RPD

a. The default control limits will only be used if the laboratory does not provide historical limits.

ATTACHMENT 13C

ARIZONA DATA QUALIFIERS

Lab Qualifier Code	Description
A	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. VALUE REPORTED IS THE MEAN OF TWO OR MORE DETERMINATIONS.
A1	MICROBIOLOGY: TOO NUMEROUS TO COUNT.
A2	MICROBIOLOGY: SAMPLE INCUBATION PERIOD EXCEEDED METHOD REQUIREMENT.
A3	MICROBIOLOGY: SAMPLE INCUBATION PERIOD WAS SHORTER THAN METHOD REQUIREMENT.
A4	MICROBIOLOGY: TARGET ORGANISM DETECTED IN ASSOCIATED METHOD BLANK.
A5	MICROBIOLOGY: INCUBATOR/WATER BATH TEMPERATURE WAS OUTSIDE METHOD REQUIREMENTS.
A6	MICROBIOLOGY: TARGET ORGANISM NOT DETECTED IN ASSOCIATED POSITIVE CONTROL.
A7	MICROBIOLOGY: MICRO SAMPLE RECEIVED WITHOUT ADEQUATE HEADSPACE.
A8	MICROBIOLOGY: PLATE COUNT WAS OUTSIDE THE METHODS REPORTING RANGE. REPORTED VALUE IS ESTIMATED.
AB	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. COMPOUND IS ABSENT.
B1	METHOD BLANK: TARGET ANALYTE DETECTED IN METHOD BLANK AT OR ABOVE THE METHOD REPORTING LIMIT.
B2	METHOD BLANK: NON-TARGET ANALYTE DETECTED IN METHOD BLANK AND SAMPLE, PRODUCING INTERFERENCE.
B3	METHOD BLANK: TARGET ANALYTE DETECTED IN CALIBRATION BLANK AT OR ABOVE THE METHOD REPORTING LIMIT.
B4	METHOD BLANK: TARGET ANALYTE DETECTED IN BLANK AT OR ABOVE METHOD ACCEPTANCE CRITERIA.
B5	METHOD BLANK: TARGET ANALYTE DETECTED IN METHOD BLANK AT OR ABOVE THE METHOD REPORTING LIMIT, BUT BELOW TRIGGER LEVEL OR MCL.
B6	METHOD BLANK: TARGET ANALYTE DETECTED IN CALIBRATION BLANK AT OR ABOVE THE METHOD REPORTING LIMIT, BUT BELOW TRIGGER LEVEL OR MCL.
B7	METHOD BLANK: TARGET ANALYTE DETECTED IN METHOD BLANK AT OR ABOVE METHOD REPORTING LIMIT.CONCENTRATION FOUND IN THE SMP WAS 10 TIMES ABOVE THE CONCENTRATION FOUND IN THE MTHD BLK.
B8	METHOD BLANK: ANALYTE FOUND IN BOTH TRAVEL BLANK AND SAMPLE.
C	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. VALUE CALCULATED.
C1	CONFIRMATION: CONFIRMATORY ANALYSIS NOT PERFORMED AS REQUIRED BY THE METHOD.
C3	CONFIRMATION: QUALITATIVE CONFIRMATION PERFORMED.
C4	CONFIRMATION: CONFIRMATORY ANALYSIS WAS PAST HOLDING TIME.
C5	CONFIRMATION. CONFIRMATORY ANALYSIS WAS PAST HOLDING TIME. ORIGINAL RESULT NOT CONFIRMED.
C6	SAMPLE RPD BETWEEN PRIMARY AND CONFIRMATORY ANALYSIS EXCEEDED 40%. PER EPA METHOD 8000B, THE HIGHER VALUE WAS REPORTED AS THERE WAS NO OBVIOUS CHROMATOGRAPHIC INTERFERENCE.
C7	SAMPLE RPD BETWEEN PRIMARY AND CONFIRMATORY ANALYSIS EXCEEDED 40%. PER EPA METHOD 8000B, THE LOWER VALUE WAS REPORTED DUE TO APPARENT CHROMATOGRAPHIC INTERFERENCE.
C8	SAMPLE RPD BETWEEN THE PRIMARY AND CONFIRMATORY ANALYSIS EXCEEDED 40%. PER EPA METHOD 8000C, THE LOWER VALUE WAS REPORTED AS

Lab Qualifier Code	Description
	THERE WAS NO EVIDENCE OF CHROMATOGRAPHIC PROBLEMS.
D	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. DILUTION FACTOR USED.LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERF
D1	DILUTION: SAMPLE REQUIRED DILUTION DUE TO MATRIX.
D2	DILUTION: SAMPLE REQUIRED DILUTION DUE TO HIGH CONCENTRATION OF TARGET ANALYTE. SEE CASE NARRATIVE.
D3	ARCHIVED FOR HISTORICAL DATA ON 20080128 NOT AVAILABLE FOR USE: DILUTION: SAMPLE DILUTION REQUIRED DUE TO INSUFFICIENT SAMPLE
D4	DILUTION: MINIMUM REPORTING LEVEL LIMIT (MRL) ADJUSTED TO REFLECT SAMPLE AMOUNT RECEIVED AND ANALYZED.
D5	DILUTION: MINIMUM REPORTING LIMIT (MRL) ADJUSTED DUE TO SAMPLE DILUTION; ANALYTE WAS NON-DETECT IN THE SAMPLE.
D6	DILUTION: MINIMUM REPORTING LIMIT ADJUSTED DUE TO AN AUTOMATIC 10X DILUTION PERFORMED ON THIS SAMPLE FOR THE PURPOSE OF REPORTING TRADITIONAL DRINKING WATER ANALYTES FOR WW REQUIRE
D7	DILUTION: MINIMUM REPORTING LIMIT ADJUSTED TO REFLECT SAMPLE DILUTION.
E	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. REPORTED VALUE ESTIMATED DUE TO MATRIX INTERFERENCE.
E1	ESTIMATED CONCENTRATION: CONCENTRATION ESTIMATED. ANALYTE EXCEEDED CALIBRATION RANGE. REANALYSIS NOT POSSIBLE DUE TO INSUFFICIENT SAMPLE.
E2	ESTIMATED CONCENTRATION: CONCENTRATION ESTIMATED. ANALYTE EXCEEDED CALIBRATION RANGE. REANALYSIS NOT PERFORMED DUE TO SAMPLE MATRIX.
E3	ESTIMATED CONCENTRATION: CONCENTRATION ESTIMATED. ANALYTE EXCEEDED CALIBRATION RANGE. REANALYSIS NOT PERFORMED DUE TO HOLDING TIME REQUIREMENTS.
E4	ESTIMATED CONCENTRATION: CONCENTRATION ESTIMATED. ANALYTE WAS DETECTED BELOW LABORATORY MINIMUM REPORTING LEVEL LIMIT (MRL) BUT ABOVE MDL.
E5	ESTIMATED CONCENTRATION: CONCENTRATION ESTIMATED. ANALYTE WAS DETECTED BELOW LABORATORY MINIMUM REPORTING LEVEL LIMIT (MRL), BUT NOT CONFIRMED BY ALTERNATE ANALYSIS.
E6	ESTIMATED CONCENTRATION: CONCENTRATION ESTIMATED. INTERNAL STANDARD RECOVERIES DID NOT MEET METHOD ACCEPTANCE CRITERIA.
E7	ESTIMATED CONCENTRAITON: CONCENTRATION ESTIMATED. INTERNAL STANDARD RECOVERIES DID NOT MEET LABORATORY ACCEPTANCE CRITERIA.
E8	ANALYTE REPORTED TO MDL PER PROJECT SPECIFICATION. TARGET ANALYTE WAS NOT DETECTED IN THE SAMPLE.
F	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. ANALYTE FOUND IN SAMPLE BLANK AS WELL AS SAMPLE.
G	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. VALUE REPORTED IS THE MAXIMUM OF TWO OR MORE DETERMINATIONS.
GT	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. GREATER THAN QUANTIFICATION LEVEL - LABORATORY REPORTED A VALUE WHICH WAS GREATER THAN THE QUA

Lab Qualifier Code	Description
H1	HOLD TIME: SAMPLE ANALYSIS PERFORMED PAST HOLDING TIME.
H2	HOLD TIME: INITIAL ANALYSIS WITHIN HOLDING TIME. REANALYSIS FOR THE REQUIRED DILUTION WAS PAST HOLDING TIME.
H3	HOLD TIME: SAMPLE WAS RECEIVED AND/OR ANALYSIS REQUESTED PAST HOLDING TIME.
H4	HOLD TIME: SAMPLE WAS EXTRACTED PAST REQUIRED EXTRACTION HOLDING TIME, BUT ANALYZED WITHIN ANALYSIS HOLDING TIME.
H5	HOLD TIME: THIS TEST IS SPECIFIED TO BE PERFORMED IN THE FIELD WITHIN 15 MINUTES OF SAMPLING; SAMPLE WAS RECEIVED AND ANALYZED PAST THE REGULATORY HOLDING TIME.
H6	HOLD TIME: THE FILTRATION WAS NOT DONE WITHIN THE REQUIRED 15 MINUTES OF SAMPLING, THE SAMPLE WAS FILTERED IN THE LABORATORY.
J	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. VALUES ARE ESTIMATED, DATA IS VALID FOR LIMITED PURPOSES. VALUES ARE ESTIMATED, DATA IS VALID
K	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. COMPOUND IS PRESENT, BUT BELOW LISTED VALUE (TYPICALLY, THE LAB DETECTION_ LIMIT).
K1	BOD/CBOD: THE SAMLE DILUTIONS SET-UP FOR THE BOD/CBOD ANALYSIS DID NOT MEET THE OXYGEN DEPLETION CRITERIA OF AT LEAST 2 MG/L. THE REPORTED RESULT IS AN ESTIMATED VALUE.
K10	BOD/CBOD: SEED CONTROL SAMPLES DO NOT DEPLETE AT LEAST 2.0 MG/L, WITH A RETENTION OF AT LEAST 1.0 MG/L DO CRITERIA IN ALL SAMPLES.
K11	BOD/CBOD: MINIMUM DO IS LESS THAN 1.0 MG/L IN ALL DILUTIONS.
K2	BOD: THE SAMPLE DILUTIONS SET UP FOR THE BOD/CBOD ANALYSIS FAILED TO MEET THE CRITERIA OF A RESIDUAL DISSOLVED OXYGEN OF AT LEAST 1 MG/L. THE REPORTED RESULT IS AN ESTIMATED VALUE.
K3	ARCHIVED FOR HISTORICAL DATA ON 20031126 NOT AVAILABLE FOR USE: THE SEED DEPLETION WAS OUTSIDE THE METHOD ACCEPTANCE LIMITS.
K4	ARCHIVED FOR HISTORICAL DATA ON 20080128 ¿ NOT AVAILABLE FOR USE: BOD/CBOD: THE SEED DEPLETION WAS OUTSIDE THE METHOD ACCEPTANCE LIMITS. THE REPORTED RESULT IS AN ESTIMATED VALUE.
K5	BOD/CBOD: THE DILUTION WATER D.O. DEPLETION WAS > 0.2 MG/L.
K6	BOD/CBOD: GLUCOSE/GLUTAMIC ACID BOD/CBOD WAS BELOW METHOD ACCEPTANCE CRITERIA
K7	BOD/CBOD: A DISCREPANCY BETWEEN THE BOD AND COD RESULTS HAS BEEN VERIFIED BY REANALYSIS OF THE SAMPLE FOR COD
K8	BOD/CBOD: GLUCOSE / GLUTAMIC ACID BOD/CBOD WAS ABOVE METHOD ACCEPTANCE LEVELS.
K9	BOD/CBOD: TEST REPLICATES SHOW MORE THAN 30% DIFFERENCE BETWEEN HIGH AND LOW VALUES.
L	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. RESULT BETWEEN CONTRACT QUANTITATION & INSTRUMENT DETECT LMT - RESULTS HAVE BEEN QUALIFIED BEC
L1	LABORATORY FORTIFIED BLANK/BLANK SPIKE: THE ASSOCIATED BLANK SPIKE RECOVERY WAS ABOVE LABORATORY ACCEPTANCE LIMITS.
L2	LABORATORY FORTIFIED BLANK/BLANK SPIKE: THE ASSOCIATED BLANK SPIKE RECOVERY WAS BELOW LABORATORY ACCEPTANCE LIMITS.
L3	LABORATORY FORTIFIED BLANK/BLANK SPIKE: THE ASSOCIATED BLANK SPIKE RECOVERY WAS ABOVE METHOD ACCEPTANCE LIMITS.
L4	LABORATORY FORTIFIED BLANK/BLANK SPIKE: THE ASSOCIATED BLANK SPIKE

Lab Qualifier Code	Description
	RECOVERY WAS BELOW METHOD ACCEPTANCE LIMITS.
L5	LABORATORY FORTIFIED BLANK/BLANK SPIKE: THE ASSOCIATED BLANK SPIKE RECOVERY WAS ABOVE LABORATORY/METHOD ACCEPTANCE LIMITS. THIS ANALYTE WAS NOT DETECTED IN THE SAMPLE.
M	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. DUPLICATE ANALYSIS OUTSIDE CONTROL LIMITS.
M1	MATRIX SPIKE: MATRIX SPIKE RECOVERY WAS HIGH, THE METHOD CONTROL SAMPLE ASSOCIATED BLANK SPIKE RECOVERY WAS ACCEPTABLE
M2	MATRIX SPIKE: MATRIX SPIKE RECOVERY WAS LOW, THE METHOD CONTROL SAMPLE ASSOCIATED BLANK SPIKE RECOVERY WAS ACCEPTABLE.
M3	MATRIX SPIKE: THE SPIKE RECOVERY VALUE IS UNUSABLE THE ANALYTE CONCENTRATION IN THE SAMPLE IS DISPROPORTIONATE TO THE SPIKE LEVEL THE ASSOCIATED BLANK SPIKE RECOVERY WAS ACCEPTABLE
M4	MATRIX SPIKE: THE ANALYSIS OF THE SPIKED SAMPLE REQUIRED A DILUTION SUCH THAT THE SPIKE RECOVERY CALCULATION DOES NOT PROVIDE USEFUL INFO THE ASSOCIATED BLANK SPIKE WAS ACCEPTABLE.
M5	MATRIX SPIKE: ANALYTE CONCENTRATION WAS DETERMINED BY THE METHOD OF STANDARD ADDITION (MSA).
M6	MATRIX SPIKE: MATRIX SPIKE RECOVERY WAS HIGH. DATA REPORTED PER ADEQ POLICY 0154.000. MATRIX INTERFERENCE WAS CONFIRMED.
M7	MATRIX SPIKE: MATRIX SPIKE RECOVERY WAS LOW. DATA REPORTED PER ADEQ POLICY 0154.000. MATRIX INTERFERENCE WAS CONFIRMED.
N	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. PRESUMPTIVE EVIDENCE OF THE PRESENCE OF THE COMPOUND - PRESUMPTIVE EVIDENCE OF THE PRESENCE OF
N1	GENERAL: SEE CASE NARRATIVE.
N2	GENERAL: SEE CORRECTIVE ACTION REPORT.
N3	ARCHIVED FOR HISTORICAL DATA ON 20080128 ¿ NOT AVAILABLE FOR USE: GENERAL: THE ANALYSIS MEETS ALL METHOD REQUIREMENTS. SEE CASE NARRATIVE.
N4	GENERAL: THE MINIMUM REPORTING LIMIT (MRL) VERIFICATION CHECK DID NOT MEET THE LABORATORY ACCEPTANCE LIMIT.
N5	GENERAL: THE MINIMUM REPORTING LIMIT (MRL) VERIFICATION CHECK DID NOT MEET THE METHOD ACCEPTANCE LIMIT.
N6	GENERAL: DATA SUSPECT DUE TO QUALITY CONTROL FAILURE, REPORTED PER DATA USER¿S REQUEST.
N7	GENERAL: ADDITIONAL ANALYSIS WAS NOT PERFORMED BASED ON THE "TOTAL" RESULT WHICH WAS BELOW THE REQUESTED ANALYTE'S MCL/ACTION LEVEL/TRIGGER LEVEL.
PR	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. COMPOUND IS PRESENT.
Q	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. HOLDING TIME EXCEEDED.
Q1	SAMPLE QUALITY: SAMPLE INTEGRITY WAS NOT MAINTAINED. SEE CASE NARRATIVE.
Q10	SAMPLE QUALITY: SAMPLE RECEIVED IN INAPPROPRIATE SAMPLE CONTAINER.
Q11	SAMPLE QUALITY: SAMPLE IS METEROGENEOUS. SAMPLE HOMOGENEITY COULD NOT BE READILY ACHIEVED USING ROUTINE LABORATORY PRACTICES.
Q2	SAMPLE QUALITY: SAMPLE RECEIVED WITH HEAD SPACE.
Q3	SAMPLE QUALITY: SAMPLE RECEIVED WITH IMPROPER CHEMICAL PRESERVATION.

Lab Qualifier Code	Description
Q4	SAMPLE QUALITY: SAMPLE RECEIVED AND ANALYZED WITHOUT CHEMICAL PRESERVATION
Q5	SAMPLE QUALITY: SAMPLE RECEIVED WITH INADEQUATE CHEMICAL PRESERVATION, BUT PRESERVED BY THE LABORATORY.
Q6	SAMPLE QUALITY: SAMPLE WAS RECEIVED ABOVE RECOMMENDED TEMPERATURE.
Q7	SAMPLE QUALITY: SAMPLE INADEQUATELY DECHLORINATED.
Q8	SAMPLE QUALITY: INSUFFICIENT SAMPLE RECEIVED TO MEET METHOD QC REQUIREMENTS. BATCH QC REQUIREMENTS SATISFY ADEQ POLICY 0154.000.
Q9	SAMPLE QUALITY: INSUFFICIENT SAMPLE RECEIVED TO MEET METHOD QC REQUIREMENTS.
R	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. VALUES HAVE BEEN REJECTED, DATA IS INVALID FOR ALL PURPOSES.
R1	DUPLICATES: RPD/RSD EXCEEDED THE METHOD CONTROL ACCEPTANCE LIMIT. SEE CASE NARRATIVE.
R10	DUPLICATES: SAMPLE RPD BETWEEN PRIMARY AND CONFIRMATORY ANALYSIS EXCEEDED 40%. PER EPA METHOD 8000B, THE LOWER VALUE WAS RPD DUE TO APPARENT CHROMATOGRAPHIC PROBLEMS.
R11	DUPLICATES: THE RPD CALCULATION FOR MS/MSD DOES NOT PROVIDE USEFUL INFORMATION DUE TO THE VARYING SAMPLE WEIGHTS WHEN ENCORE SAMPLERS/METHANOL FIELD PRESERVED SAMPLES ARE USED.
R12	DUPLICATES: RPD/RSD EXCEEDED THE METHOD ACCEPTANCE LIMIT. RESULT LESS THAN 5 TIMES THE PQL.
R13	DUPLICATES: MS/MSD RPD EXCEEDED METHOD ACCEPTANCE LIMIT. MATRIX SPIKE RECOVERY WAS OUTSIDE ACCEPTANCE CRITERIA. BATCH PRECISION AND ACCURACY WERE DEMONSTRATED.
R2	DUPLICATES: RPD/RSD EXCEEDED THE LABORATORY CONTROL ACCEPTANCE LIMIT. SEE CASE NARRATIVE
R4	DUPLICATES: MS/MSD RPD EXCEEDED THE METHOD CONTROL ACCEPTANCE LIMIT. RECOVERY MET ACCEPTANCE CRITERIA
R5	DUPLICATES: MS/MSD RPD EXCEEDED THE LABORATORY CONTROL ACCEPTANCE LIMIT. RECOVERY MET ACCEPTANCE CRITERIA.
R6	DUPLICATES: LFB/LFBD RPD EXCEEDED THE METHOD CONTROL ACCEPTANCE LIMIT. RECOVERY MET ACCEPTANCE CRITERIA.
R7	DUPLICATES: LFB/LFBD RPD EXCEEDED THE LABORATORY CONTROL ACCEPTANCE LIMIT. RECOVERY MET ACCEPTANCE CRITERIA
R8	DUPLICATES: SAMPLE RPD EXCEEDED THE METHOD CONTROL ACCEPTANCE LIMIT.
R9	DUPLICATES: SAMPLE RPD EXCEEDED THE LABORATORY CONTROL ACCEPTANCE LIMIT.
S	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. SPIKED SAMPLE RECOVERY OUTSIDE CONTROL LIMITS
S1	SURROGATE: SURROGATE RECOVERY WAS ABOVE LABORATORY ACCEPTANCE LIMITS, BUT WITHIN METHOD ACCEPTANCE LIMITS.
S10	SURROGATE: SURROGATE RECOVERY WAS ABOVE LABORATORY AND METHOD ACCEPTANCE LIMITS. SEE CASE NARRATIVE.
S11	SURROGATE: SURROGATE RECOVERY WAS HIGH. DATA REPORTED PER ADEQ POLICY 0154.000.
S12	SURROGATE: SURROGATE RECOVERY WAS LOW. DATA REPORTED PER ADEQ POLICY 0154.000.

Lab Qualifier Code	Description
S2	ARCHIVED FOR HISTORICAL DATA ON 20031126 NOT AVAILABLE FOR USE: SURROGATE RECOVERY WAS ABOVE LABORATORY AND METHOD ACCEPTANCE LIMITS.
S3	SURROGATE: SURROGATE RECOVERY WAS ABOVE LABORATORY ACCEPTANCE LIMITS, BUT WITHIN METHOD ACCEPTANCE LIMITS. NO TARGET ANALYTES WERE DETECTED IN THE SAMPLE.
S4	SURROGATE: SURROGATE RECOVERY WAS ABOVE LABORATORY AND METHOD ACCEPTANCE LIMITS. NO TARGET ANALYTES WERE DETECTED IN THE SAMPLE.
S5	SURROGATE: SURROGATE RECOVERY WAS BELOW LABORATORY ACCEPTANCE LIMITS, BUT WITHIN METHOD ACCEPTANCE LIMITS.
S6	SURROGATE: SURROGATE RECOVERY WAS BELOW LABORATORY AND METHOD ACCEPTANCE LIMITS. REEXTRACTION AND/OR REANALYSIS CONFIRMS LOW RECOVERY CAUSED BY MATRIX EFFECT.
S7	SURROGATE: SURROGATE RECOVERY WAS BELOW LABORATORY AND METHOD ACCEPTANCE LIMITS. UNABLE TO CONFIRM MATRIX EFFECT.
S8	SURROGATE: THE ANALYSIS OF THE SAMPLE REQUIRED DILUTION SUCH THAT THE SURROGATE RECOVERY CALCULATION DOES NOT PROVIDE USEFUL INFORMATION. THE ASSOCIATED BLANK SPIKE WAS ACCEPTABLE.
S9	ARCHIVED FOR HISTORICAL DATA ON 20031126 NOT AVAILABLE FOR USE: THE ANALYSIS OF THE SAMPLE REQUIRED A DILUTION SUCH THAT THE SURROGATE CONCENTRATION WAS DILUTED BELOW THE LABORAT
T	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. VALUE REPORTED IS LESS THAN CRITERIA OF DETECTION.
T1	METHOD/ANALYTE DISCREPANCIES: METHOD APPROVED BY EPA, BUT NOT YET LICENSED BY ADHS.
T2	METHOD/ANALYTE DISCREPANCIES: CITED ADHS LICENSED METHOD DOES NOT CONTAIN THIS ANALYTE AS PART OF METHOD COUMPOUND LIST.
T3	METHOD/ANALYTE DISCREPANCIES: METHOD NOT PROMULGATED EITHER BY EPA OR ADHS.
T4	METHOD/ANALYTE DISCREPANCIES: TENTATIVELY IDENTIFIED COMPOUND. CONCENTRATION IS ESTIMATED AND BASED ON TEH CLOSEST INTERNAL STANDARD.
T5	METHOD/ANALYTE DISCREPANCIES: LABORATORY NOT LICENSED FOR THIS PARAMETER (METHOD, OR METHOD AND ANALYTE).
T6	METHOD/ANALYTE DISCREPANCIES: THE REPORTED RESULT CANNOT BE USED FOR COMPLIANCE PURPOSES.
T7	METHOD/ANALYTE DISCREPANCIES: INCUBATOR/OVEN TEMPERATURES WERE NOT MONITORED AS REQUIRED DURING ALL DAYS OF USE.
T8	METHOD/ANALYTE DISCREPANCIES: METHOD USED NOT LISTED IN 40 CFR 136; ALTERNATE METHOD CHOSEN AS ACCEPTABLE PER PERMIT.
T9	METHOD/ANALYTE DISCREPANCIES: LESS THAN THE PRESCRIBED SAMPLE AMOUNT WAS AVAILABLE TO PERFORM THE LEACHATE EXTRACTION. THE VOLUME OF EXTRACTION FLUID WAS ADJUSTED PROPORTIONATELY
TR	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. TRACE - LABORATORY REPORTED A TRACE VALUE FOR THE COMPOUND.
U	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. COMPOUND WAS NOT DETECTED ABOVE THE CONCENTRATION LISTED.
UJ	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. SAMPLE QUANTITATION LIMIT WAS ADJUSTED-

Lab Qualifier Code	Description
	VALUE IS ESTIMATED
V1	CALIBRATION VERIFICATION: CCV RECOVERY WAS ABOVE METHOD ACCEPTANCE LIMITS. THIS TARGET ANALYTE WAS NOT DETECTED IN THE SAMPLE.
V2	CALIBRATION VERIFICATION: CCV RECOVERY WAS ABOVE METHOD ACCEPTANCE LIMITS.THIS TARGET ANALYRTE WAS DETECTED IN THE SAMPLE.SAMPLE COULD NOT BE REANALYZED DUE TO INSUFICIENT SAMPLE.
V3	CALIBRATION VERIFICATION: CCV RECOVERY WAS ABOVE METHOD ACCEPTANCE LIMITS. THIS TARGET ANALYTE WAS DETECTED IN THE SAMPLE, BUT THE SAMPLE WAS NOT REANALYZED. SEE CASE NARRATIVE.
V4	CALIBRATION VERIFICATION: CCV RECOVERY WAS BELOW METHOD ACCEPTANCE LIMITS. THE SAMPLE COULD NOT BE REANALYZED DUE TO INSUFFICIENT SAMPLE.
V5	CALIBRATION VERIFICATION: CCV RECOVERY AFTER A GROUP OF SAMPLES WAS ABOVE ACCEPTANCE LIMITS. THIS TARGET ANALYTE WAS NOT DETECTED IN THE SAMPLE; ACCEPTABLE PER EPA METHOD 8000C.
V6	CALIBRATION VERIFICATION: DATA REPORTED FROM ONE-POINT CALIBRATION CRITERIA.
V7	CALIBRATION VERIFICATION: CV RECOVERY WAS ABOVE THE METHOD CONTROL LIMIT FOR THIS ANALYTE, HOWEVER, AVERAG % DIFFERENCE OR % DRIFT FOR ALL THE ANALYTES MET METHOD CRITERIA.
V8	CALIBRATION VERIFICATION: CV RECOVERY WAS BELOW THE METHOD CONTROL LIMIT FOR THIS ANALYTE, HOWEVER, THE AVERAGE % DIFFERENCE OR % DRIFT FOR ALL THE ANALYTES MET METHOD CRITERIA
V9	CALIBRATION VERIFICATION: CCV RECOVERY WAS BELOW METHOD ACCEPTANCE LIMITS.
W	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. VALUE OBSERVED IS LESS THAN LOWEST VALUE UNDER "T".
W1	ARCHIVED FOR HISTORICAL DATA ON 20120905 ¿ NOT AVAILABLE FOR USE: CALIBRATION: THE % RSD FOR THIS COMPOUND WAS ABOVE 20%. THE AVERAGE % RSD FOR ALL COMPOUNDS IN THE CALIBRATION MET
W2	ARCHIVED FOR HISTORICAL DATA ON 20120905 ¿ NOT AVAILABLE FOR USE: CALIBRATION: THE % RSD FOR THIS COMPOUND WAS ABOVE 15%. THE AVERAGE % RSD FOR ALL COMPOUNDS IN THE CALIBRATION MET
X	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. OTHER (SEE COMMENTS FROM SAMPLE).
Y	LAB NOTATION CODE ADDED TO ARIZONA DATA QUALIFIER LOOK UP TABLE FOR OVERFLOW CAPTURE. QC RATIOS OUTSIDE ACCEPTABLE RANGE.

ATTACHMENT 13D

LAB DOCUMENTATION REQUIREMENTS FOR DATA VALIDATION

LABORATORY DOCUMENTATION REQUIREMENTS FOR DATA VALIDATION

DRAFT

Document Control Number 9QA-07-97

(Supersedes 9QA-07-90)

JULY 1997

Quality Assurance Program

USEPA Region 9

San Francisco, California

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INTRODUCTION

In all hazardous site investigations, it is essential to know the quality of the data used for decision-making purposes. The process of generating data of known quality begins in the planning stages when data quality objectives (DQOs) are established (EPA 1993 and 1994); continues during sample collection activities and laboratory analysis; is re-evaluated when validating the analytical data (EPA 1994a, 1994b); and is finalized as part of the data quality assessment process (EPA 1996). This document has been revised to be consistent with the deliverable specifications defined in revisions to contract laboratory program (CLP) inorganic and organic statements of work (EPA 1992, 1994c), and to identify the specific laboratory documentation requirements that are generally necessary as part of the DQO process.

Validation of data requires that appropriate quality assurance and quality control (QA/QC) procedures be followed, and that adequate documentation be included for all data generated both in the laboratory and in the field. Professionals trained in data validation procedures review this information, "flag" data with qualifiers when QA/QC criteria are not met, and prepare the data validation report. The validation reports are then used as sources of data quality indicators, which are used to conduct a data quality assessment relative to the pre-established DQOs.

The QA/QC documentation provided by any laboratory, in conjunction with the sample results, allows for the evaluation of the following indicators of data quality:

- Integrity and stability of the samples;
- Instrument performance during sample analysis;
- Possibility of sample contamination;
- Identification and quantitation of analytes;
- Analytical precision; and
- Analytical accuracy.

The general laboratory documentation requirements discussed in this document are formatted into two (2) sections, pertaining to the organic and inorganic analyses. In addition to the general documentation requirements discussed in this document, several new appendices have been added to provide specific details regarding data deliverables for selected non-CLP analytical methods. The summary of deliverable specifications presented in the appendices were derived for the non-CLP methods commonly used by the EPA Region 9 Analytical Program. The deliverable specifications are not intended to be a prescriptive list that is always required, but rather, they are intended to show what EPA Region 9 has done to establish general analytical documentation requirements in response to the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

It is hoped that this document will help clarify some of the confusion that exists between the various analytical levels of data quality that were included in the outdated guidance document *Data Quality Objectives fore Remedial Response Activities*. The more recent DQO guidance, *Guidance for the Data Quality Objectives Process* (EPA 1994) requires the use of definitive data for decision making.

Accordingly, any data used to make decisions should be appropriately documented. This document should be used as a menu of quality control parameters, naming conventions, and formatting examples for a specific group of analytical procedures. The fundamental objective is to produce documentation that substantiates data quality.

I. ORGANIC ANALYSES

I.A. Documentation

The data package submitted for EPA data validation will consist of five (5) sections:

- Case narrative;
- Chain-of-Custody documentation;
- Summary of results for environmental samples (including quantitation limits);
- Summary of QA/QC results; and
- Raw data.

I.B. Case Narrative

The case narrative will be written on laboratory letterhead and the release of data will be authorized by the laboratory manager or his/her designee. The Case Narrative will consist of the following information:

- Client's sample identification and the corresponding laboratory identification;
- Parameters analyzed for each sample and the methodology used. EPA method numbers should be cited when applicable.
- Whether the holding times were met or exceeded;
- Detailed description of all problems encountered;
- Discussion of possible reasons for any QA/QC sample results outside acceptance limits; and
- Observations regarding any occurrences which may adversely affect sample integrity or data quality.

I.C. Chain-of-Custody Documentation

Legible copies of Chain-of-Custody forms for each sample shall be submitted in the data package. The date of receipt and the observed sample condition at the time of receipt must be described on the Chain-of-Custody form. Copies of any internal laboratory tracking documents should be included.

I.D. Summary of Environmental Sample Results (CLP Form I Equivalent)

The following information is to be included in the summary of sample results for each environmental sample. The summary form should follow the CLP format if possible, but other formats are acceptable provided that all necessary information is included.

- Form Title;
- Client's sample identification and the corresponding laboratory identification;

- Sample collection date;
- Sample matrix;
- Date of sample (or sub-sample) extraction and quantity of sample subjected to extraction, as applicable;
- Date and time of analysis;
- Identification of the instrument used for analysis;
- Gas Chromatography (GC) column and detector specifications;
- Weight or volume of sample used for analysis/extraction;
- Dilution or concentration factor for the sample;
- Percentage of moisture in soil sample (optional);
- Method detection limits (MDL) or sample quantitation limits;
- Analytical results and associated units; and
- Definitions for any laboratory data qualifiers used.

I.E. Summary of QA/QC Sample Results

The following QA/QC sample results must be presented on QC summary forms to facilitate data validation and data quality assessment activities. The summaries should follow the CLP format, if possible. Other formats may be acceptable provided that all necessary information is included and the summary is easy to follow. These summaries must have all the information outlined in Section I.D (a detailed summary is presented in Appendix D).

I.E.1. Instrument Calibration (for each instrument used)

Initial Calibration (CLP Form VI equivalent)

Report the analyte concentrations of the initial calibration standards and the date and time of analysis. List the response factor (RF), the average RF, percent relative standard deviation (%RSD), and retention time (for GC analyses) for each analyte. The initial calibration (IC) report must also include a sample identifier (ID), associated injection volume or quantity of sample analyzed, and the acceptance criteria, such as minimum RF values, and associated maximum %RSD values.

Continuing Calibration (CLP Form VI equivalent)

Report the concentration of the calibration standard used for the continuing calibration and for the mid-level standard, and the date and time of analysis. List the RF, percent difference (%D), and retention time (for GC analyses) for each analyte.

I.E.2. Method Blank Analysis (CLP Form IV equivalent)

List the environmental samples and QC analyses associated with each method blank. Report the concentrations of any analytes found in the method blanks.

I.E.3. Surrogate Standard Recovery (CLP Form II equivalent)

Report the name and concentration of each surrogate compound added. List the percent recoveries of all surrogates in the samples, method blanks, matrix spike/matrix spike duplicates and other QC analyses.

I.E.4. Precision and Accuracy (CLP Form III equivalent)

- Matrix spike/matrix spike duplicate (MS/MSD) analysis.

Report the name and concentration of each spiking compound. Samples are to be spiked with all specified compounds of potential concern. List the sample results, spiked sample results (concentration and %R), percent recovery and the relative percent difference (RPD). The acceptance criteria must also be presented to facilitate evaluation of both spike and duplicate results.

- Laboratory duplicate analysis, as applicable.

Report the RPD between duplicate analyses, along with the associated acceptance criteria.

- Laboratory QC check sample analysis.

Report the percent recovery for each analyte in the laboratory QC check sample. List the associated acceptance limits.

I.E.5. Other QC Criteria

- GC Retention time windows determination (CLP Form X equivalent)

Report the retention time window for each analyte, for both primary and confirmation analyses.

Retention time windows are established by performing 3 analyses of standards for all analytes being measured throughout the course of a 72-hour period. The retention time window is defined as plus or minus 3 times the standard deviation of the absolute retention time. Retention time windows are to be updated daily.

- Compound identification (GC).

Report the retention times and the concentrations of each analyte detected in the samples for both primary and confirmation analyses.

- MDL determination.

List the method detection limits.

Method detection limits are determined by performing at least 7 analyses of standards for all analytes measured at 2-5 times the required detection limit concentrations. The method detection limits are calculated as 3.143 times the standard deviation of the measured values. Refer to 40 CFR Part 136 Appendix B.

I.F. Raw Data

I.F.1. GC Analyses

This section shall include **legible copies** of the raw data for the following:

- Environmental samples (arranged in sequential order by client sample number);
- Instrument calibrations; and
- QC analyses.

The raw data for both the primary and confirmation analyses are to be included.

The raw data for each analysis shall include the following:

- Chromatograms (label all analyte peaks, internal standards and surrogate standards with chemical names);
- Area print-outs or quantitation reports;
- Sample extraction and clean-up logs;
- Instrument analysis logs for each instrument used; and
- GC/MS confirmation, as applicable.

I.F.2. GC/MS Analyses

This section shall include **legible copies** of the raw data for the following:

- Environmental samples (arranged in increasing client's sample number order);
- Mass spectrometer tuning and mass calibration (BFB, DFTPP);
- Initial and continuing instrument calibrations;
- QC analyses;
- Sample extraction and clean-up logs; and
- Instrument analysis logs for each instrument used.

The raw data for each analysis shall include the following:

- Chromatograms (label all analyte peaks, internal standards and surrogate standards with chemical names);
- Enhanced spectra of target analytes and tentatively identified compounds (TICs), with the associated best-match spectra; and
- Quantitation reports.

Legible copies of the raw data shall be organized systematically, each page shall be numbered, and a table of contents must be included with each package. The raw data for compound identification and quantitation must be sufficient to verify each result presented in Sections I.D. and I.E.

I.G. SUMMARY OF DOCUMENTATION REQUIREMENTS

Organic Data

Section I. Case Narrative

Section II. Chain-of-Custody Documentation

1. Original Chain-of-Custody forms with ID numbers and laboratory receipt signatures

2. Copies of internal tracking documents, as applicable

Section III. Sample Analysis Results

1. Environmental samples, with quantitation limits (include dilutions and re-analyses)

Section IV. QC Summary Forms

1. Initial calibration summary
2. Continuing calibration summary
3. Method blank results
4. Surrogate percent recoveries
5. Matrix spike percent recoveries
6. Laboratory duplicate relative percent differences
7. Laboratory QC check sample, if applicable
8. Retention times and acceptance windows
9. Method detection limits (MDLs)

Section V. Raw Data, chromatograms and area/quantitation reports

1. Environmental samples (include dilutions and re-analyses)
2. Instrument tuning, for analyses gas chromatography/mass spectrometry (GC/MS)
3. Initial calibration
4. Continuing calibration
5. Method blanks
6. Surrogate recoveries
7. Matrix spike (MS)
8. Laboratory duplicate or matrix spike duplicate (MSD)
9. Laboratory QC check sample, as applicable

10. Retention time windows

11. Percent moisture for soil samples

12. Sample extraction and clean-up logs

13. Instrument analysis log for each instrument used

II. INORGANIC ANALYSES

II.A. Documentation

The data package submitted for EPA data validation will consist of five (5) sections:

- Case narrative;
- Chain-of-Custody documentation;
- Summary of results for environmental samples (including quantitation limits);
- Summary of QA/QC results; and
- Raw data.

II.B. Case Narrative

The case narrative will be written on laboratory letterhead and the release of data will be authorized by the laboratory manager or his/her designee. The Case Narrative will consist of the following information:

- Client's sample identification and the corresponding laboratory identification;
- Parameters analyzed for each sample and the methodology used. When applicable, cite EPA method numbers;
- Whether the holding times were met or exceeded;
- Detailed description of all problems encountered;
- Discussion of possible reasons for any QA/QC sample results outside acceptance limits; and
- Observations regarding any occurrences which may affect sample integrity or data quality.

II.C. Chain-of-Custody Documentation

Legible copies of Chain-of-Custody forms for each sample shall be submitted in the data package. The date of receipt and the observed sample condition at the time of receipt must be described on the Chain-of-Custody form.

II.D. Summary of Environmental Results

The following information is to be included in the summary of results for each environmental sample. The summary should follow the CLP format if possible, but other formats are acceptable provided that all necessary information is included.

- Form Title;
- Client's sample identification and the corresponding laboratory identification;

- Sample collection date;
- Sample matrix;
- Date of sample digestion and quantity of sample subjected to digestion, as applicable;
- Date and time of analysis;
- Identification of the instrument used for analysis;
- Instrument specifications;
- Weight or volume of sample used for analysis/digestion;
- Dilution or concentration factor for the sample;
- Percentage of moisture in the soil sample;
- Instrument detection limits (IDL) or MDL;
- Analytical results; and
- Definitions for any data qualifiers used.

II.E. Summary of QA/QC Results

The following QA/QC sample results must be presented on summary forms to facilitate data validation and data quality assessment activities. These summaries should follow the CLP format, if possible. Other formats are acceptable provided that all necessary information is included and the summary is easy to follow. These summaries must have all information stated in Section II.D.

II.E.1. Instrument Calibration (CLP Form II equivalent)

The order for reporting of calibrations for each analyte must follow the chronological order in which the standards were analyzed.

Initial Calibration Verification

Report the source for the calibrations standards. Report the concentration for the true value, the concentration found, the percent recovery, and the control limits for each element analyzed. The date and time of analysis must also be reported.

Continuing Calibration Verification

Report the source for the calibrations standards. Report the concentration for the true value, the concentration found, the percent recovery, and the control limits for each element analyzed. The date and time analysis must also be reported.

Report results for (low-level) standards used to verify instrument sensitivity (that the reported detection limits can be achieved) in the manner described for continuing calibration verification. This should accompany data packages when modified analytical procedures result in lower reporting (i.e., quantitation) limits.

II.E.2. Method Blank Analysis (CLP Form III equivalent)

Report analyte concentrations found in the initial calibration blank (ICB), the continuing calibration blank (CCB), and in the preparation blank. The date and time of analysis must also be reported.

The order for reporting ICB and CCB results for each analyte must follow the chronological order in which the blanks were analyzed.

II.E.3. ICP Interference Check Sample (CLP Form V equivalent)

Identify the source for the interference check sample. Report the true value, the initial and final results and the calculated percent recovery, and the control limits for each analyte.

II.E.4. Precision and Accuracy

- MS analysis (CLP Form V equivalent)

Report the concentration of the spiked sample result, the sample result and the quantity of spiking solution added to the predigestion spike for each analyte. Calculate and report the %R and list the control limits.

- Post Digest Spike (CLP Form V equivalent)

In addition to matrix spikes, post-digestion spikes are sometimes analyzed during furnace analysis. Report the concentration of the spiked sample result, the sample result, and the spiking solution added for each element when sample matrix conditions require post digestion spikes. Calculate and report the %R and list the control limits.

- Laboratory Duplicate Analysis

Report the original concentration, duplicate concentration and RPD. List the control limits.

- Laboratory Control Sample (CLP Form VII equivalent)

Identify the source for the laboratory control sample. Report the concentration of the spiked sample result, the sample results and the spiking solution added for each element analyzed. Calculate and report the percent recovery and list the control limits.

The laboratory control check sample is prepared following the identical procedure that was used for preparing the analytical samples.

II.E.5. Other QC Criteria

- Method of Standard Additions (MSA)

This summary must be included when MSA analyses are required. Report the absorbance values with corresponding concentration values. Report the final analyte concentration and list the associated correlation coefficient, and the control limits.

- Inductively Coupled Plasma (ICP) Serial Dilution

Report the initial and serial dilution results, the associated %D, and the control limits.

- ICP Linear Ranges

For each instrument and wavelength used, report the date on which the linear ranges were established, the integration time, and the upper limit concentration.

- ICP Inter--element Correction Factors

For each instrument and wavelength used, report the date on which the correction factors were determined. List the inter--element correction factors for Al, Ca, Fe, Mg and any other element and the analytes to which they are applied.

- IDL determination

List the IDLs.

IDLs are determined by multiplying by 3.143, the average of the standard deviations obtained on three nonconsecutive days from the analysis of a standard solution at a concentration 3-5 times the estimated detection limit concentrations, with 7 consecutive measurements per day. Refer to the 40 CFR Part 136 Appendix B.

II.F. Raw data

This section shall include **legible copies** of the raw data for the following:

- Environmental sample results (arranged in increasing client's sample number order);
- Instrument calibrations; and
- QC sample analysis data.

The raw data for each analysis shall include the following:

- Measurement print-outs and quantitation reports for each instrument used;
- Absorbance, titrimetric, or other measurements for wet chemical analysis;
- Sample preparation and digestion logs;
- Instrument analysis logs for each instrument used; and
- Percent moisture in the soil samples (when applicable).

Legible copies of the raw data shall be organized systematically, and each page shall be numbered, and a table of contents must be included in each package. The raw data for compound identification and quantitation must be sufficient to verify each result presented in Sections II.D. and II.E.

II.G. SUMMARY OF DOCUMENTATION REQUIREMENTS

Inorganic Data

Section I. Case Narrative

Section II. Chain-of-Custody Documentation

1. Original Chain-of-Custody forms with laboratory ID numbers and sample receipt signatures.

2. Copies of internal tracking documents, as applicable

Section III. Sample Analysis Results

1. Environmental samples, with quantitation limits (include dilutions and re-analyses)

Section IV. QC Sample Result Summary Forms

1. Initial and continuing calibrations

2. Method blanks, continuing calibration blanks, and prep blanks

3. ICP interference check sample

4. Matrix spike

5. Laboratory duplicate

6. Laboratory control sample

7. Method of standard additions

8. ICP serial dilution

9. Instrument detection limits

10. ICP linear range

Section V. Raw Data - sequential measurement readout records for ICP, graphite furnace atomic absorption (AA), flame AA, cold vapor mercury, cyanide, and/or other inorganic analyses.

1. Environmental samples (including dilutions and reanalyses)

2. Initial and continuing calibrations

3. Continuing calibration and Preparation blanks

4. Matrix spikes

5. Post digest spikes

6. Method of standard additions, when applicable

7. Laboratory duplicate or matrix spike duplicates

8. ICP Serial Dilution

9. Laboratory control samples, when applicable

10. Percent moisture for soil samples

11. Sample digestion and/or sample preparation logs

12. Instrument analysis log, for each instrument used

13. Instrument tuning for ICP-MS, when applicable

III. QC REQUIREMENTS SUMMARY

III.A. GC/MS Organic Analyses

QC limits, unless specified below, shall be determined according to the analytical methods and must be consistent with the associated DQOs. When QC limits are not specified in the methods, good laboratory practices (GLP) are to be followed. Re-analyses may be necessary when QC limits are not met.

Presented below is a summary of most analytical requirements for the various QC parameters. In order to document the quality of QC sample results, associated information must also be presented on the QC summary forms (see Appendix B)

1. **Instrument Tuning**

- At the beginning of each day that samples are analyzed.

2. **Initial Calibration**

- At the beginning of the analytical sequence;
- Whenever %D between the continuing and initial calibration response factors exceeds $\pm$25%. This applies to specified compounds of interest, or calibration check compounds (CCCs);
- Whenever the response factors for specified compounds of interest or system performance check compounds (SPCC) are less than 0.300 (0.250 for bromoform) for volatiles or less than 0.050 for semi-volatiles analyses; and
- After installation of a new column or after maintenance service/repair of the GC/MS.

3. **Continuing Calibration**

- Prior to the analysis of environmental samples, on each 12-hour shift that samples are analyzed.

4. **Method Blank**

- Purgeables (Volatiles): After each continuing calibration analysis and after the analyses of unusually concentrated samples, to demonstrate that the system is free of contamination;
- Extractables (Semivolatiles): One for each extraction batch of 20 or fewer samples, for each sample matrix. Analyze method blanks on all instruments used for sample analysis; and

- Method blanks should not contain any analytes of interest and are to be free of interfering peaks.

5. **Calibration Range**

- For samples containing one or more analytes at concentrations above the initial calibration range, the samples are to be diluted and re-analyzed.

6. **Surrogate Standard**

- Surrogate standards (3 for volatiles; 3 phenolic and 3 neutral compounds for semi-volatiles) are to be added to the calibration standards, method blanks, environmental samples and QC samples.

7. **Internal Standard**

- Internal standards (3 for volatiles and 6 for semi-volatiles) are to be added to the calibration standards, method blanks, environmental samples and QC samples; and
- If the extracted ion chromatogram profile (EICP) area for any of the internal standards changes by a factor of two (-50% to +100%) from the last continuing calibration, re-analysis of the samples is required after corrective action.

8. **Matrix Spike (MS) Analysis**

- For each extraction/analysis batch of 20 or fewer samples, for each sample matrix; and
- MS solutions are to contain all specified compounds of interest.

9. **Sample Duplicate or Matrix Spike Duplicate (MSD) Analysis**

- For each extraction/analysis batch of 20 or fewer samples, for each sample matrix.

10. **Laboratory QC Check Sample**

- At the beginning of the QC program and as needed.

11. **Method Detection Limits Determination**

- At the beginning of the QC program and as needed.

III. QC REQUIREMENTS SUMMARY

III.B. Pesticides/PCBs

QC limits, unless specified below, shall be according to the analytical methods. When QC limits are not specified in the methods, good laboratory practices (GLP) are to be followed. Re-analyses may be necessary when QC limits are not met.

1. **Initial Calibration**

- At beginning of the QC program;;

- Whenever the %D in calibration factors (CF) between continuing calibration and initial calibration exceeds ±15%; and
- After installation of a new column or after maintenance service/repair of the GC.

2. **Daily Calibration**

- Prior to the analysis of environmental samples, on each day that samples are analyzed.

3. **Mid-level Standard**

- After each group of 10 samples; and
- Report the percent breakdown for 4,4'-DDT and for endrin.

4. **Method Blank**

- For each extraction batch of 20 or fewer samples, for each sample matrix. Analyze method blanks on all instruments used for sample analysis; and
- Method blanks must demonstrate that the analytical system is free of contaminants and interfering peaks.

5. **Calibration Range**

- For samples containing one or more analytes at concentrations above the initial calibration range, the samples are to be diluted and re-analyzed.

6. **Surrogate Standard**

- Surrogate standards are to be added to the calibration standards, method blanks, environmental samples and QC samples.

7. **Matrix Spike (MS) Analysis**

- For each extraction batch of 20 or fewer samples, for each sample matrix; and
- MS solutions are to contain all specified compounds of interest.

8. **Sample Duplicate or Matrix Spike Duplicate (MSD) Analysis**

- For each extraction batch of 20 or fewer samples, for each sample matrix.

9. **Laboratory QC Check Sample**

- At beginning of the QC program and as needed.

10. **Retention Time Windows Determination**

- For each GC column, to be updated daily.

11. **Method Detection Limits Determination**

- At beginning of the QC program and as needed

III. QC REQUIREMENTS SUMMARY

III.C. Purgeable Organics by GC

QC limits, unless specified below, shall be according to the analytical methods. When QC limits are not specified in the methods, good laboratory practices (GLP) are to be followed. Re-analyses may be necessary when QC limits are not met.

1. **Initial Calibration**

- At beginning of the QC program;
- Whenever the %D in the CF between continuing calibration and initial calibration exceeds $\pm$15%; and
- After installation of a new column or after maintenance service/repair of the GC.

2. **Daily Calibration**

- Prior to the analysis of environmental samples, on each day that samples are analyzed.

3. **Mid-level Standard**

- After each group of 10 samples.

4. **Method Blank**

- After each daily calibration and mid-level standard analysis and after the analyses of unusually concentrated samples, to demonstrate that the system is free of contamination; and
- Method blanks should not contain any analytes of interest and are to be free of interfering peaks.

5. **Calibration Range**

- For samples containing one or more analytes at concentrations above the initial calibration range, the samples are to be diluted and re-analyzed.

6. **Surrogate Standard**

- Surrogate standards are to be added to the calibration standards, method blanks, environmental samples and QC samples.

7. **Matrix Spike (MS) Analysis**

- For each analysis batch of 20 or fewer samples, for each sample matrix; and
- MS solutions are to contain all specified compounds of interest.

8. **Sample Duplicate or Matrix Spike Duplicate (MSD) Analysis**

- For each analysis batch of 20 or fewer samples, for each sample matrix.

9. **Laboratory QC Check Sample**

- At beginning of the QC program and as needed.

10. **Retention Time Windows Determination**

- For each GC column, to be updated daily.

11. **Method Detection Limits Determination**

- At beginning of the QC program and as needed.

III. QC REQUIREMENTS SUMMARY

III.D. Metals Analyses

QC limits, unless specified below, shall be according to the analytical methods. When QC limits are not specified in the methods, good laboratory practices (GLP) are to be followed. Re-analyses may be necessary when QC limits are not met.

1. **Initial Calibration**

- Daily and each time the instrument is set up;
- Whenever the %D between the initial calibration and the continuing calibration exceeds 10% (20% for mercury and graphite furnace atomic absorption [GFAA] analyses);
- Whenever the %D between either of the ICP interference check samples and the true value exceeds 20%; and
- Blank standard required as part of initial calibration.

2. **Continuing Calibration Verification Standard**

- After every ten or fewer samples; and
- Analyses are required to have calibrations with acceptable recoveries (the %D between the initial calibration and the continuing calibration less than 10% [20% for mercury]) before and after the sample analysis.

3. **Blanks**

- Continuing calibration blank run immediately following continuing calibration verification standard; and
- Method blank for each preparation batch of 20 or fewer samples, for each sample matrix.

4. **ICP Interference Check Sample**

- At the beginning and at the end of the analytical run; and

- ICP analyses are required to have both ICP interference check samples with acceptable recoveries (the %D between the true value and the ICP interference check sample less than 20%).

5. **Calibration Range**

- For samples containing one or more analytes at concentrations above the initial calibration range, the samples are to be diluted and re-analyzed.

6. **Matrix Spike (MS) Analysis**

- For each preparation batch of 20 or fewer samples, for each sample matrix; and
- MS solutions are to contain all specified compounds of interest.

7. **Sample Duplicate Analysis**

- For each preparation batch of 20 or fewer samples, for each sample matrix.

8. **Laboratory Control Sample (LCS)**

- For each preparation batch of 20 or fewer samples, for each sample matrix;
- Analyses are required to have the LCS results within acceptable recoveries. The %R should be within the range of 80-120% for all metals.
- LCSs are not usually required for mercury or cyanide determinations, but should these data be deemed to be critical to decision making, it would be reasonable to require the mercury %R to be within the range of 90-110%,cyanide &R to be within the range of 85-115%.

9. **Graphite Furnace Post Digest QC**

- A post digest spike at approximately 10 to 20 µg/L is required for all furnace analyses. If the result is greater than or equal to 10 µg/L in the digestate and the recovery of the spike is not within 85% to 115%, the method of standard additions is required for analyte quantification; and
- If the method of standard additions correlation coefficient is less than 0.995, the method of standard additions analysis is required to be repeated once.

10. **ICP Serial Dilution**

- For each preparation batch of 20 or fewer samples, for each sample matrix, dilute the digestate by five and re-analyze.

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APPENDIX A

DATA DELIVERABLE SPECIFICATIONS FOR NON-CLP METHODS IN THE REGION 9 ANALYTICAL PROGRAM

ATTACHMENT 13E

DATA VERIFICATION AND VALIDATION CHECKLISTS

LABORATORY REPORT GOAL: DATA VERIFICATION

Perform data verification on all samples collected to characterize the site, including quarterly groundwater monitoring samples and soil investigation samples. A chemist or other professional with data validation or analytical laboratory experience who is approved by ADEQ will perform data verification. The professional should be familiar with the QC requirements specified for the analytical methods being reviewed. Data verification precedes data validation and is a systematic process for evaluating whether data has been generated with acceptable quality control, as defined in the Project QAPP.

Review only the items listed below, as well as completeness of supporting documentation. This is a cursory review of the laboratory's quality control and may suggest that a more thorough validation is needed.

CHECKLIST: DATA VERIFICATION

Completed	Review Item
	1. Case Narrative
	Have any anomalies, deficiencies, and QC problems been identified in the case narrative? What corrective action, if any, was taken?
	2. Chain-of-Custody Documentation
	Are the original Chain-of-Custody forms with ID numbers and laboratory receipt signatures present?
	Are there copies of internal tracking documents, as applicable?
	3. Sample Analysis Results
	Are sample analysis results included for environmental samples, with quantitation limits (include dilutions and re-analyses)?
	4. QC Summary – Is the following Information Included?
	Initial and continuing calibrations
	Method blanks, continuing calibration blanks, and preparation blanks
	Surrogate percent recoveries
	Internal standard percent recoveries
	Matrix spike percent recoveries

CHECKLIST: DATA VERIFICATION

Completed	Review Item
	Laboratory duplicate relative percent differences
	Laboratory QC check sample, laboratory control sample recoveries
	Field duplicates, if identified, reproducibility will be evaluated
	Acceptance criteria, if not already established by the method/DQO
	Definitions for any laboratory data qualifiers used
	Method of standard additions (INORGANIC)
	ICP serial dilution (INORGANIC)
	5. Specifically review the following:
	Was a check for timeliness and errors conducted, including requested deliverables, preservation, holding times, and Chain-of-Custody?
	Was a duplicate sample/matrix spike/matrix spike duplicate/post digest spike reviewed against precision and accuracy criteria specified by the method or by project DQOs?
	Were compound quantitation and reported detection limits reviewed, checking reporting limits against contract required limits, verifying dry weights, calculations, and dilutions?
	6. Does the Verification Report include the following information:
	Case narrative including, but not limited to, an overall summary of data acceptability and comparison to DQOs and DQIs (PARCC), a list of recommended changes, a summary of all laboratory contacts, in which communications with the laboratory, if any, would be identified, and any other problems associated with the actual analysis which might impact the sample integrity or data quality
	Marking of recommended changes directly on copies of the laboratory reports for the client's ease in performing data entry
	Tabulated summary of all data results supplied electronically by email or on 3.5-inch floppy disks in a commonly used software format

LABORATORY REPORT GOAL: DATA VALIDATION

Experienced chemists will perform full data validation on a data package(s) selected by the contractor Project Supervisor at the beginning of the project. The package(s) should be a full sample batch (approximately 20 samples), consisting of samples collected for groundwater monitoring and/or soil investigation, and should be typical of the type of samples expected for the project. Each analytical method used in the project should be initially validated prior to proceeding with performing data verification on the bulk of the laboratory results. Additionally, during each six-month period that the project is ongoing, the Project Supervisor will select additional data packages for validation, which are representative of the matrix and analyses being performed.

Data validation will consist of a review of sample and QC results, and the accompanying raw data. The ADEQ Project Manager will identify the compounds of concern, and the data validation will include a review of 100% of the QC data and sample data for these compounds in the laboratory report for a sample delivery group. Compounds not identified as contaminants of interest will not be validated unless requested by ADEQ's Project Manager. Data validation will be conducted by the contractor's QA officer or an independent data validation contractor. The ADEQ QA Unit will validate data at the ADEQ Project Manager's request. Validation includes all of the following items listed as validation deliverables.

The percentage of data that undergoes full validation may be increased if substantial data quality issues are raised during the initial or subsequent assessments. Or, ADEQ may require that a larger percent of the data be fully validated for various reasons including, but not limited to, determining the extent of the issue and/or if the issue has been corrected in subsequent analyses, or that additional data be made available for review, besides the validation deliverables mentioned below.

CHECKLIST: DATA VALIDATION

Completed	Review Item
	1. Case Narrative
	Have any anomalies, deficiencies, and QC problems been identified in the case narrative? What corrective action, if any, was taken?
	2. Chain-of-Custody Documentation
	Are the original Chain-of-Custody forms with ID numbers and laboratory receipt signatures present?
	Are there copies of internal tracking documents, as applicable?
	3. Sample Analysis Results
	Are sample analysis results included for environmental samples, with quantitation limits (include dilutions and re-analyses)?

CHECKLIST: DATA VALIDATION

Completed	Review Item
	4. QC Summary – Is the following Information Included?
	Initial and continuing calibrations
	Method blanks, continuing calibration blanks, and preparation blanks
	Surrogate percent recoveries
	Internal standard percent recoveries
	Matrix spike percent recoveries
	Laboratory duplicate relative percent differences
	Laboratory QC check sample, laboratory control sample recoveries
	Field duplicates, if identified, reproducibility will be evaluated
	Acceptance criteria, if not already established by the method/DQO
	Definitions for any laboratory data qualifiers used
	Gas chromatograph breakdown products
	Retention times and acceptance windows (ORGANIC)
	ICP interference check sample (INORGANIC)
	Method of standard additions (INORGANIC)
	ICP serial dilution (INORGANIC)
	5. Raw data, chromatograms, and area quantitation reports (ORGANIC), sequential measurement readout records for ICP, graphite furnace atomic absorption (AA), flame AA, cold vapor mercury, cyanide, and/or other inorganic analyses (INORGANIC), including but not limited to the following:
	Environmental samples (include dilutions and re-analyses)

CHECKLIST: DATA VALIDATION

Completed	Review Item
	Instrument tuning, for analyses of gas chromatography/mass spectrometry (GC/MS)
	Initial calibration and continuing calibrations
	Method blanks, continuing calibration, and preparation blanks
	Surrogate recoveries and internal standard recoveries, where applicable
	Matrix spike (MS)
	Laboratory duplicate or matrix spike duplicate (MSD)
	Laboratory QC check sample, or laboratory control samples, as applicable
	Retention time windows
	Percent moisture for soil samples
	Sample extraction and cleanup logs (ORGANIC)
	Enhanced spectra of target analytes and tentatively identified compounds (TICs) with the associated best match spectra for MS data
	Sample digestion and/or sample preparation logs (INORGANIC)
	Instrument analysis log for each instrument used (INORGANIC)
	Post-digest spikes (INORGANIC)
	Method of standard additions when applicable (INORGANIC)
	ICP serial dilution (INORGANIC)
	Instrument tuning for ICP/MS, when applicable (INORGANIC)

CHECKLIST: DATA VALIDATION

Completed	Review Item
	6. Specifically review the following:
	Was a check for timeliness and errors conducted, including requested deliverables, preservation, holding times, and Chain-of-Custody?
	Was a duplicate sample/matrix spike/matrix spike duplicate/post-digest spike reviewed against precision and accuracy criteria specified by the method or by project DQOs?
	Was compound quantitation and reported detection limits reviewed, checking reporting limits against contract required limits, verifying dry weights, calculations, and dilutions?
	Was target list compounds identified, indicating proper identification of analytes?
	Was sample result verification conducted, in which the final reports are reviewed against all raw instrumental data and logs and all applicable worksheets to check anomalies, data reduction/calculations, transcription, linear ranges, and dilutions?
	7. OPTIONAL (as requested by ADEQ for data validation on a case-by-case basis)
	Method detection limits (MDLs)
	Instrument detection limits (IDLs)
	ICP linear range (INORGANIC)
	8. Does the Validation Report include the following information?
	Case narrative including, but not limited to, an overall summary of data acceptability and comparison to DQOs (PARCC), a list of recommended changes, a summary of all laboratory contacts, in which communications with the laboratory, if any, would be identified, and any other problems associated with the actual analysis which might impact the sample integrity or data quality
	Marking of recommended changes directly on copies of the laboratory reports for the client's ease in performing data entry
	Tabulated summary of all data results supplied electronically by email or on 3.5-inch floppy disks in a commonly used software format

ATTACHMENT 13F

ADEQ POLICY 0154.000 (Addressing Spike & Surrogate Recovery)

0154.000 ADDRESSING SPIKE AND SURROGATE RECOVERY AS THEY RELATE TO MATRIX EFFECTS IN WATER, AIR, SLUDGE AND SOIL MATRICES POLICY

Level One **Arizona Department of Environmental Quality**

Originator: **Kenyon C. Carlson, Manager**
Quality Assurance/Quality Control (QA\QC) Unit

Contact for Information **Kenyon C. Carlson, Manager**
Quality Assurance/Quality Control (QA\QC) Unit

Issue Date: **October 23, 1998**

PURPOSE

The Arizona Department of Health Services (ADHS) has not established a comprehensive policy on the issue of matrix spike or surrogate recoveries because they do not have the authority to establish criteria by which ADEQ will either accept or reject data.

This policy will assure that all data submitted to ADEQ meets regulatory requirements and are legally defensible by establishing alternative criteria for when the established method recovery acceptance criteria for matrix spikes and/or surrogates are exceeded.

ADEQ is concerned with the assumption that if spike and/or surrogate recoveries exceed method acceptance criteria and that if those results can be duplicated without re-extracting the sample, the failure of that quality control criteria is a result of matrix effects. Duplication of out-of-range results can be the result of influences other than matrix effects and could be indicative of the method or instrument being out-of-control.

The ADEQ QA/QC Unit believes a more accurate and reliable assessment of possible matrix effects can be established using either a (1) dilution technique, (2) the method of standard additions, or (3) analyzing a laboratory fortified blank (LFB) or a laboratory control sample (LCS). Because ADEQ is a regulatory agency, compliance results must be able to meet all legal constraints and uphold all analytical method requirements.

AUTHORITY

A.A.C. R18-4-106 and R9-14-608.

DEFINITIONS

Data: For the purposes of this policy, data is defined as >raw data= (examples include but are Not limited to calibration curves, chromatograms, spectras, sample preparation and injection logs etc.) and does not include laboratory reports. (Contact the QA unit for further information.)

Laboratory Fortified Blank (LFB): (aka blank spike) an aliquot of organic free reagent water to which known quantities of the method analytes are added in the laboratory. The LFB is analyzed exactly like a sample, and its purpose is to determine whether the methodology (analytical process) is in control, and whether the laboratory is capable of making accurate and precise measurements at the required method detection limit.

Laboratory Fortified Blank Duplicate (LFBD): (aka blank spike duplicate) a duplicate sample of the aliquot of reagent water to which known quantities of the method analytes are added in the laboratory. The LFBD is analyzed exactly like a sample, and its purpose is to determine whether the methodology (analytical process) is in control, and whether the laboratory is capable of making accurate and precise measurements at the required method detection limit.

Laboratory Control Sample (LCS): A sample of clean dirt or sand to which known quantities of the method analytes are added in the laboratory. The LCS is extracted and analyzed exactly like a sample, and its purpose is to determine whether the methodology (sample preparation and analytical process) is in control, and whether the laboratory is capable of making accurate and precise measurements at the required method detection limit.

Laboratory Control Sample Duplicate (LCSD): A duplicate sample of clean dirt or sand to which known quantities of the method analytes are added in the laboratory. The LCSD is extracted and analyzed exactly like a sample, and its purpose is to determine whether the methodology (sample preparation and analytical process) is in control, and whether the laboratory is capable of making accurate and precise measurements at the required method detection limit.

Laboratory Fortified Sample Matrix (LFM): (aka matrix spike) an aliquot of an environmental sample to which known quantities of the method analytes are added in the laboratory. The LFM is analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results and therefore determines to what degree the method is successful in analyzing the target analytes. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the LFM corrected for background concentrations.

Laboratory Fortified Sample Matrix Duplicate (LFMD): (aka matrix spike duplicate) A duplicate sample of the aliquot of an environmental sample to which known quantities of the method analytes are added in the laboratory. The LFMD is analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results and therefore determines to what degree the method is successful in analyzing the target analytes. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the LFMD corrected for background concentrations.

Matrix: The predominant material, component or substrate, which contains the analyte of interest.

Matrix is not necessarily synonymous with phase (liquid or solid).

Matrix Interference: Also referred to as matrix effects. Matrix spike interference are those chemical and/or physical interferences that impede the analytical instrumentation in detecting the true value concentration of a target analyte in a sample. One possible source of matrix interferences may be caused by contaminants that are co-extracted from the sample and result in a positive or negative bias. The extent of matrix interferences will vary considerably from source to source, depending upon the nature and diversity of the sample matrix.

Method of Standard Additions: A technique used most commonly in metals analysis by atomic absorption; however, it can be applied in many areas of the laboratory. It serves to correct for matrix effects in the sample. Aliquots of a sample are spiked with at least three different concentrations of a standard.

Surrogate: A pure analyte, which is extremely unlikely to be found in any sample, and which is added to a sample aliquot in known amounts before extraction and is measured with the same procedures used to measure other sample components. A surrogate behaves similarly to the target analyte and its use is most often used with organic analytical procedures. The purpose of a surrogate analyte is to monitor method performance with each sample.

POLICY

ADEQ will not accept test results for regulatory purposes when the LFM and/or surrogate recovery exceed the acceptance criteria unless the laboratory has demonstrated that the sample itself is responsible for the QC results exceeding the methods acceptance criteria.

RESPONSIBILITY

The ADEQ Program staff will be responsible for reviewing the final report or the quality control summary sheets, which accompany the final results of the laboratory analysis to verify that matrix spikes and/or surrogate recoveries were within the acceptance criteria. If the program staff is uncertain as to how to evaluate the final report, or if required information is missing, it shall be the responsibility of the program staff to forward the information to the ADEQ QA/QC Unit for review and recommendations.

The ADEQ QA/QC Unit will review data referred by program staff to ensure that the procedures outlined in Attachment A of this policy were followed by the laboratory and to report their findings to the appropriate ADEQ program staff.

APPLICABILITY

This policy is applicable to all types of water, air, sludge, and soil matrices regardless of the method of analysis.

PROCEDURES

The ADEQ program staff shall review the final report or the quality control (QC) summary sheet, which accompanies the final report. ADEQ program staff shall assess the results of the LFM and LFMB on the QC Summary sheet to determine if the recoveries are within the acceptance range. If the LFM or LFMB results exceed the established recovery criteria, ADEQ program staff will assess the recovery criteria for those out of range analytes in either the LFB/LFBD or LCS/LCSD. If the required information is not included with the final report or program staff are uncertain as to how to evaluate the final report, they shall notify the QA/QC Unit so the QA/QC staff can perform a more thorough evaluation of the results.

The ADEQ QA/QC staff, if necessary, shall request a laboratory data package to review the raw data, determine the validity of the results and compliance with the ADEQ data reporting policy. The QA/QC Unit shall also submit in writing, to the program staff, the data validation findings and the ADEQ QA/QC Unit's recommendations.

Attachment A
Laboratory Procedures

The ADEQ policy for addressing spike and surrogate recovery as they relate to matrix effects in water, air, sludge, and soil matrices suggests three different techniques (analysis of an LFB/LFBD or LCS/LCSD pair, dilution procedure, or the standard additions technique), which may adequately explain the out-of-range QC results of samples. These three techniques do not represent an all-inclusive list for demonstrating matrix effects within a sample, and laboratories may have alternate and valid techniques to demonstrate matrix interference. These alternate techniques should be discussed with and approved by the ADEQ QA Unit prior to analysis to avoid the rejection of data.

ADEQ also requires the analysis of an LFB/LFBD, LCS/LCSD or LFM/LFMD pair to satisfy the precision requirements for drinking water methods. More useful information can be obtained regarding precision when comparing samples containing target analytes. Very little useful precision information is obtained when comparing the instrument precision using two samples that are non detect. Whenever included in the analytical batch, the laboratory must report the results of the LFB/LFBD or LCS/LCSD in addition to the LFM/LFMD to ADEQ and shall include the numerical values established by the laboratory for the QC acceptance criteria whenever the method has not provided any.

While the method would require a re-extraction of that sample to confirm matrix interference if the LFM and/or the LFMB fall outside the method's acceptance criteria, ADEQ will accept the results of the LFB/LFBD or LCS/LCSD, which demonstrate that the analytical process is in control. The LFB/LFBD and LCS/LCSD provide an interference-free matrix so that if the surrogates and/or matrix spike analytes are within the method's acceptance criteria, there is compelling data that an instrument is operating properly, the extraction procedure provided no bias, and the method is in control. The LFB/LFBD must be analyzed with the same batch as the LFM/LFMD for ADEQ to accept the LFB/LFBD results. The LCS/LCSD samples must be extracted and analyzed with the same batch as the LFM/LFMD samples for ADEQ to accept the results of the LCS/LCSD samples. The laboratory shall include the numerical values established by the laboratory for the QC acceptance criteria whenever the method has not provided any.

Another option is the dilution technique. The dilution technique is particularly well suited for demonstrating matrix effects in the LFM samples for analyses that don't require extraction procedures. Laboratories performing analytical work for ADEQ that suspect matrix interference in LFM samples may dilute that sample so that all suspected matrix effects are diluted out as well prior to spiking. Once the matrix effects have been diluted out, recovery of the matrix spikes and surrogates should fall within the acceptable recovery criteria established by the method, or the lab if none are given in the method.

The dilution of samples suspected of having matrix interference so that interference is no longer a factor strongly suggests that there may have been matrix effects in the sample, and the recovery of the spiked analytes within the acceptance range demonstrates the instrumentation and method are in control. ADEQ will accept use of the dilution technique to demonstrate matrix effects in LFM and LFMD samples because not every sample is matrix spiked and it cannot be assumed that the matrix effects observed in one sample are representative of the entire sample batch.

Because the dilution technique raises the reporting level of an analyte, it may not be a suitable technique to demonstrate matrix interference if the resulting reporting level exceeds the regulatory (trigger) or action level. The method of standard additions would be a preferred technique to help correct for positive or negative bias in the samples because this technique is unlikely to raise the reporting level of regulated contaminants that may be present in the sample. The method of standard additions usually employs aliquots of a digested or extracted sample, which are spiked with at least three different concentrations of a standard. The standard additions are chosen to bracket the unknown sample concentration and the response of the instrument must be linear.

Samples whose matrix spikes or surrogate recoveries continue to fall outside the acceptance criteria after any of the above three techniques or an alternate method pre-approved by the ADEQ QA Unit have been employed shall be reviewed by ADEQ on a case-by-case basis. Any results reported which are affected by matrix interference shall be flagged as an estimated quantitation.

Though groundwater protection levels (GPLs) are shown in Table 1 (where available), the primary concern with respect to the groundwater samples collected under this SAP is whether there are any detectable levels of OB/OD-related constituents present. Additional consideration in the final report will be made for the Arizona Aquifer Water Quality Standards. These standards were not included in Table 1 for brevity. That is, or course, excluding any such constituents that can be shown to be due to natural conditions. If contamination is present at detectable levels in these production wells, additional evaluations will likely be necessary to determine their potential significance and source. The groundwater sampling described by this plan is associated with the evaluation of conditions at the MTF. However, based solely on the distance from the Facility to the area of Wells H and J, it is highly unlikely that any contamination detected in these wells could be attributed to OB/OD actions. In addition, testing and training activities involving the same materials, as are managed at the MTF, are performed throughout the area. Detection of OB/OD-type hazardous contaminants in the production wells (should it occur) presents a problem whether or not the levels detected represent a risk to human health. In such a case, follow-on evaluations would be needed to determine the next steps necessary to locate the source of the contamination.

ATTACHMENT 13G

ADEQ POLICY 0155.000 (Calibration Verification Constraints Policy)

0155.000 ANALYTICAL METHODS HAVING PROVISIONS FOR A ONE-POINT CALIBRATION AND CONTINUING CALIBRATION VERIFICATION CONSTRAINTS POLICY

Level One **Arizona Department of Environmental Quality**

Originator: **Kenyon C. Carlson, Manager**
Quality Assurance\Quality Control (QA\QC) Unit

Contact for Information: **Kenyon C. Carlson, Manager**
Quality Assurance\Quality Control (QA\QC) Unit

Issue Date: **October 23, 1998**

PURPOSE

Most analytical methods have established upper and lower control limits for CCV's, and when the recovery exceeds those limits the method is considered "out-of-control". ADEQ is concerned with the assumption that the 'data is not impacted', as reported by laboratories when the upper control limit of a CCV has been exceeded in a non-detect result. Currently, there is no way to differentiate between an instrument that has gained sensitivity and one that has drifted out of control when the upper control limit of a CCV is ignored.

Adherence to this policy will assure that all laboratory-generated data submitted to ADEQ meets regulatory requirements and are legally defensible.

Because ADEQ is a regulatory agency, compliance results must be able to meet all legal requirements. Where CCV requirements are part of the test method and where test methods are part of the regulatory requirements, then the CCV requirements as dictated by the analytical method must be followed.

AUTHORITY

A.A.C. R18-4-106 and R9-14-608.

The EPA methods continue to be written such that upper and lower control limits for the CCV are established and there is no documentation, which permits one to ignore the violation of an upper control limit in light of certain conditions.

DEFINITIONS

Continuing Calibration Verification Standard (CCV)--Consists of an aliquot of reagent water to which known quantities of the method analytes are added by the laboratory. The CCV's purpose is to determine whether the methodology is 'in control' by verifying the linearity of the calibration curve and to assure that the sample results reflect accurate and precise measurements.

Data--For the purposes of this policy, data is defined as raw data (examples include but are not limited to calibration curves, chromatograms, spectras, injection logs, etc.) and does not include laboratory reports. (Contact the QA unit for further information).

POLICY

From a regulator's perspective, a laboratory must follow the method as written to ensure the analytical data generated is defensible and can survive the scrutiny of litigation. ADEQ will not accept test results for regulatory purposes when the CCV's acceptance criteria have been exceeded. This includes sample results where the upper control limit of the CCV has been exceeded and the result is reported as non-detect.

However, in the event a CCV exceeds its control limits for a detect sample, ADEQ allows the laboratory to either 1) recalibrate the entire multi-point curve and reanalyze the samples or 2) perform a one-point calibration as the method permits.

RESPONSIBILITY

The ADEQ QA/QC staff will be responsible, when reviewing data for the purpose of recommending to ADEQ program staff to either accept or reject such data, to ensure that the procedures outlined in this policy are followed.

APPLICABILITY

This policy is only applicable to those methods which provide for a one-point calibration and those water matrices for the analysis of volatile organic compounds (VOCs), synthetic organic compounds (SOCs), and inorganic compounds (IOCs) analyzed using 40 CFR methods (ex. 200, 500, and 600 series). This policy does not apply to those samples analyzed using SW-846 methods.

LABORATORY PROCEDURES

EPA and the ADEQ QA/QC Unit require that laboratories, which elect to recalibrate using a one-point calibration, must demonstrate there is adequate instrument sensitivity to detect a peak at the method reporting level for those contaminants. Therefore, to justify reporting sample results as non-detect when the control limits of a CCV have been exceeded, the laboratory must recalibrate using a standard at the method reporting level and re-run all the samples or extracts after that CCV.

The laboratory must detect a significant peak for each analyte reported in the method reporting level standard. A significant peak is considered to be one in which the peak is at least 3 to 5 times the signal to noise ratio (40 CFR, Part 136, Appendix B, Procedure Section 1a).

This ADEQ policy provides a means for laboratories to demonstrate that sample results are, in fact, non-detect for target analytes. The method reporting level standard must be analyzed (and determined to be acceptable) before reanalyzing any samples in a run.

Non-Detects:

To report a non-detect result using a one-point calibration, the laboratory must meet the following requirement: Establish the absence of a significant peak at the retention time of the target analyte. The absence of a significant peak at the retention time of the target analyte is defined as one whose response is less than that of the analyte present in the low level standard (which must be prepared at the reporting limit) used for the one-point calibration.

Detects:

To report a detect result using a one-point calibration, a laboratory must meet the following requirement: a one-point calibration must be performed so that the concentration of the one-point calibration standard is within ±20% of the concentration of analyte detected in a sample.

Attachment
Statement of Position

There has been some debate among the laboratory community concerning continuing calibration verification (CCVs) standards and non detect samples. Most analytical methods have established upper and lower control limits for CCVs, and when the recovery exceeds those limits, the method is considered "out of control." Recently, there has been a growing consensus among some laboratories that an analytical method is ***not*** out of control if the upper control limit of the CCV is exceeded providing the sample is a non-detect. The reasoning here is that the instrument has somehow "gained" sensitivity and if there were anything in the sample, it would surely have been detected.

The ADEQ QA/QC Unit understands this logic and recognizes that it may be true in some cases. However, this is only one of several possibilities. Another possibility is that the analytical method is now out of control. ADEQ is concerned with the assumption that the "data are not impacted," as reported by laboratories when the upper control limit of a CCV has been exceeded in a non-detect result. Currently, there is no way to differentiate between an instrument that has gained sensitivity and one that has drifted out of control when the upper control limit of a CCV is ignored.

As a regulatory agency, ADEQ cannot assume that each time the upper control limit is exceeded; it is the result of increased instrument sensitivity. Such an assumption can result in the court or the hearing officer invalidating or dismissing the analytical results because an integral portion of the method's quality control has been omitted. The ADEQ Quality Assurance\Quality Control Unit has discussed this subject at length with EPA Region IX's Quality Assurance Management Section. Region IX concurs with the ADEQ's QA\QC Unit's interpretation. They have further expressed their concern that ignoring established upper control limits for the CCV is not in line with good laboratory science and may invite abuse and even laboratory fraud.

ATTACHMENT 13H

LABORATORY ACCEPTANCE OF QAPP CONDITIONS

Laboratory Acceptance of QAPP Conditions

Name of Facility:

Contact Person:

Address:

City, State, Zip:

Telephone Number:

ADHS Certification Number / Expiration Date:

I have read and acknowledge all fixed laboratory conditions of this QAPP (and all attachments), Revision _______ for the U.S. Army Garrison RCRA Open Burning/Open Detonation (OB/OD) Operating Permit. I certify that all analysis performed for this project will meet the requirements of this QAPP, unless noted in the analytical reports.

Authorized Signature: Date:

Printed Name

ATTACHMENT 13I

TECHNICAL SYSTEMS AUDIT CHECKLIST

Technical Systems Audit Checklist

Audited Project: ______________________________
Auditee: ______________________________
Audit Location: ______________________________
Auditors: ______________________________
Audit Dates: ______________________________
Brief Project Description: ______________________________

A. QUALITY SYSTEM DOCUMENTATION

AUDIT QUESTIONS	RESPONSE			COMMENT
	Y	N	NA	
1. Is there an approved QA Project Plan for the overall project and has it been reviewed by all appropriate personnel?				
2. Is a copy of the current approved QA Project Plan maintained at the site? If not, briefly describe how and where quality assurance (QA) and quality control (QC) requirements and procedures are documented at the site.				
3. Is the implementation of the project in accordance with the QA Project Plan?				
4. Are there deviations from the QA Project Plan? Explain.				
5. Do any deviations from the QA Project Plan affect data quality?				
6. Are written and approved current standard operating procedures (SOP's) used in the project? If so, list them and note whether they are available at the field site. If not, briefly describe how and where the project procedures are documented.				
7. Is the anticipated use of the data known and documented in the QA Project Plan?				
8. What are the critical measurements? (List under Comments)				
9. Have performance goals for each critical measurement been documented clearly and explicitly in the QA Project Plan?				
10. Do the above performance goals appear to be based on documented performance criteria or on actual QC data compiled for the measured parameter?				
11. Are there established procedures for corrective or response actions when performance goals (e.g., out-of-control calibration data) are not met? If yes, briefly describe them.				
12. Are corrective action procedures consistent with the QA Project Plan?				

AUDIT QUESTIONS	RESPONSE			COMMENT
	Y	N	NA	
13. Have any such corrective actions been taken during the project?				
14. Has the performance of each of the critical measurements been assessed and documented during the project?				
15. For each critical measurement, does the QA Project Plan specify the frequency of calibration, the acceptance criteria for the calibration, and the process for calibration data reduction and review?				
16. Briefly describe how calibration and other QC data are documented.				
17. Does the calibration documentation show that calibrations are being performed at the required frequency and in the required manner?				
18. Are there standard paper or electronic forms to record QC data and operational data?				
19. Are the standard forms dated?				
20. Is the person who recorded the data identified on the form?				
21. Are paper records written in indelible ink?				
22. Are the QC data reviewed by another qualified person such as the QA manager or the project manager? Who is this individual?				
23. Is the project team adhering to the planned schedule? If not, explain the new schedule. Verify that all schedule changes have been authorized.				

B. ORGANIZATION AND RESPONSIBILITIES

Identify the following personnel and determine whether they have the listed responsibilities.

AUDIT QUESTIONS	RESPONSE			COMMENT
	Y	N	NA	
1. Project Manager: ______________________________ (name) • Responsible for overall performance of the project, and Communicates with EPA.				
2. Project Quality Assurance Manager (QAM): ______________________________ (name) • Reviews instrumentation and QC data, and Performs QC activities.				
3. EPA QA Representative: ______________________________ (name) • Assists with and will be responsible for review and monitoring of all QA and QC activities.				
4. Project Manager at Site: ______________________________ (name) • Coordinates with project manager, and Plans and schedules the project.				
5. Analytical Instrumentation Operator(s): ______________________________ (name) ______________________________ (name) • Operate the instrumentation, Calibrate the instrumentation, and Record operational parameters.				
6. Who is authorized to halt the project in the event of a health or safety hazard? ______________________________ (name)				
7. Does the project maintain descriptions of the project organization and personnel responsibilities?				

C. TRAINING AND SAFETY

AUDIT QUESTIONS	RESPONSE			COMMENT
	Y	N	NA	
1. Do the instrument operators have special training or experience for the operation of the instruments?				
2. Do the project files contain current summaries of the training and qualifications of project personnel?				
3. Is there special safety equipment required to ensure the health and safety of project personnel?				
4. Is each project team member appropriately outfitted with safety gear?				
5. Are project personnel adequately trained for their safety during the performance of the project?				
6. Is there evidence of conditions that present a clear danger to the health and safety of project personnel? If so, take appropriate steps to stop work or to inform the appropriate responsible parties of the danger.				

Additional Questions or Comments:

ARIZONA HAZARDOUS WASTE MANAGEMENT PERMIT

EPA I.D. NO. AZ5213820991

U.S. ARMY GARRISON YUMA PROVING GROUND

PERMIT ATTACHMENT 14

CLOSURE PLAN

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ATTACHMENTS

CLOSURE PLAN

14.1 INTRODUCTION

This Closure Plan has been prepared for the U.S. Army Garrison Yuma Proving Ground (USAGYPG) Open Burn/Open Detonation Munitions Treatment Facility (OB/OD MTF) in accordance with State and Federal regulations promulgated under the Resource Conservation and Recovery Act (RCRA). The OB/OD MTF is in the Kofa Region of the USAGYPG (see Permit Attachment 1A, Figures 1A-3a through 1A-3c for detailed figures and drawings of the OB/OD MTF). The objective of this Closure Plan is to present an initial closure strategy for the OB and OD units within the OB/OD facility.

The OB/OD MTF consists of two operational concrete pads, each with three burn pans, where OB occurs and five pits for OD of waste military munitions. Closure of these units will be conducted according to the requirements of the Arizona Administrative Code (A.A.C.) R18-8-264.A, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities" [Title 40 of the Code of Federal Regulations (CFR) Part 264] and the A.A.C. R18-7-201 et seq., "Soil Remediation Rule."

In accordance with the requirements of A.A.C. R18-8-264.A (40 CFR 264.112), this Closure Plan presents:

1. A description of how each hazardous waste management unit at the OB/OD MTF will be closed;

2. An estimate of the maximum inventory of hazardous waste on the site at any time over the active life of the facility and the manner in which hazardous waste remaining at the site at the time of closure will be managed;

3. A detailed description of the manner in which hazardous waste residues and contaminated components, equipment, structures, and soil will be removed or decontaminated, and the methods that will be employed to verify closure performance standards are met;

4. A description of other activities necessary during closure, such as run-on and runoff control; and

5. A schedule for closure of the OB/OD hazardous waste management units.

When the closure plan is implemented, the purpose will be to return the area back to military range standards (non-residential standards). Any contaminated equipment or structures will be treated on the site. Contaminated soil will be delineated, excavated, and disposed of in accordance with all applicable Federal and State requirements. The proposed closure strategy would achieve closure of the OB/OD units by removing pads and structures or decontaminating them to achieve standards set or referenced in the Closure Plan and removing contaminated soils, as necessary, to reach non-residential Soil Remediation Levels (SRL) established by the State of Arizona (A.A.C., Title 18, Chapter 7, Article 2) for hazardous chemicals. Soil with chemical levels below the Groundwater Protection Levels (GPL) and non-residential SRLs will not be subject to treatment or removal because the Arizona Department of Environmental Quality (ADEQ) has determined that these are protective of human health and the environment.

This Closure Plan describes the methods to be used and the general actions to be undertaken to achieve closure of the OB/OD MTF. It does not present specific numbers and locations for samples to be taken in order to determine where and how much soil, if any, will be removed to meet performance standards. Nor does it describe specific samples that will be collected in order to verify that performance standards have been met. The ultimate design of final closure will take into consideration operating records, results of periodic characterization, partial closure activities, and any other characterization activities. When the ADEQ is notified that the USAGYPG intends to close any or all of the OB/OD treatment units, a revised Closure Plan (partial or final) will be provided at least 60 days before closure is planned to begin. Information contained in the revised plan will provide detail (including procedures, locations, and quality assurance actions) on characterization and verification sampling that will be performed to support closure activities. The proposed revision will be handled as a request for a major Closure Plan modification to the permit, which requires public notice and approval, and the (proposed) revision will be submitted to ADEQ at least six months prior to the planned start of final closure to allow time for adequate processing.

Prior to acknowledgment of final closure of the OB/OD MTF by ADEQ, investigation and closure of all solid waste management units (SWMUs) and areas of concern (AOCs) must also be completed. Such areas include, but are not limited to, the hazardous waste satellite accumulation area next to the site safety bunker (40 CFR 262.34(c)) and any other interim (status) or inactive OB/OD units. The investigation and closure of these SWMUs and AOCs are to be handled by documentation separate from this closure plan and may be included in a corrective action plan.

The USAGYPG military installation is a RCRA-regulated installation, and the OB/OD MTF is a grouping of 8 treatment units within the installation [EPA ID No. AZ5213820991]. This consists of five OD Pits and two OB Pads. A 3rd OB Pad is inactive and is currently in a closure action. The closure actions described in this plan are considered either a partial closure (for specific equipment or units) or complete closure (for the entire facility). For example, when the USAGYPG started closure of the former south OB Pad (after construction of the new OB Pads), that was considered a partial closure (and a partial closure plan was submitted to ADEQ in a timely manner). The plan was submitted pursuant to A.A.C. R18-8-264.A (40 CFR 264) regulations. Although the area of the OB/OD MTF has been used for OB/OD activities since the mid-1970s, it operated under interim status in accordance with A.A.C. R18-8-265A (40 CFR 265) since the USAGYPG filed a Part A Permit Application in 1984.

14.2 FACILITY DESCRIPTION

The USAGYPG installation is located in La Paz and Yuma Counties in the southwest section of the State of Arizona, adjacent to the Colorado River and north of the international border with Mexico. The USAGYPG base covers about 835,000 acres or 1,300 square miles (3,380 square kilometers) of federally controlled land that is roughly "U" shaped and is about 23 miles (37 kilometers) northeast of the city of Yuma, Arizona, at its closest boundary. USAGYPG is a modern research and development facility focused on the testing of military equipment, much of which includes weapons systems. In conducting these test programs, USAGYPG produces, stores, and uses significant quantities of munitions and explosives. Each year, quantities of these materials must be treated as wastes. These wastes include explosives and propellants, items in storage or manufacture that have failed quality assurance tests, munitions items, and any unsafe munitions items, components, or explosives. The OB/OD MTF at USAGYPG is an area designated for the treatment of waste munitions and explosives. The remainder of this section provides additional detail on the OB/OD MTF and its operations.

14.2.1 Configuration

The OB/OD MTF is on the Kofa Firing Range of the USAGYPG installation, approximately 10 miles (16 kilometers) north of the Kofa Firing Range complex. The site is a square fenced area measuring approximately 4,921 feet by 4,921 feet (1,500 meters by 1,500 meters) or 572 acres. This is considered the active area of the site (as defined in 40 CFR 260.10) because the distance from the OD Pits and OB Pads to the fence (except for the south fence which is less) is equal or greater than the protective distance to the property of others defined in 40 CFR 265.382 (1,730 feet).

The active treatment area, which includes burn pads/pans and demolition trenches, covers an area of approximately 14 acres in the central portion of the site. This enclosed 14-acre active area is roughly centered within a safety buffer zone that is basically devoid of vegetation.

The remainder of the facility is a safety buffer that is not used in the treatment of waste munitions. However, as explained above, shrapnel, scrap, OE, or other residue could impact this area as a result of OB/OD activities. Primary access to the site is via an access road through the west perimeter fence. A safety bunker (operational shield) is located alongside the access road, just inside the perimeter fence.

The OB/OD units included in the RCRA permit and addressed by this Closure Plan consist of 7 units including two concrete OB Pads, each with three pans, used for OB (2 units) and three open trenches (two with two cells or pits each, one for surface detonation) used for OD (5 units). There are two OB pads – a south OB pad and a north OB pad. At no time there will be no more than two pads in operation.

The two concrete pads are designated the North and South OB Pads. They do not have curbs, but each is sloped to an interior storm water collection sump that is piped to an adjacent retention basin. Permit Attachment 2 (Miscellaneous Units) contains detailed descriptions and containment device drawings (pads, burn pans). The burn pans are of a welded steel construction, lined with refractory. The layers of protection from ash to subsurface are sequenced as follows: castable refractory, fiber board liner, steel pan, castable refractory, sealant, concrete, sand, liner and virgin soil. Burn pans are elevated on an integral steel base above the concrete pads. The pads and pans are used to treat excess propellant and ammunition-related materials by burning. Propellant and powder are carefully loaded into the burn pans; the material is ignited and left to burn completely. The concrete pad is insulated from excessive heat by the pan refractory lining, air space, and refractory top surface. Ash generated from the burn, potentially designated as Hazardous Waste is collected from the pans and pads after each burn for disposal/treatment as hazardous waste.

The OD units consist of three pits (two with two cells each, one for surface detonation) for OD of waste ordnance. The two of the three open pits are each approximately 30 feet (9 meters) wide, 13 feet (4 meters) deep, and 300 feet (91 meters) long. Material to be detonated is placed in the pits and generally covered by a minimum of 24 inches (61 centimeters) of soil prior to detonation. The items containing submunitions are treated in Pit #1, during a surface operation and are not covered with soil. The pits are inspected and cleared of scrap metal fragments after each action.

No waste explosives or munitions are stored at the OB/OD MTF. The satellite accumulation area associated with the OB/OD MTF, located at the safety bunker approximately 2400 feet (730 meters) from the active treatment area, is maintained for the accumulation of treatment residues, specifically the ash from OB activities. The ash, a dry product of burning propellants, is collected after each OB activity for placement in a 55-gallon drum, which is held temporarily outside the safety bunker for later transport to the USAGYPG less-than-90-day waste accumulation location. Operation of a hazardous waste satellite accumulation area does not require a RCRA permit and, accordingly, the management of this specific satellite accumulation area is not addressed in this Closure Plan.

14.2.2 Operations

Propellants, explosives, and pyrotechnics (PEP) are thermally or explosively treated at the OB/OD MTF. These operations are carried out in strict accordance with Army regulations (AR) and USAGYPG Standard Operating Procedures (SOP) provided in Permit Attachment 6 (OB/OD Operations).

Consistent with SOPs, no more waste explosives or propellant are taken to the site than the amount authorized in the RCRA Permit. For OB actions this is no more than 4,000 pounds per day, and for OD actions this is no more than 1,000 pounds per day.

During OB, bulk waste black powder and propellants (open or bagged), and other energetic materials are poured into burn pans on concrete pads and ignited. The following requirements are applicable to the OB operation through ARs or SOPs or a combination of both:

1. Loose propellant depth in burn pan is not to exceed 3 inches. It will not be mixed with black powder;

2. OB operations are not to be conducted between the hours of one-half hour after sunrise and one-half hour before sunset;

3. All burns shall be conducted in burn pans;

4. Burn pans shall only be used once in a 24-hour period;

5. Black powder is not to exceed 50 pounds per burn and will not be mixed with propellant; and

6. No PEP that is water reactive will be placed in a wet or moist pan.

The OD management unit is a large cleared area consisting of three open trenches. The following requirements are applicable to the OD operation through ARs or SOPs or a combination of both:

1. Projectiles without submunitions shall be covered with dirt to eliminate the scattering of fragments;

2. Projectiles with submunitions (such as M692, M731, M718, M741, M483, M509, and M864) will not be covered with dirt;

3. OD operations are not to be conducted between the hours of one-half hour after sunrise and one-half hour before sunset; and

4. The Summary Treatment Form (see Permit Attachment 6) documents the treatment weather conditions, location, and amounts.

14.2.3 History

PEP materials have been managed/treated in the area of the current OB/OD MTF since the mid-1970s, prior to the implementation of hazardous waste regulations under RCRA. Original OB operations were conducted on the ground, which was typical for most OB sites of that period. That unit is not included in this closure plan. OD was conducted in pits that are still utilized today. (YPG 2004c, Submittal 2).

Treatment units addressed in this Closure Plan include the OB Pads (2 units, each with 6 pans) and the three areas used for OD (5 pit units). As indicated, the OD pits have been in operation since the area's use of OB/OD treatment began.

As described in Permit Attachment 14 Section 14.1, independent actions to characterize potential contamination remaining at these inactive sites were in the planning stages at the time this Closure Plan was prepared.

14.2.4 Waste Characteristics & Maximum Inventory

14.2.4.1 Waste Characteristics

As previously described, the facility treats hazardous waste through OB/OD operations. Waste munitions are not stored at the site. The only other hazardous waste found at the facility is the waste ash and splatter materials left on the pads that are byproducts of OB actions. The waste materials are potentially designated as potentially hazardous waste and are accumulated in a 55-gallon drum that is held temporarily within the OB/OD MTF at a satellite accumulation point adjacent to the safety bunker. The container is marked as “HAZARDOUS WASTE-ASH” when placed into service. When the drum is approximately 75 % full, this waste is moved to the USAGYPG less-than-90-day storage area.

The maximum reasonable amount of waste munitions treated during 30 years (1986 to 2016) could approach 907,180 kilograms (2 million pounds) of EPA Hazardous Waste Code D001/D003 explosives and 6,350 kilograms (14,000 pounds) of D008 waste ash.

The potential compounds treated at the OB/OD site could be present at the time of closure in the form of treatment residues not picked up with ash and debris. These constituents are listed in the Waste Analysis Plan (WAP) (Permit Attachment 3) and master contaminants of potential concern (COPC) list (Permit Attachment 4) for closure actions.

14.2.4.2 Maximum Inventory

Waste PEP (EPA Hazardous Waste Numbers D001/D003) is not stored at the OB/OD MTF site. If small quantities of waste PEP that has already undergone OB/OD are recovered and determined to still contain explosive residues, it will either be treated there on the spot or moved to the treatment unit and treated (per the contingency plan – Permit Attachment 10). The Ordnance Recovery Technicians (ORTs) are the only qualified personnel authorized to determine if hazardous residue remains, and the item requires further treatment. As indicated in Permit Attachment 14 Section 14.2.2, no more waste than the daily amount authorized is taken to the site for treatment. The maximum permissible inventory amounts to no more than 4,000 pounds per day for OB actions and no more than 1,000 pounds net explosive weight (NEW) per day for OD actions.

Residues of the treatment processes will be at the facility, but in limited quantities. Ash from OB is collected from pads and pans following each burn, then bagged and placed into a 55-gallon drum at the satellite accumulation site adjacent to the safety bunker. Under the satellite accumulation rules of A.A.C. R18-8-262.A [40 CFR 262.34(c)], this drum (or drums) must be removed from the site within 3 days of becoming full. On this basis, the maximum inventory of ash expected to be present at the OB/OD MTF is the amount that a 55-gallon drum can hold.

Scrap metal residues, visually verified to contain no residual energetic materials (otherwise it would be treated again until treatment is successful), are collected following each OD action. In addition, the scrap is verified to contain no other hazardous waste residue (e.g., lead, etc.) prior to its transport for metal recycling or other permitted disposal.

Each OB pad is designed to retain precipitation falling on its surface or that of the associated retention basin. Because of the hot, desert environment, significant accumulations of precipitation are infrequent at the OB/OD MTF. As a result, no attempt will be made to develop estimates of how much accumulated precipitation could be present during closure. However, it is recognized that precipitation falling and accumulating on the OB structures prior to completion of closure decontamination or removal action is also subject to the closure actions and performance standards set by the Closure Plan.

The only other hazardous wastes potentially present at the OB/OD MTF are the potential treatment residues not removed during normal cleanup operations. Any hazardous constituent contamination remaining in the burn pans, on the burn pads, or in surrounding soils is subject to the closure actions and performance standards set forth in the following sections of this Closure Plan. This includes any materials in the gap between the pad and liner.

14.3 REGULATORY REVIEW

Closure of the OB/OD MTF will be conducted in compliance with Federal regulations as adopted and modified by A.A.C. R18-8-264.A. The closure will also be conducted in compliance with other Federal and State regulatory programs that address secondary aspects of closure, such as programs for worker protection and hazardous materials transportation. In addition all permit requirements (e.g., security, inspections, training on evacuation procedures) will remain in force until the permitted facility is acknowledged as closed.

14.4 FACILITY SETTING

14.4.1 Physiography

The OB/OD MTF is in Sections 30 and 31, Township 5 South, Range 19 West, Gila and Salt River Meridian (G&SRM), and Yuma County, Arizona. The facility is centered approximately at latitude North 32 degrees, 57 minutes, 20 seconds and longitude West 114 degrees, 15 minutes, 49 seconds. The facility occurs within the mapping limits of the 7.5-minute U.S. Geological Survey (USGS) Quadrangle, Middle Mountains South, Arizona-Yuma Co. The OB/OD MTF is located on USAGYPG installation, which is approximately 24 miles (39 kilometers) northeast of the City of Yuma. The USAGYPG is approximately 300 square miles (3,370 square kilometers) in area. The OB/OD MTF is in the southwest portion of the USAGYPG site. Its fenced area consists of approximately 570 acres (2.3 square kilometers), of which the active portion is about 14 acres (0.06 square kilometers).

The USAGYPG installation and the OB/OD MTF are in the Sonoran Desert Section of the Basin and Range Physiographic Province. The Sonoran Desert is characterized by generally elongated, low rugged mountains trending north-northwest, separated by extensive desert plains and river valleys. Although the relief of the mountains is relatively low, the combination of steeply faulted margins, jointing, and weathering has produced rugged topography with slopes sometimes exceeding 40 percent. The desert plains are relatively flat with land surface gradients commonly less than 50 to 100 feet per mile in the Kofa Firing Range.

The OB/OD MTF is on the desert floor of the Castle Dome Plain at an elevation of approximately 230 meters (750 feet) above mean sea level (msl). Castle Dome Plain slopes southwestward at 45 to 100 feet per mile. Dark brown desert pavement is well developed on the surfaces between the present washes.

14.4.2 Climatology

The southwestern region of Arizona where the USAGYPG (installation) is located is an extremely arid environment. The average annual precipitation rate is 9 centimeters (3.57 inches). The precipitation sequence is bimodal. The majority of rain events occur in late winter months, late summer, and early fall. Winter rains are widespread, of long duration, and of low intensity, whereas late summer rains are localized, high-intensity events. The mean temperatures range from greater than 32.2 °C (90°F) in July to 2.1 °C (35.8°F) in January. The potential evapotranspiration rate is reported to be from 100 to 210 centimeters (39.6 to 85.2 inches) per year.

14.4.3 Land Use

Population in the area near the OB/OD MTF is sparse. Surrounding property is utilized for USAGYPG activities. No residential areas are within 1 mile (1.6 kilometers) of the OB/OD MTF. The nearest public road is Castle Dome Mine Road into KNWR (slightly east of U.S. Highway 95). The closest point of public access is approximately 7809 feet (2380 meters) from the facility's active area. Use of the area within the 7800-foot radius requires a range clearance for passage. The nearest USAGYPG boundary is also the boundary to the Kofa National Wildlife Refuge, which lies in the center of the "U" formed by USAGYPG property.

14.4.4 Geology

The descriptions of local geology are taken from Remedial Investigation Report for selected sites at Yuma Proving Ground, Arizona (Davies et. al. 2004).

Wide, gently sloping plains formed by late Tertiary and Quaternary age basin-fill deposits characterize the geology of the USAGYPG military base. Sharply rising mountains break the continuity of these deposits. The mountain ranges consist mainly of Cretaceous-Quaternary age intrusive and volcanic rocks. Sedimentary deposits of Triassic-Jurassic age make up a portion of the mountains in the western and central portions of the USAGYPG base. The sedimentary rocks are locally metamorphosed to schists and gneiss. Together these formations form the lateral and underlying boundaries of the alluvial basins. The basin-fill deposits are generally sandy, with variable fine-grained (silts and clays) to coarse-grained (gravel and cobbles) lenses. These deposits can exceed a thickness of 1,300 ft.

The basins at the USAGYPG base were formed during the middle to late Miocene epoch basin-and-range structural disturbance. Movement along high-angle normal faults down-dropped relative to the mountains, producing a series of generally north-northwest trending basins. These basins subsequently subsided. This subsidence was a gradual process accompanied by deposition of locally derived sediment in internally drained basins. The closed drainage system produced a gradual change from coarse-grained sediment near the mountains to fine-grained near the basin centers. The basins within the areas of interest at the USAGYPG base are currently not enclosed and drain to the Colorado and Gila Rivers.

14.4.5 Soil Description

Four hypothermic arid general soil associations occur near the OB/OD MTF: Gilman-Vint-Brios; Harqua-Perryville-Gunsight; Coolidge-Wellton-Antho; and Lomitas-Rock Outcrop. The OB/OD MTF is located in a Harqua-Perryville-Gunsight soil area. Gilman-Vint-Brios soils are found along the southwestern and western portion of the USAGYPG base and are mainly sandy loam and find and are found only on the floodplains of the Colorado and Gila Rivers. The Harqua-Perryville-Gunsight soils are the most prevalent of all the soil types at the USAGYPG base and consist of moderately fine- and medium-textured soils from volcanic, granitic, and sedimentary sources. Coolidge-Wellton-Antho soils, which are found in the southwestern corner of USAGYPG, are medium- to coarse-textured soils formed from source rocks similar to those that are the sources of the Harqua-Perryville-Gunsight soils. The Lomitas-Rock outcrop is the source of soil found in the Harqua-Perryville-Gunsight areas and the Coolidge-Wellton-Antho areas. The watershed that contributes to washes adjacent to the OB/OD MTF contains this outcrop.

Boring logs recorded for three soil borings drilled at the Open Burn / Open Detonation site show that silty sand (USCS soil classification SM) mixed with some gravel predominate in the upper fifty feet of the subsurface. Thin zones of gravel mixed with silt and sand (USCS soil classification GP-GM) were observed at depths ranging from the surface to fifteen feet below ground surface.

14.4.6 Facility Surface Hydrology

Surface hydrology at the OB/OD MTF consists of desert washes, which conduct precipitation overflow through the area from localized rain flow events and those of the surrounding watershed. The Treatment Facility is located within the Castle Dome Plain; the surrounding watershed influences surface hydrology drainage patterns. The drainage patterns on this portion of the plain are generally shallow and ill defined because drainage must traverse hard desert pavement in this area. The watershed for this area is approximately 17 square miles (44 square kilometers); flows are southwest toward the Gila River at a gradient of about 5 feet per mile. Detailed surface hydrology information for the facility is contained in Geohydrologic Study of the Yuma Proving Ground with Particular Reference to the Open Burning/Open Detonation Facility at Yuma County, Arizona (YPG 2004c, Submittal 4). Based on a review of OB/OD

MTF national Federal Insurance Rate Map (FIRM) 04027C1000E, effective 8/28/2008, the OB/OD MTF is located in Zone D outside of both the 100-year and 500-year flood areas; however, a previous floodplain evaluation included in the Surface Water Hydrological Data Detailed Report (YPG 2004c, Submittal 6) had indicated that the area might be subject to the effects of 100-year flood.

14.4.7 Groundwater

Groundwater is present in two systems beneath USAGYPG: deep groundwater is found in consolidated volcanic rock (at depths typically greater than 500 feet) and in deep sediment, and a shallower unconfined aquifer is found in alluvial and floodplain deposits. In the distant past, water entered the closed basins and formed salty lakes. With time, the lakes evaporated and developed layers of evaporates (salts). Infiltration of salty water produced highly mineralized water deep within the basin. This water has been primarily recharged by water from the Colorado and Gila Rivers. Infiltration of precipitation and ponded surface water adds very small amounts of additional recharge to this deep groundwater. Because this water is very deep and highly mineralized, it is not considered to be a primary drinking water source. Therefore, this discussion focuses on the shallow groundwater that occurs within the alluvial and floodplain deposits at USAGYPG.

A study of the hydrogeology at the USAGYPG installation was conducted in 1987. At that time, 13 production wells were located within USAGYPG. The top of the groundwater aquifer ranged in elevation from approximately 200 feet MSL at the Castle Dome Heliport to 155 feet MSL in the southwestern portion of USAGYPG. The depth to groundwater ranged from 30 feet below ground surface (bgs) in well X to greater than 600 feet bgs in well M. Water levels in these wells did not substantially change over a 1-year period in 1987. The groundwater gradient is about 4-5 feet per mile upgradient of the major pumping wells, and less than about 4 feet per mile near the rivers. Near the rivers, the groundwater elevation becomes shallower, and it may be within 10 feet of the surface in floodplain deposits.

Three parameters are frequently used to characterize a groundwater aquifer: transmissivity, hydraulic conductivity, and storativity. Transmissivity is an indication of how well an aquifer can transmit water. It is the rate of flow through a vertical strip of the aquifer that has a width of 1 foot. Hydraulic conductivity is a function of the porous media and the fluid (in this case, groundwater) with units of distance/time. The storage coefficient of the aquifer is an indication of the aquifer's ability to yield or store water. Transmissivity values for the USAGYPG production wells range from 19,000 to 83,300 gallons/day/foot (gpd/ft), 9,600 gpd/ft for the consolidated rock, and averaged 130,800 gpd/ft for the floodplain deposits. Hydraulic conductivity ranged from 83 to 902 gpd/ft2 for the alluvial wells, with an average value of about 500 gpd/ft2. The hydraulic conductivity was about 56 gpd/ft2 for consolidated rock and about 1,245 gpd/ft2 for the floodplain deposits. Reasonable values for the storage coefficient range from 10 to 15 percent for alluvium, 1 to 5 percent for consolidated rock, and 20 to 30 percent for floodplain deposits.

The rate of groundwater movement can be determined by combining data on the hydraulic gradient in the aquifer with its hydraulic conductivity and storativity. For the above values, the average rate of groundwater movement is about 0.55 ft/day (200 ft/year) in the alluvial material. This is an average flow rate across the areas that have been investigated or are under investigation at the USAGYPG. Local heterogeneity within the surficial aquifer can result in a range of flow direction and velocity at specific locations on the USAGYPG base.

Hydraulic conductivity tests were performed on three samples collected from 40 feet below ground surface from three soil borings drilled at the Open Burn / Open Detonation site. Results showed an average hydraulic conductivity value of 0.01 ft/day (3.7 ft/year) with a range of values from 0.000334 ft/day (0.12 ft/year) to 0.02 ft/day (7.3 ft/year), somewhat less permeable than might be expected from a mostly granular matrix. Porosity in the samples ranges from 18 to 23 percent, within the expected range for a mostly granular soil.

14.5 CLOSURE PERFORMANCE STANDARDS

14.5.1 Regulatory Performance Standards

The OB/OD MTF closure will meet the performance standards found in A.A.C. R18-8-264.A (40 CFR 264.111). Those standards indicate that closure must be conducted in a manner that:

1. Minimizes the need for future maintenance;

2. Controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, surface waters, or the atmosphere; and

3. Meets the Arizona soil remediation rule and remediation standards prescribed in A.A.C. R18-7-201 et seq. (including those for constituents that due not fit into the second bullet above.)

14.5.2 Closure Methods

Details on the closure method and management and disposition of facility equipment and waste are provided in Section 14.7 (Closure Activities). Methods for meeting the closure standards include:

1. Removing hazardous waste inventory and residues from the OB/OD MTF as discussed in Permit Attachment 14 Section 14.7.1;

2. Addressing process equipment and structures (i.e., burn pads and pans) as described in Permit Attachment 14 Section 14.7.2 by using, individually or in combination, the following approaches:

   a. Using physical extraction methods to treat surfaces that might have contacted hazardous waste until a condition analogous to a clean debris surface is achieved; or

   b. Dismantling and removing process equipment and structures for disposal as hazardous waste.

3. As described in Permit Attachment 14 Section 14.7.4, removing contaminated soil as needed until it can be verified through sampling and analysis that any remaining hazardous constituents (including those not considered to be hazardous waste constituents and that may not fit into the second performance standard above) meet the Arizona Soil Remediation Rule and remediation standards in A.A.C. R18-7-201 et seq., or otherwise proposed in this document; and

4. Managing closure-generated waste as described in Section 14.7.6.

14.5.3 Criteria

This section identifies the criteria that will be used to ensure the methods described in Permit Attachment 14 Section 14.5.2 achieve the performance standards of Permit Attachment 14 Section 14.5.1.

Hazardous waste determinations will be performed on all waste generated during closure using criteria found in the WAP (Permit Attachment 3) and Quality Assurance Project Plan (QAPP) (Permit Attachment 13). These will be based on sampling results or process knowledge.

Soil left in place will meet performance as in the WAP (Permit Attachment 3) such as non-residential SRLs, GPLs, or TCLP levels.

14.6 COMPOSITE WHEEL SAMPLING PROTOCOL

Surface samples will be collected from the surface and in the base of the trenches using the composite wheel sampling method described below and methods provided in the WAP (Permit Attachment 3). The composite wheel method is based on numerous research projects completed by the U.S. Army.

The wheel has seven openings used to collect soils from each location for compositing. The opening in the center of the wheel will be used to collect a discrete sample to be analyzed for all constituents presented in the WAP (Permit Attachment 3) except the explosives components (i.e., method 8330, Nitrocellulose, and Nitroguanidine). The soils collected from the remaining six openings will be composited into one sample to be analyzed for energetic constituents. The following describes compositing procedures required for this operation:

1. Place the 48 inch (122 centimeter) diameter composite template at the sample location, with the north arrow towards magnetic north; and

2. Sample at the depth intervals specified and where sampling procedures may be modified as noted below.

    a. Collect a discrete sample from the center opening in the wheel and place in sampling containers, as needed for analysis of non-explosive constituents.

    b. Collect samples from each of the periphery holes in the sample wheel. The individual sample weights should be +/- 5% of each other to provide a representative sample.

    c. Composite six sub-samples into sample containers for transportation and analysis in accordance with WAP (Permit Attachment 3).

Surface samples will be collected in accordance with procedures outlined in the WAP (Permit Attachment 3). Where a duplicate sample is designated; it will be collected from the mass generated for the original sample. Samples will be collected with clean, decontaminated equipment with field decontamination performed as necessary in accordance with the decontamination method described in the WAP, which also describes the method that will be used to collect an equipment blank for this site. The equipment blank should include de-ionized water flushes from each piece of equipment used in a routine sample collection event.

In between surface sampling intervals, the locations will be excavated to the next depth interval for the second surface sample, where applicable. Subsequently, subsurface soil samples will be collected from boreholes using drilling and sampling methods in accordance with the WAP (Permit Attachment 3). Soil samplers will be used to collect continuous samples to total depth of the boreholes. Exact sample locations will be field determined in the updated Closure Plan.

Where a duplicate sample is designated, it will be collected from a sample of adequate volume to homogenize and divide into two samples. Samples will be collected with disposable equipment or clean, decontaminated equipment with field decontamination performed as necessary in accordance with the decontamination method described in the WAP (Permit Attachment 3). This EOP also describes the method to be used to collect equipment blanks. The equipment blank will include de-ionized water flushes from each piece of equipment used in a routine sample collection event that comes into direct contact with the sample.

14.7 CLOSURE ACTIVITIES

The following sections describe the closure activities (waste management, dismantling, characterization, decontamination and disposal activities) necessary to close the OB/OD MTF and meet the performance standards of A.A.C. R18-8-264.A (40 CFR 264.111). The nature of the waste treated at the OB/OD MTF presents numerous concerns that may affect the manner in which closure actions are accomplished. For example, some of the tools and equipment normally used in the closure actions described in this plan produce sparks, heat, and friction, to which many ordnance and explosives residues are sensitive. There could also be concerns of incompatibility between certain detergent cleaners and PEP residue. The lead ORT onsite will determine required protective measures, if any. OB/OD operators will take part in closure activities to ensure safety of all participants.

14.7.1 Hazardous Waste Management

Reactive and/or ignitable waste (EPA Hazardous Waste Numbers D003 and D001, respectively) was never stored at the OB/OD MTF; waste generation practices are such that waste taken to the facility was only in quantities that could be treated during the same day. Accordingly, there should be no untreated waste to remove when closure is started. As a safety precaution, however, OB/OD operator/treatment personnel will provide a final clearance of the facility before closure actions start. At a minimum, this will involve a walk-down of the entire area looking for untreated propellant, explosive devices, or oxidizer (reactive and ignitable) materials. If such materials are found at this time, or at any time during the closure, they will be extracted from the area by qualified personnel, packaged appropriately, then shipped for hazardous waste treatment at an authorized facility that can handle explosive materials. As a last resort, if materials are found that are deemed too hazardous to move, the ORT will treat them in place. Per the Contingency Plan (Permit Attachment 10), locations where ordnance or explosives are removed or destroyed will be appropriately staked, recorded to plus or minus 1 foot by measurement relative to a nearby GPS or land surveyed location, and sampled for cleanup verification according to the same procedures for closure of the permitted OB/OD units. The final clearance walk-down of the facility will also be used to locate and remove, as appropriate, any OB spatter in soils surrounding the pads or any metal debris from OD treatment not cleaned up during final OB/OD operations.

Treatment residues in the form of ash from OB actions are accumulated in small quantities until there is enough (at the most, 75% of the volume of a 55-gallon drum) to be moved to a USAGYPG less-than-90-day accumulation area. Follow-on closure actions will not be undertaken until all routine procedural actions to remove treatment residues have been performed following the final treatment action. Accumulated treatment residues will also be removed after final treatment residues are collected unless it is decided that closure activities are starting soon (within 90 days, for example), and it would be beneficial to continue accumulating closure-generated waste in the same container.

Treatment debris from OD actions is visually identified and collected after each event. For closure, one more thorough area inspection will be conducted. The area is defined as the total area within the storm water berms plus 300-foot radius from each OD unit. Additionally, a large magnet will be pulled over the area to gather MC, DMM, or munitions scrap not immediately visible. The magnet will be turned off and the metallic debris dropped onto a cover. The ORT then visually inspects and thereby sorts the items segregating them into separate piles: one that is turned into the metal recycling yard and one that requires removal of the explosive residues. After collection and segregation, the remaining HE related items would be consolidated into a plastic bag and treated as the last OD operation. A final visual inspection will be conducted. If additional HE related items are found, they will be collected and treated. The remaining non-HE related items including but not limited to inert metal parts, plastics, wood, trash, etc. would be collected and discarded according to the proper hazardous classification conducted by the ORT.

Prior to disposition, all debris will be inspected and certified by an ORT to ensure that all items are free and clear of explosive residue. A final flashing will be conducted within the berm perimeter and then on a case-by-case basis outside of the berms within the 300-foot radius the pits to eliminate accumulated non-observed energetic materials. If ash is generated from the flaming operations, it will be collected and treated similar to the ash residues from the OB operations.

Accumulations of water may be present in the OB pad structures at the start of closure actions or it could accumulate during closure as a result of precipitation. In any case, if the water accumulation occurs prior to decontamination of the applicable equipment and structures (i.e., the equipment and structures contacted by the water), it will be managed as potentially contaminated wastewater. It will be either managed in accordance with normal unit operations (i.e., performing sampling and analysis per the WAP (Permit Attachment 3) to determine its proper disposition before pumping it) or left in place to be managed as closure-generated waste. The latter option is appropriate if it is envisioned that decontamination of OB structures and equipment may include water washing/flushing, which will result in wash waters accumulating in the same area as the precipitation, and the combined wastewater would then be managed as appropriate. This scenario seems most reasonable when the amount of accumulated precipitation is too small (the expected condition, if any is present) to be managed independently.

14.7.2 Addressing Process Equipment and Structures

There is no process equipment or structures related to the OD operation. The OB Pads and pans and their associated components will be either decontaminated to meet clean debris standards or dismantled and disposed of as hazardous waste. As appropriate, a combination of these methods might be used on a single structure or piece of equipment. The proposed closure strategy would achieve clean closure of the OB/OD units by removing pads and structures or decontaminating them to achieve clean debris requirements and removing them, and removing contaminated soils, as necessary, followed by disposal as solid waste.

14.7.2.1 Decontamination

The OB structures and equipment are potentially contaminated with residues from the treatment of ignitable (D001) and/or reactive (D003) waste. Having already been treated by open burning, the resulting residues should no longer exhibit either of these hazardous characteristics. With respect to the characteristic of reactivity, there should be no significant potential for the residues to contain reactive levels of cyanide. Though ash residues are analyzed for the presence of cyanides (see the WAP – Permit Attachment 3), this is for the determination of underlying hazardous constituents and not because of any suspicion that there might be reactive levels of this constituent. Residues remaining on the OB structures and equipment may, however, contain toxic constituents from the waste materials originally treated, such as 2,4-DNT, and could cause these items to qualify as hazardous waste.

After years of use, it is anticipated that hazardous constituents could become embedded in the surfaces of the concrete pads exposed to OB actions and in the lining of the burn pans. The favored approach to managing these items is to perform surface decontamination (as opposed to direct management as hazardous waste) in a manner that will achieve a clean debris surface as specified in A.A.C. R18-8-268.A (40 CFR 268.45). The OB/OD MTF items that might be managed in this manner and the treatment options that could be employed are listed in Permit Attachment 14 Table 14A-1. Treated pad and pan materials that achieve the required performance standards (also listed in Permit Attachment 14 Table 14A-1) are no longer considered hazardous waste and will, as appropriate, be recycled as scrap or managed as solid waste. This, of course, would be provided that the materials (soil, liner, and sand) under the pad can still be adequately addressed per the terms of this Closure Plan. Treatment residues generated as a result of any of the decontamination methods shown in Permit Attachment 14 Table 14A-1 [e.g., used blast media, grindings, wash fluids (and solids they contain)] will be managed as hazardous waste unless determined to be nonhazardous through sampling and analysis.

Concrete structures subject to these closure actions include the precipitation accumulation sumps and retention basins as well as the OB pads themselves. The treatment and performance standards shown in Permit Attachment 14Table 14A-1 will be applied only to the concrete surfaces exposed to the OB actions or to runoff that might be contaminated as a result of the OB actions. That is, the top surface of the pad, the top and interior side of the containment berm, and the interior surfaces of any precipitation collection sump and retention basin will all be subject to the treatment and performance standards. Correspondingly, outside edges and the underside of the concrete pad will not be considered potentially contaminated and will not be subjected to decontamination or treatment. It is expected that the affected concrete surfaces will be treated through use of a scarifying/scabbling device that can be passed over potentially affected surfaces of the concrete until a layer of at least 0.25 inches (0.6 centimeters) has been removed and a clean debris surface obtained. Equipment capable of performing the described scarification/scabbling is commercially available and includes models with dust collection capabilities. Dust generation will be minimized through these means or others to reduce the spread of potential contamination. Physical extraction methods that can be employed on the concrete pads are not limited to scarification/scabbling devices as shown in Permit Attachment 14 Table 14A-1. However, any other method used must be similarly effective in meeting the performance standard and minimizing the spread of potential contamination.

Under the decontamination approach, the metal burn pans will be treated through abrasive blasting or vibratory finishing. It is expected that either technology will be effective and that wet or dry techniques might be used under either one. The specific method selected at the time of closure is expected to depend on the types of equipment readily available that are best at controlling emissions (dust or overspray) while minimizing waste generation.

Refractory materials inside the burn pads will be removed and managed separately from the metal pans. It is anticipated these materials will be managed as hazardous waste and shipped off the site for eventual treatment/disposal. It is possible the materials could be treated according to methods listed in Permit Attachment 14 Table 14A-1 as appropriate for the concrete pad. However, in the case of the firebricks, all surfaces (i.e., all sides of the bricks) would be considered contaminated and would have to meet the applicable performance standard.

Other metal components, such as the grating material over the precipitation collection sump and the exposed portion of the steel well pipe in the sump, will be treated in the same manner as the metal burn pans. The underground drain pipe running from the OB pad collection sump to the retention basin, though plastic, is another system component that can be treated in a manner similar to the metal burn pans, as shown in Permit Attachment 14 Table 14A-1. In this case, however, it is anticipated that a high-pressure water spray is a more likely decontamination approach. As with the concrete surfaces, only the exposed, internal walls of the drain pipe will be subject to decontamination. These items (i.e., the metal grating and the pipes) are components of the concrete pads and, accordingly, it is proposed that these components also undergo the described treatment processes in order to achieve a condition analogous to a clean debris surface and then be removed and disposed as solid waste.

Structures and equipment undergoing successful decontamination (in accordance with the hazardous waste debris rule and the criteria in Permit Attachment 14 Table 14A-1) will generally be managed as nonhazardous solid waste or scrap metal. The hazardous waste debris rule applies only to hazardous waste that will be disposed of in a solid waste landfill; however, ADEQ will make an allowance to allow this material to be recycled if it meets the solid waste recycler's acceptance criteria for potential remaining constituents in the scrap (e.g., the clean debris surface allows contamination or potential contamination to remain in up to 5% of the debris' surface area).

If decontamination is performed (and structures and equipment are not just removed as hazardous waste), the order of work performed will be in the same direction that precipitation hitting the OB structures and equipment would move. That is, for one OB structure setup, the pans would be done first, then the decontamination efforts would move, in order, to the pads on which the pans rest, the sump in OB pad (including the well pipe in the sump), the drain pipe connecting the OB pad to the retention basin, and, finally, the retention basin. In this manner, any water in the system (from precipitation or from decontamination) would move from clean to dirty areas and would not cause additional contamination or recontamination of a clean area.

Residues generated from treatment of equipment and structures will be collected and managed as closure-generated waste per Permit Attachment 14 Section 14.7.6 Potentially contaminated components of equipment used in the treatment will be either removed for disposition as closure-generated waste or washed/rinsed to remove potential contamination. As described in Permit Attachment 14 Section 14.7.5 for equipment used in soil removal, this includes decontamination, as needed (i.e., if they contact contaminated materials), of heavy equipment and tools (bulldozers, jackhammers, scabblers, etc.) used in either decontaminating or removing the OB structures and equipment. Rinse water generated in this manner will be managed as closure-generated waste.

14.7.2.2 Management as Waste without Decontamination

Process equipment and structures exposed to OB actions and not undergoing decontamination will be dismantled as necessary and removed from the site for subsequent management as waste.

Such materials will be presumed to be hazardous waste based on process knowledge unless it can be determined through sampling and analysis that they do not qualify as hazardous waste. As indicated above, the preferred management method for the burn pads and pans is decontamination followed by management as nonhazardous solid waste or scrap. However, if it is determined at the time of closure that simple removal and management as waste (without decontamination) is the more efficient and cost-effective approach, it will be pursued.

The concrete burn pads permitted for OB operations are underlain with a synthetic liner to provide secondary containment. The interstitial area between the pad and the liner is periodically checked for any accumulation of liquid. If there has never been liquid detected in the interstitial area at the time of closure, neither the liner nor the interstitial bedding material (primarily sand) below the concrete pad will be considered hazardous waste. If there has been evidence of leakage through the pad, the liner will be removed and disposed of as hazardous waste, and the bedding material will be managed in the same manner as surrounding soil (see Permit Attachment 14 Section 14.7.4.

If the concrete or other debris is not decontaminated and just sampled to determine if it is a hazardous waste, the surface exposed to treatment and potential treatment residues will be sampled to determine what hazardous waste characteristics, if any, apply to the debris.

14.7.3 OD Pit Evaluation and Cleanup

The soils within the three pits require a closer scrutiny: excavation to native, segregation of soil and military munitions, soil pile sampling, pit clearance, pit validation sampling, and finally pending laboratory results proper disposal of the soils and military munition categories.

First, the pits will be excavated to virgin soils and the soils placed onto heavy plastic sheeting. It should be noted that there would no longer be a dividing wall in what is now designated as the pits. Approximately 6 inches will be removed from the side trenches and the bottom of the pits. The pile will then be sorted using a shaker screen with tight visual control by an ORT. The pile will be segregated into sifted soil and other materials, which will be further sorted into munitions debris, munitions constituents (MC), and discarded military munitions (DMM). The sifted soil pile will be placed on another heavy plastic sheet and composite sampled for hazardous constituents. If the laboratory results for the pile demonstrate below action levels, the pile will be saved as borrow material pending clean verification of the trenches. If the soil pile results are higher than action levels, the soil will be evaluated under a corrective measures study. After a close inspection by the ORT of the byproduct shaker screen streams, the munitions debris is then discarded as solid waste or recyclable material. The remaining MC and DMM will be consolidated for hazardous waste disposal.

Upon removal of the soils to virgin in the trenches, the surficial soil sampling will be conducted according to the following frequency methodology:

1. 1 per 500 square foot of trench bottom surface area
   - 0 to 3 inch interval (surface)

2. 1 per 2,250 square foot of trench bottom surface area at 3-foot depth interval
   -- 1 biased sample from the low point of each pit at 3-foot depth interval
   -- As part of the revision to the Closure Plan prior to closure implementation, USAGYPG will evaluate the subsurface sampling requirements.

3. 1 per 25 foot of sidewall
   -- 0 to 3 inch interval (surface)

4. Sample analysis
   -- 100% screening, 15% full suite

Sampling analysis will be conducted in accordance with the WAP (Permit Attachment 3) for the COPCs as initially established in Permit Attachment 4.

In order to ensure that there are no buried military munitions remaining in the trench, a geophysical study will be conducted. The methodology and equipment will be determined as part of the Closure Plan revision. This will allow for use of new technologies that will at a minimum be able to distinguish at depth (from the bottom of the freshly excavated trench) any size or material that could in anyway be perceived as a military munition. Therefore, USAGYPG will confirm that each of the three trenches will be clear of military munitions with a probability greater than 85%, prior to backfilling the trench.

Upon verification of clean from the trench sampling and the geophysical study, the trenches will be filled and compacted according to standard USAGYPG engineering requirements. The source of the borrow materials will be either the verified ‘clean’ removed trench soils, verified ‘clean’ removed berm soils, or from an offsite designated clean borrow source pending sampling results.

14.7.4 Areal Surficial Soil Characterization and Removal

It is anticipated that once the trenches and burn pads and pans have been addressed in accordance with Permit Attachment 14 Section 14.7.2 and 14.7.3, closure actions will begin assessing potentially contaminated surficial soils. Closure actions will proceed in this order (i.e., pads, then soil) so that any contamination spread to soils during closure of the pads or trenches and not subsequently cleaned up will be addressed with the soils. (That is, it should be relatively simple to sweep or collect soil from the surface of decontaminated pads as compared to removing pad decontamination residues from clean soils.). The alternate to this process order may be to leave at least one of the OB pads until the end so that it can be used as a location where closure equipment can be decontaminated. The OB pads’ design parameters to accommodate and contain precipitation make them an obvious choice as an equipment decontamination location. Under this option, particular care would be required during the pad’s eventual decontamination to assure surrounding soils are not contaminated.

When closure activities are started, standard operating procedures associated with the last OB/OD action(s) will have been completed. This includes removal of any spatter from OB actions that might have reached soils surrounding the OB pads and removal of any energetic or metal debris from the trenches and adjacent areas where OD actions took place. In addition, any residues generated during closure of the pads will have been cleaned up to the extent practicable (see discussion of specific closure activities in Permit Attachment 14 Section 14.7.2). At this point, a decision will be made either to proceed directly to sampling of OD pit soils and soils surrounding the burn pads to characterize any remaining contamination or to perform a soil removal action before soil sampling. Data should be available at the time of closure that provides a characterization of soil contamination associated with inactive OB units at the OB/OD MTF site and which, it is anticipated, will provide a basis for the decision. This decision should be site-specific based on the nature of treatment activities and how well they match activities represented by the characterization data. In the event no such data is available or, if the data cannot be related to the units undergoing closure, the decision (again site-specific) can be based on the appearance of the soil area and a review of the area's history. For example, if there is no history of significant quantities of material being released to the soil and there are no visible areas of contamination (spatter and loose debris should have been cleaned up as described in Permit Attachment 14 Section 14.7.1), then it might be appropriate to start with a sampling action.

Even if the decision is made to move directly to sampling, the first soil-related action associated with closure will be the close visual inspection of soil areas around the pads and pits. This visual inspection will be accompanied by removal of any soil appearing to contain spatter from OB actions, residue from burn pad/pan decontamination, or debris remaining from OD actions. It is anticipated that this can be done with a shovel or scoop, removing the top layer of soil containing the spatter or residue and placing the soil material or debris in an appropriate container. OB/OD personnel/operators will need to take part in these and other closure activities to ensure the safety of all participants. This inspection will include locations were contingency response actions occurred. These locations will be kept as part of the Operating Record.

Whether a decision is made to do soil removal first or go directly to soil sampling (with only minor cleanup as appropriate), the objective is the same. That is, the objective is to verify, through soil sampling activities, that remaining soils meet non-residential SRLs set in A.A.C. R18-7-201 to –209, or similarly established response levels (if an SRL does not exist for a specific constituent or constituents) as identified in the WAP (Permit Attachment 3). If sampling shows that one or more non-residential SRL has been exceeded, then additional soil removal actions will be undertaken followed by additional verification sampling. It is expected that the decision (removal versus sampling first) will be based on findings from efforts to characterize inactive OB/OD units in the same area. It is anticipated that characterization of inactive units will have been completed some time between preparation of this Closure Plan and implementation of closure actions. The USAGYPG reserves the right to conduct a Risk Assessment as alternative approach to meeting the SRLs.

As described above, the objective in addressing potentially contaminated soil is to verify that soil remaining at the site meets residential SRL values. Values at or below the performance standard (i.e., the SRL value) will achieve the standard.

Once performance standards are achieved, there should be no restrictions on future use of the land, and the OB/OD MTF will be considered clean closed. If at any time during this phase of the closure action, it is determined to be infeasible or impractical to reach residential SRL values, then soil contamination levels will be compared to nonresidential SRL values. If these values are achieved and it is deemed impractical to perform additional soil removal, USAGYPG will work with ADEQ to develop reasonable administrative land use restrictions sufficient to protect human health in a manner that will be functionally equivalent to the restrictions found in the Declaration of Environmental Use Restriction (DEUR) program. In this case (i.e., the nonresidential SRL values are met, but not the residential values), the OB/OD MTF will be considered to have achieved closure with land use restrictions, but without the need for any other post-closure care. In the unexpected event that it is determined impractical to achieve either residential or nonresidential SRL values, then a Post-Closure Plan will be developed and submitted to the ADEQ as described in Permit Attachment 14 Sections 14.9 and Section 14.11.

Background levels of any naturally occurring constituents might be considered during actions to address soil contamination. If background soil concentrations meeting the requirements of A.A.C. R18-7-204 are shown to be higher than corresponding residential SRL values (using the 95th-percentile upper confidence limit as described in the same A.A.C. section), those background values will be used in lieu of the residential SRLs.

Universal Treatment Standards (UTS) (where available) set in A.A.C. R18-8-268.A (40 CFR 268.48) might become important in determining the appropriate management and disposition of waste soil removed from the site. They are shown in the WAP (Permit Attachment 3).

14.7.4.1 Soil Characterization

Soil sampling and analysis will be used to determine if soils at the OB/OD MTF meet the performance standards described in Permit Attachment 14 Section 14.5.3 or if soil removal is necessary to meet the standards. Soil characterization activities could be done for multiple OB/OD units at the same time, but design of the sampling scheme will be unit-specific unless there is overlap in soil areas between units. The nature of the OB/OD units, whether they are OB pads or OD trenches, is that the potential for soil contamination should decrease with lateral distance from the site (pad or trench) where the treatment operations have taken place. Unless there have been recorded incidents of releases in a specific area, no portion or quadrant of soil surrounding the units would be more apt to contain contamination than another.

Accordingly, initial soil samples outside each unit will be collected in a “wheel” pattern as preferred by ADEQ. Under this sampling scheme, samples are collected along a 16 radial spoke pattern emanating out from the center of the unit (the spokes radiate out every 22½ degrees from the center of an imaginary circle):

1. Sampling on a 16 radial spoke pattern from center of detonation/burn areas unit;

2. Sample at 25 foot intervals on each spoke from center of detonation/burn unit, where:

    a. One sample each at depths of 0-3 inches and 12-15 inches; and

    b. Samples analyzed at 100% for screening analysis and 15% for full suite analysis.

3. Sampling continues on each spoke until 2 consecutive locations are below clean-up standards.

As appropriate, biased samples will be collected from areas of known contamination (such as locations where the Contingency Plan (Permit Attachment 10) operations has been exercised) and with problematic historical data.

The nature of the OB/OD treatment actions is such that any soil contamination would be expected to be surficial in nature, with the exception of the OD trenches, where soil has been moved and mixed due to covering most PEP items with a minimum of 24 inches (61 centimeters) of soil before OD actions. Other than inside the OD trenches, the potential for soil contamination is the result of settling of detonation dust and spatter and debris falling on surrounding soil surfaces. Accordingly, if analytical results from a soil sample show the performance standards are met, those results will not only be considered representative of the soil layer from which the sample was taken, but also will indicate that underlying soils meet the performance standard. Using this rationale, initial soil sampling (other than inside OD pits) can be limited to surface soils [no more than 6 inches (15 centimeters) in depth], or they can include both surface soils and soils at depth in discrete intervals. If only surface soils are sampled and the analytical results indicate contaminant levels in excess of performance standards, then samples at greater depths will have to be collected (before or after soil removal). The decision as to whether soil samples are limited to the surface layer will be based on information gathered from characterization of inactive OB/OD sites (which should be available at the time this Closure Plan is implemented) or the best judgment of those designing the sampling scheme.

Development of the sampling and analysis plan (SAP) portion of this closure plan for initial soil characterization (unless soil screening is used as discussed below) will include consideration of all of the PEP COPCs shown in the WAP (Permit Attachment 3). Additionally, the WAP identifies the COPCs for which there are applicable performance standards. When the SAP for closure actions is submitted (see the schedule in Permit Attachment 14 Section 14.8, it will take into consideration results from periodic pit sampling and records of items treated, as discussed in Permit Attachment 14 Section 14.2.4.1. The master list of COPCs presented in the WAP may be expanded, shortened, or otherwise modified, as appropriate; to be consistent with the knowledge of site contaminants available at the time the Closure Plan modification is prepared. In this regard, the modification, which will be submitted to ADEQ for public notice and approval, will include an explanation/justification for any changes to the COPC list.

Once the initial characterization sampling has been completed, the approach for any subsequent sampling and analysis can be altered based on the results from the initial sampling. For example, any potential contaminants not detected at a level of concern in the area to be addressed by the additional sampling can be dropped from the list of analytes to be considered. Similarly, if hot spots (specific areas exceeding performance standards) are identified during the initial characterization and soil is removed, only the remediated areas will be subjected to the verification sampling.

Comparison of soil sampling results to performance standards will be done on the basis of each potential contamination zone (pit base, pit sidewall, pit berm, or ring at depth 1, depth 2, etc.) set up in the sampling design. For example, results from within a sampling ring will be averaged to develop the statistical values described in Permit Attachment 14 Section 14.6.3, which will then be used for comparison to the applicable performance standard. This will be done to reduce the chance of uncontaminated areas of soil inappropriately bringing down the average concentration of the overall area. Conversely, it should also keep the amount of soils requiring removal to a minimum.

14.7.4.1.1 Optional Field Screening Methods

It is expected that closure of the OB/OD MTF will require the collection of a large number of soil samples to isolate areas requiring soil removal and to provide verification that performance standards are met. To reduce costs associated with sampling and analysis and to reduce the amount of time needed to implement closure, the USAGYPG might choose to incorporate screening methods (with analyses performed in the field, or rapidly at a fixed facility) into the characterization effort. If this is done, it would be followed by a much smaller number of soil samples collected for verification purposes and submitted to an analytical laboratory certified/licensed by the State of Arizona. The USAGYPG will present the screening methods to be utilized in the revision of the closure plan anticipated prior to closure of the unit. This methodology will allow the screening technologies to mature, and gain regulatory acceptance. Some current screening methods from EPA SW-846 are described briefly below:

1. Modified method 6010, with accelerated preparation methods;

2. Modified method 8330, with accelerated preparation methods;

3. EPA Method 4050, TNT Explosives in Soil by Immunoassay;

4. EPA Method 4051, Hexahydro-1,3,5-trinitro-1,3,5-trianzine (RDX) in Soil by Immunoassay;

5. EPA Method 8515, Colorimetric Screening Method for Trinitrotoluene (TNT) in Soil;

6. EPA Method 8510, Colorimetric Screening Procedure for RDX and HMX in Soil; and

7. EPA Method 6200, Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment.

14.7.4.2 Soil Removal

Soils containing hazardous contaminants in excess of the performance standards set in the WAP (Permit Attachment 3) will be excavated and removed from the OB/OD MTF to the extent practicable. Soil characterization efforts described in Permit Attachment 14 Section 14.7.4.1 will define the zone or zones that require removal. Removal of soil will continue in depth and lateral extent until all the impacted soil defined by the characterization effort is removed. If at any time it is determined to be impractical or unfeasible to remove soil to achieve the applicable performance standards, then a Post-Closure Plan will be submitted to the ADEQ as discussed in Permit Attachment 14 Section 14.11.

In the event soil removal is performed, the boundaries of the areas subject to removal will be marked on the ground. Excavation will proceed across the marked area to the specified depth. When the entire zone has been removed, confirmation samples will be collected and analyzed to verify that underlying exposed soil meets applicable performance standards. Should the analytical results show that the standards have not been met, additional soil removal will be undertaken. Once the standards have been met, excavated areas will be backfilled after the analytical closure progress report is provided to ADEQ and ADEQ concurs the area is not contaminated. Backfill material will be from an approved location and will be placed into the excavation and the surface will be graded.

Confirmation samples will be collected from the walls (or edges for shallow excavations) and floor of the excavation. ADEQ typically requires verification sampling to be at a higher resolution than the characterization sampling described in Permit Attachment 14 Section 14.7.4. Unless the closure plan amendment or revision can provide a sound basis for some other approach, samples will be collected at a rate of one per 10 linear feet (3 linear meters) of excavated sidewall and one per 100 square feet (9.3 square meters) of excavation bottom. The samples will be analyzed by the method appropriate for the waste constituents identified as being of concern in the initial characterization sampling. If the decision is made to remove soil prior to any sampling effort, the subsequent verification sampling will be performed as described above to provide confirmation of the success of the soil removal action.

The manner in which soil removal is performed will depend on the size of the excavation, if any, which is needed. Small excavations might be performed with hand equipment, but it is more likely that heavy equipment will be involved. Typical soil removal equipment requirements would include:

1. Containers ranging from drums to roll-off bins;

2. Rubber-tired backhoe with smooth and toothed buckets;

3. Shovels, hoes, and brushes;

4. Paint, flagging, and stakes;

5. Decontamination station; and

6. Personal protective equipment (PPE).

Soil would be removed under the following procedure or its equivalent:

1. Mark the areas subject to removal based on soil characterization. Designate, locate, and mark exclusion area boundaries, entry/exit points, personnel decontamination areas, and equipment decontamination areas. Designate a properly sized soil container, which will be reserved for this particular soil profile. Determine specific locations for the backhoe and waste container. Develop the specific extension, swing, reach, and release patterns that the backhoe operator wants to use.

2. Place the equipment decontamination station and prepare it for service.

3. Spread plastic sheeting on adjoining areas, as necessary, to protect against the spilling of excavated soil onto areas not subject to removal. The plastic sheeting will also prevent tracking of the backhoe across areas not subject to removal.

4. Use the backhoe to excavate the soil area to the specified depth and place the excavated soil in the selected container.

5. Use hand tools to remove all loose remnants of the designated soil from the excavation area. Place this soil in the container.

6. Collect confirmation samples from the walls and floor of the excavation.

7. Berm the excavation with soils from a clean source to prevent run-on.

8. Close and secure the containers. Decontaminate all equipment, tools, and personnel. Release excavation equipment and personnel.

9. Repeat the above if confirmation sample results indicate additional removal is required.

10. When the removal has ended, select a suitable borrow source that is known to be free of chemical contaminants. Arrange transportation of the backfill soil to the excavation.

11. Backfill the excavation, compacting between layers.

14.7.5 Decontamination of Closure Equipment

Equipment used to implement closure actions and potentially coming into contact with contaminated materials will be decontaminated before being released from the OB/OD site. This includes any equipment not being considered as waste at the end of closure actions, and may include heavy equipment such as earthmovers or bulldozers if significant earth removal is required. Decontamination will be in the form of washing, spraying, and/or wiping as necessary until there is no visible residues of dust or dirt remaining on the equipment surfaces that may have been exposed to potentially contaminated materials. Stiff bristle brushes or similar devices will be used as necessary in the event potentially contaminated materials prove difficult to remove. Because the OB/OD treatment actions involve no acid, bases, organic solvents, or other liquids, decontamination of heavy equipment is expected to require no more than removal of dirt and dust with minor, if any, levels of contamination. Given the type of contamination anticipated to be present on closure equipment, decontamination to a visually clean surface is judged to be the appropriate criteria.

Decontamination of closure equipment will be performed over an area where all wash water, including over spray, will be captured for management as closure-generated waste. This may mean that equipment decontamination is performed on an OB pad before it is decontaminated or removed. It may also mean that equipment decontamination is performed over heavy plastic sheeting that is laid over sloped ground allowing drainage to a small temporary collection basin installed for that purpose.

14.7.6 Management of Closure-Generated Waste

Waste generated during closure might include residues from decontamination (debris treatment) of burn pads and pans, firebrick from the burn pans (unless they are decontaminated), contaminated soil, rinse water from cleaning equipment used in the closure, and personal protective equipment. Permit Attachment 14A Table 14A-2 provides a description of the types of closure-generated waste that may be expected depending on the specific closure approach taken. Also shown in Permit Attachment 14 Table 14A-2 for each waste stream are volumes that may be involved (if known), the type package that will likely be used for transportation, and expected disposition. Closure-generated waste will be properly stored and managed in the facility and disposed of in accordance with A.A.C. R18-8-262.A (40 CFR 262, “Standards Applicable to Generators of Hazardous Waste”). It will be segregated into groups of similar physical and (suspect) contamination characteristics in order to facilitate characterization and to prevent waste incompatibilities. Hazardous waste determinations, based on the constituents of concern, will be completed for all waste streams according to 40 CFR 262.11, “Hazardous Waste Determination.” Closure-generated waste will be managed at the OB/OD MTF for as long as necessary during closure actions without triggering the need for a storage permit. This applies only during formal closure actions as described by the closure schedule in Permit Attachment 14 Section 14.8. During this time, waste will be properly containerized and periodically inspected in accordance with the operational requirements for a less-than-90-day storage site.

The OB/OD MTF is designated for the treatment of primarily ignitable and/or reactive (EPA Hazardous Waste Numbers D001 and D003) characteristic wastes. Residues from the treatment, unless they consist of unburned or unexploded PEP materials, no longer qualify as ignitable or reactive. Although treatment residues might contain underlying hazardous constituents as defined in A.A.C. 18-8-268.A (40 CFR 268), they must be managed as hazardous waste only if they qualify as hazardous based on their own characteristics [e.g., if they are determined to be too toxic through use of the Toxicity Characteristic Leaching Procedure (TCLP) analysis for either a hazardous metal, such as lead (EPA Hazardous Waste Number D008), or a hazardous organic, such as 2,4-DNT (EPA Hazardous Waste Number D030)]. If treatment residues no longer qualify as hazardous for any characteristic, they can be disposed in a Class D landfill independent of whether underlying hazardous constituents meet the UTS set in A.A.C. R18-8-268.A (40 CFR 268.48), provided the appropriate documentation and certifications are maintained and submitted as specified in A.A.C. R18-8-268.A (40 CFR 268.7 and 268.9).

The OB/OD MTF is currently operating under an ADEQ approved Groundwater Monitoring Plan (see Permit Attachment 7). To date, no groundwater contamination has been detected. Soil characterization performed before and during closure is intended to provide verification that groundwater has not been impacted by unit activities. The groundwater monitoring protocol arising from soil exceedances during closure sampling will be addressed specifically in documentation submitted to the ADEQ at that time.

Closure-generated waste will be managed and disposed of as hazardous waste if determined to be characteristically hazardous. Because of the suspected presence of underlying hazardous constituents, USAGYPG also has the option to manage closure-generated waste as hazardous even in the event that it no longer qualifies as a characteristic hazardous waste. However, this latter option would depend on specific characterization results of closure-generated waste and the management/disposition alternatives available when closure is performed. In any case, closure-generated waste will be managed in accordance with hazardous waste regulations that are in effect at the time of closure.

Hazardous waste determinations for waste contaminated with toxicity characteristic metals and organics are generally based on TCLP analyses as described in the preceding paragraph. However, if analyses for total concentrations in solids are available rather than TCLP values, hazardous waste determinations can still be made by applying the “20 times rule” to the total concentration values. This rule is based on the fact that the TCLP analytical procedure incorporates a dilution factor of 20 into its results when it is used on solid samples. For example, if a solid sample containing 20 mg/kg of lead were subjected to the TCLP analysis and all of the lead leached out of the sample during the process, analysis of the TCLP leachate would result in a value of 1 mg/L. Since the amount of a hazardous constituent that leaches out of the sample under the TCLP analysis is often less than 100% (and no more than 100% can leach out), use of the “20 times rule” is conservative. Again using lead as an example, if a total metals analysis shows a material to have a lead concentration of 100 mg/kg, it will be assumed that the waste is hazardous because the regulatory level (via TCLP analysis) is 5 mg/L, which is 1/20th of the total lead concentration. This is conservative because 5 mg/L is the maximum possible TCLP value from this sample. If less than 100% of the lead were to leach from the sample under TCLP analysis, the TCLP result would be less than 5 mg/L and the sample would not be hazardous for lead.

Closure-generated waste managed as hazardous waste will eventually be moved to the USAGYPG less-than-90-day storage site or arrangements will be made to have the waste picked up directly at the closure site for shipment to a commercial, offsite Treatment, Storage, or Disposal Facility (TSDF). Waste disposition will occur through normal channels [HAZMART (Hazardous Material Pharmacy), DRMO (Defense Reutilization and Marketing Office)] to properly permitted facilities. Closure-generated waste containers managed at the site will either be skid-mounted, placed on pallets, or otherwise amenable to placement on pallets so they can be moved by forklift to trucks.

14.8 CLOSURE SCHEDULE

Permit Attachment 14A Table 14A-3 identifies the closure schedule and activities that will be initiated at the start of closure. The schedule reflects the time required for conducting closure activities and submitting information to the independent PE for the closure certification. At present there is no forecast for when closure of the OB/OD MTF will be performed. The USAGYPG will notify the ADEQ at least 60 days prior to the date that closure is expected to begin as required by A.A.C. R18-8-264.A (40 CFR 264.112). In accordance with A.A.C. R18-8-264.A (40 CFR 264.112(d)(2)(i)), the date closure is expected to begin must be either of the following: (1) no later than 30 days after the OB/OD MTF receives the known final volume of hazardous waste for treatment; or (2) if there is still a reasonable possibility that the unit will receive additional hazardous waste, no later than one year after the date it received the most recent volume of hazardous waste. [That is, if the OB/OD MTF is inactive (treats no waste) for a year, hazardous waste regulations require that its closure be started.] Once closure is started, ADEQ will be notified at least 7 calendar days before each major closure event (e.g., decontamination, sampling, excavation, etc.).

A.A.C. R18-8-264.A (40 CFR 264.113) requires closure to be complete within 180 days from its initiation. As indicated in Permit Attachment 14 Table 14A-3, closure actions are expected to include two rounds of soil sampling (one initial characterization and one verification), which may make the 180-day schedule difficult to achieve. If deemed necessary and appropriate, the SAP and QAPP submittal prior to start of closure actions will include a request for an extension to the closure period pursuant to stipulations in A.A.C. R18-8-264.A (40 CFR 264.113). The QAPP will include all the requirements of Permit Attachment 13.

14.9 CLOSURE PLAN AMENDMENTS

The conditions described in A.A.C. R18-8-264.A (40 CFR 264.112(c), “Closure Plan; Amendment of Plan”) and A.A.C. R18-8-270.A (40 CFR 270.42, “Permit Modification at the Request of the Permittee”) will be followed to implement changes to the approved Closure Plan. Prior to the closure period, the Closure Plan shall be amended if it is affected by a proposed change in operating plans or design, or by the occurrence of an unexpected event. The request for the amendment shall be submitted at least 60 days prior to implementing any operating plan or design change and within 60 days after an unexpected event occurs. Should unexpected events during the closure period require modification of approved closure activities, the Closure Plan will be amended within 30 days of the unexpected event. A written request detailing the proposed changes and the rationale for those changes and a copy of the amended Closure Plan will be submitted to the ADEQ for approval. Minor changes to the approved Closure Plan, which are equivalent to or do not compromise the closure requirements and performance standards identified in the approved Closure Plan, could be made without prior notification to the ADEQ. Minor changes or Class I modifications will be submitted to the ADEQ pursuant to A.A.C. R18-8-270A (40 CFR 270.42) and will be identified in the Closure Report that accompanies the certification statement (see Permit Attachment 14 Section 14.10).

A.A.C. R18-8-270.A (Appendix I to 40 CFR 270.42) identifies "equipment replacement or upgrading with functionally equivalent components" as a Class 1 permit modification that does not require prior written approval of the ADEQ. (There are, however, notification requirements that must be met within set timeframes of such a change being put into effect.) A.A.C. R18-8-264.A [40 CFR 264.112(e)] specifies that nothing in the closure and post-closure requirements "shall preclude the owner or operator from removing hazardous waste and decontaminating or dismantling equipment in accordance with the approved partial or final Closure Plan at anytime before or after notification of partial or final closure." The cited regulations recognize that equipment, such as those that make up the OB Pans, might need to be replaced in kind with functionally equivalent components during the life of the facility and that such actions can be taken as a Class I modification. Further, once this Closure Plan has been approved, the old replaced components can be dismantled and decontaminated as appropriate in accordance with the methods and activities described in this Closure Plan, but without implementing final closure or otherwise amending this Plan.

14.10 DOCUMENTATION/CERTIFICATION OF ACHIEVING CLOSURE

Closure activities will be monitored and reviewed by an independent Arizona registered professional engineer (PE) in accordance with A.A.C. R18-8-264.A (40 CFR 264.115). Following successful completion of closure activities, the PE will certify that closure was performed in accordance with the methods described in the approved Closure Plan. The PE will observe, as necessary, decontamination, verification sampling, soil and residue removal, and waste management activities. The PE will also review logs of closure actions, the closure plan, and sampling data.

Information regarding waste management during closure activities, including hazardous waste determinations and certifications, will be provided to the independent PE to support closure certification.

Within 60 days of completing closure activities, a certification of closure of the OB/OD MTF will be provided in accordance with A.A.C. R18-8-264.A (40 CFR 264.115) by an independent Arizona-registered PE and the owner/operator of the USAGYPG. The PE and the owner/operator signatures on the closure certifications submitted to the ADEQ will document completion of closure activities in accordance with the approved Closure Plan and A.A.C. R18-8-260 et seq. requirements. The owner/operator certification will use the following language:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

The owner/operator and independent Arizona-registered PE certifications will be completed on forms consistent with those provided by ADEQ. In addition to the certifications, a Closure Report will be submitted to ADEQ. The Closure Report shall include the following information:

1. A brief summary of the closure plan and a brief presentation of the closure results and conclusions;

2. A discussion of the closure procedures, including drawings and photographs where appropriate, and including identification of any deviations from the approved closure plan;

3. A detailed discussion of the conclusions following closure; and

4. Data generated from sampling and analysis activities performed pursuant to the plan, including field notes, manifests, bills of lading, LDR forms, laboratory submittal forms, chain-of-custody forms, laboratory reports, and drilling logs.

Additionally, information to satisfy A.A.C. R18-8-208 (Letter of Completion) and –209 (Notice of Remediation and Repository) will be submitted to ADEQ for any soil areas above residential standards or any soils remediated.

Closure of this facility (which may represent partial closure of the overall USAGYPG facility) will be considered complete upon receipt of written acceptance issued by the ADEQ.

Copies of documentation supporting the closure of the OB/OD MTF, including supporting documentation of the PE certification, will remain in the project files in the event that information is requested by the ADEQ. The OB/OD facility is not a hazardous waste disposal facility and, therefore, a Notice in Deed and survey plat are not required.

14.11 POST-CLOSURE ACTIVITIES

The Closure Plan provides for the removal of hazardous wastes, treatment residues, and contaminated soil from the unit. Post-closure care is not planned at this point. If, during closure activities, it is determined that performance standards cannot be achieved through reasonable decontamination and soil removal actions, post-closure care may be necessary. Post-closure care would be detailed in an amendment to the Closure Plan in the form of a Post-Closure Plan. In the unexpected event it is determined during closure that a Post-Closure Plan is necessary, that Plan will be submitted to the ADEQ within 30 days of making the determination, as required by A.A.C. R18-8-264.A [40 CFR 264.112(c)].

The remaining elements of this section discuss facility elements that would be considered in post-closure activities should they become necessary. The discussion includes current status of the facility elements and how they might change before and during closure actions.

14.11.1 Groundwater Monitoring

Soil characterization performed before and during closure is intended to provide verification that groundwater has not been impacted by unit activities. The groundwater monitoring protocol arising from soil exceedances during closure sampling will be addressed specifically in documentation submitted to the ADEQ at that time.

14.11.2 Leachate Collection

The facility operation is not known to have generated leachate. Any impacts due to fluids moving through the OB pads, surrounding soils, or the OD trenches will be confirmed by sample collection and analysis. After decontamination of the pads and pans and removal of soil not meeting the performance standards specified in this Closure Plan, there will be no potential for leachate production of any concern.

14.11.3 Run-On/Runoff Control

Run-on/runoff control will continue through the closure period. The existing perimeter berms will be maintained during closure. After decontamination of the facility and removal of any impacted soils, maintenance of the run-on/runoff control berms will be unnecessary.

14.11.4 Survey Plat

A survey plat of the unit will not be submitted. A survey plat is not required for nondisposal units. The Closure Plan describes the intended approach of achieving clean closure for the OB/OD MTF. The Plan also describes the possibility that the performance standards achieved could be those for nonresidential SRLs, in which case the USAGYPG would work with ADEQ to develop reasonable administrative land use restrictions sufficient to protect human health in a manner functionally equivalent to the restrictions found in the DEUR program. In this case, the OB/OD MTF will be considered to have achieved closure with land use restrictions, but without the need for any other post-closure care. The requirements for a survey plat set at A.A.C. R18-8-264.A (40 CFR 264.116) would be implemented only in the unexpected event that it is determined to be impractical to achieve either residential or nonresidential SRL values.

14.12 CLOSURE/POST-CLOSURE COST & FINANCIAL ASSURANCE

A.A.C. R18-8-264.A (40 CFR 264 Subpart H) specifies that the Federal Government, as owner and operator of the USAGYPG OB/OD MTF, is exempt from all financial requirements for closure.

14.13 REFERENCES

The following documents were used in the preparation of this Closure Plan, and provide additional supporting data and guidance:

ADEQ 2004, ADEQ (Arizona Department of Environmental Quality) 2004, "Open Burning Permit #3010," Phoenix, Arizona.

Cochran, Chris, 1991, Soil Survey of the U.S. Army Yuma Proving Ground, Arizona – Parts of LaPaz and Yuma Counties in 1991, Soil Conservation Service, U.S. Army Yuma Proving Ground, Yuma, Arizona.

Davies, et. al. 2004, Davies, B., Botdorf, C., Butler, J., Cantwell, B., Hlohowskyyj, I., Kimmell, T.A., et. al. 2004, *Remedial Investigation Report for Selected Site at Yuma Proving Ground, Arizona*, Argonne National Laboratory, Environmental Assessment Division, Argonne IL, prepared for U.S. Army Yuma Proving Ground.

Entech 1987, Entech Engineers, Inc. 1987, *Yuma Proving Ground Hydrologic and Pollution Investigation Study, Cibola and Kofa Ranges*, Santa Ana, California, prepared for: U.S. Army Corps of Engineers, Los Angeles District.

EPA 1999, *RCRA Facility Assessment, U.S. Army Yuma Proving Ground, Yuma Arizona, AZ5213820991*, Region 9, April, San Francisco, California.

HW Operating Permit, U.S. Army YPG Kofa Hazardous Waste OB/OD Treatment Facility, Arizona HWMA/RCRA Operating Permit.

HW Operating Record, U.S. Army YPG Kofa Hazardous Waste OB/OD Treatment Facility, Arizona HWMA/RCRA Operating Record.

NOAA 1973, NOAA (National Oceanic and Atmospheric Administration, U.S. Department of Commerce) 1973, *NOAA Atlas 2, Volume VIII.* NOAA, National Weather Service, Office of Hydrology. Prepared by the U.S. Department of Agriculture, Soil Conservation Service, Engineering Division.

U.S. Army ARs, U.S. Dept. of Defense (DoD) Army regulations.

USEPA SW-846, U.S. Environmental Protection Agency (USEPA), Office of Solid Waste Publication No. 846 (SW-846), “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods”.

USGS Map, U.S. Geological Survey (USGS) 7.5-minute Quadrangle Map, Middle Mountains South, Arizona-Yuma Co.

YPG 1984, RCRA Permit Part A Application.

YPG 2001, *Final Range-Wide Environmental Impact Statement*, Command Technology Directorate, CSTE-DTC-YP-CD-ES, Yuma, Arizona.

ATTACHMENT 14A

TABLES

Table 14A-1. Decontamination Methods for OB/OD Structures and Equipment

Primary Components	Potentially Applicable Physical Extraction Technologies[a, b]	Performance Standard[a]
Metal pans and pipes, concrete pads, and plastic pipes (surfaces exposed to treatment residues)	*Abrasive Blasting* – Removal of contaminated debris surface layers using water and/or air pressure to propel a solid media	*Concrete* – Removal of at least 0.6 cm (0.25 inch) of the surface layer; and treatment to a clean debris surface[c] *Metal* - Treatment to a clean debris surface[c]
Concrete pads, sumps, and retention basins (surfaces exposed to treatment residues)	*Scarification, Grinding, and Planing* – Process using striking piston heads, saws, or rotating grinding wheels such that contaminated debris surface layers are removed	Removal of at least 0.6 cm (0.25 inch) of the surface layer; and treatment to a clean debris surface [c]
Metal pans, pipes, or grates, and/or plastic pipes	*Vibratory Finishing* – Process utilizing scrubbing media, flushing fluid, and oscillating energy such that hazardous contaminants or contaminated debris surface layers are removed	Treatment to a clean debris surface[c]
Metal pans, pipes, or grates, and/or plastic pipes	*High-Pressure Steam and Water Sprays* – Application of water or steam sprays of sufficient temperature, pressure, residence time, agitation, surfactants, and detergents to remove hazardous contaminants from debris surfaces or to remove contaminated debris surface layers	Treatment to a clean debris surface[c]

a. Source: A.A.C. 18-8-268.A (40 CFR 268.45, Table 1).

b. Acids, solvents, and chemical reagents may react with some debris and contaminants to form hazardous compounds. For example, acid washing of cyanide-contaminated debris could result in the formation of hydrogen cyanide. Some acids may also react violently with some debris and contaminants, depending on the concentration of the acid and the type of debris and contaminants. Person performing debris treatment should refer to the safety precautions specified in Safety Data Sheets for various acids to avoid applying an incompatible acid to a particular debris/contaminant combination. For example, concentrated sulfuric acid may react violently with certain organic compounds, such as acrylonitrile.

c. "Clean debris surface" means the surface, when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste except that residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations, and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks, crevices, and pits shall be limited to no more than 5 percent of each square inch of surface area.

Table 14A-2. Summary of Potential Closure-Generated Waste

Description of Potential Closure-Generated Waste	Estimated Volume	Expected Packaging for Transportation[a]	Expected Disposition[b]
Waste Inventory			
Ash From OB (In Between Firebricks)	< 55 gal	Drum	Offsite TSDF
Unexploded PEP	< 55 gal	Drum or Box	
Facility Equipment and Structures If Not Decontaminated			
Concrete And Refractory Brick	20,000 ft^3	Waste Box or Roll off container	Offsite TSDF
Metal Burn Pans	300 ft^3	Waste Box	
Firebrick	100 ft^3	Drum or Box	
Metal Grates	2 ft^3	Waste Box	
Metal And Plastic Pipe	< 55 gal	Drum or Box	
Pad Liner From Under Concrete Pad[c]	1,000 ft^3	Drum or Box	
Sand Covering Pad Liner[c]	1,600 ft^3	Box, Supersack, or Truck Bed	
Facility Equipment and Structures If Decontaminated			
Concrete	20,000 ft^3	Dump Truck or Roll off container	Disposed as solid waste or recycled
Metal Burn Pans	300 ft^3	Truck Bed	
Firebrick / Refractory Lining	100 ft^3	Dump Truck or Roll off container	Disposed as solid waste
Metal Grates	2 ft^3	Waste Box	Disposed as solid waste or recycled
Metal And Plastic Pipe	2 ft^3	Waste Box	
Pad Liner From Under Concrete Pad[d]	1,000 ft^3	Drum or Box	
Sand Covering Pad Liner[d]	1,600 ft^3	Dump Truck or Roll off container	
Solid Residues from Decon of Facility Equip & Structures			
Blast Media With Metal Dust Or Grindings	50 ft^3	Drum	Offsite TSDF
Concrete Debris, Cuttings, Dust	500 ft^3		
Firebrick Debris, Cuttings, Dust	10 ft^3		
Closure Equipment			
PPE	8 ft^3	Drum or Box	Offsite TSDF
Plastic Sheets Used For Contamination Control	50 ft^3		
Disposable Sampling Equipment	2 ft^3		
Disposable Decon Equipment	5 ft^3		
Contaminated Water			
From Decon Of Facility Equipment (Drainage Pipes)	Unknown	Drum or Tank	Offsite TSDF
From Decon Of Closure Equipment	Unknown		
Precipitation Runoff From Contaminated Surfaces	Unknown		
Contaminated Soil			
Contaminated Soil	Unknown	Box, Supersack, or Truck Bed	Offsite TSDF

a. Whatever container is used for transport, it will have to be a DOT-approved container for the transport method.

b. Waste streams shown with "Offsite TSDF" are expected to be managed as hazardous waste unless sampling is performed to verify that it can be managed as non-hazardous solid waste.

c. The pad liner & sand cover are not subject to decontamination, but if the pad is not decontaminated (i.e., it is broken up and removed), it is assumed the sand & liner will also be removed for disposal as HW unless sampled and shown to be non-hazardous.

d. Under the scenario that there will be no evidence of contaminants leaking to the pad liner and its sand cover and they will also be left in place.

Table 14A-3. Schedule for Closure of the OB/OD MTF

Activity	Day Completed
Submit SAP And QAPP For Soil Characterization Actions	-180
Initiate Closure Activities (Received Final Volume Of Hazardous Waste)	0
Complete Removal Of All Free Treatment Residues (Those Not Commingled With Soil Or Tied To Debris Surfaces)	15
Complete Decontamination Or Removal Of Structures And Equipment (OB Pads And Pans) Including Cleanup Of Any Decontamination Residues	45
Complete Initial Soil Characterization Effort	60
Complete Soil Removal Actions As Appropriate	105
Complete Soil Verification Sampling	120
Complete All Closure Activities, Including Completing Hazardous Waste Determinations, Removal Of All Wastes (Where Applicable), And Developing Documentation That Verifies Achievement Of Performance Standards	180
Submit Closure Certification To The State Of Arizona	60 Days After Completion Of Closure

ARIZONA HAZARDOUS WASTE MANAGEMENT PERMIT

EPA I.D. NO. AZ5213820991

U.S. ARMY GARRISON YUMA PROVING GROUND

PERMIT ATTACHMENT 15

RECORDKEEPING AND REPORTING

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ATTACHMENTS

RECORDKEEPING & REPORTING

This section presents information on recordkeeping and reporting to support 40 CFR 264.73 and 40 CFR 264.602, which specifies operating and reporting requirements for miscellaneous units.

Concerning records, the following information must be recorded, as it becomes available, and maintained in the operating record located at the U.S. Army Garrison Yuma Proving Ground (USAGYPG) until closure of the Open Burn/Open Detonation Munitions Treatment Facility (OB/OD MTF). The retention period of all records is automatically extended if there is a written request to do so by the Arizona Department of Environmental Quality (ADEQ) or there is an unresolved enforcement action. Exceptions to the "retention until closure" period for certain records are detailed in the subsequent sections below. A summary of the requirements for most records required by the Permit is provided in Permit Attachment 15, Table 15A-1.

The operating record, including all plans and reports, shall be available at all reasonable times for inspection. The records will be kept in file cabinets that are fireproof and protected from moisture and other environmental elements. These written records shall be kept under the control of the USAGYPG Environmental Sciences Division.

The USAGYPG shall maintain the written documents and records at the designated location in Table 15A-1 for at least three (3) years. Documents so specified that are greater than three (3) years old, yet still required to demonstrate compliance with Arizona HWMA/RCRA, may be maintained at an alternate location so long asthe security and other protective measures are equivalent or better than those of the original record storage location. For example, documents and records as required by this Permit may be maintained at records repository (e.g., central administrative office at the USAGYPG) for the USAGYPG installation and USAGYPG contractor employees, provided the records are readily available for inspection by an authorized official of DoD, EPA, or ADEQ.

Use of electronic recordkeeping of documents or records required to be retained by this permit is not allowed, except as a backup of the original document and for documents whose age has passed their retention periods as required by regulation. (Reference: ADEQ Letter dated September 26, 1997 from Santana to McCord entitled "Safety-Kleen's Electronic Storage of Documents Request" and Federal Register Vol. 66, No. 170, Page 46162 et seq. "Establishment of Electronic Reporting; Electronic Records – Proposed Rule").

The locations of all records shall be designated in Permit Attachment 15, Table 15A-1 or in the inspection schedule (Permit Attachment 11, Permit Attachment 11A) so that those locations can be inspected to ensure the records are protected.

15.1 HAZARDOUS WASTE RECEIVED

The completed Treatment Summary Form (Permit Attachment 6 (OB/OD Operations)) will be kept in the operating record. As part of the daily file, the form will be completed and accompanied by the transfer document listed below. This packet will be retained in the operating record until closure of the OB/OD MTF.

If the material is not listed or is proprietary in nature, the generator must:

1. Compare the materials and constituents to the Master list (Permit Attachment 4 (Constituents of Potential Concern); and

2. Make a determination/certification (Permit Attachment 6 (OB/OD Operations)) that the chemicals are authorized for treatment. This will be maintained along with the Summary Treatment form.

One of the following four transfer forms will be used to record the description and the quantity of each hazardous waste received and the method(s) plus date(s) of its treatment (Destroy/Burn Listing). The completed form will be maintained with the Summary Treatment Form in the operating record. Any one of the forms can be used for accountability purposes.

1. DD Form 1348-1A (Single Line Item release / Receipt Document)
2. DA Form 4508 (Ammunition Transfer Record) is utilized for transfers from the ammunition warehouse to maintain stock control.
3. DA Form 2407 (Maintenance Request) serves as the plant's documentation to illustrate disposal of test munitions that have not been added to the stock inventory.
4. YT Form 24 (Propellant Burn Control Register) is used by the plant to document destruction of propellant that requires immediate disposal.

15.2 RECORDS OF SECONDARY WASTE MANAGED

Records of secondary wastes managed will be maintained with the facility operating record. There are two locations for storage of the wastes generated from treatment at this facility – the satellite accumulation area located adjacent to the personnel safety bunker and the installation HAZMART (a 90-day accumulation area).

A Scrap Certification form (Permit Attachment 6, Permit Attachment 6B) is completed when the ORT verifies that treated materials are no longer hazardous. This will be included in the facility operating record. Transfer from the HAZMART facility will include specific manifest document numbers.

The disposal documentation for the HW should be maintained. Documentation of each waste removal, including the quantity of waste removed, the sump or collection system the waste was removed from, and the date and time of removal. If a manifest from another state is used to ship hazardous waste to that state, then submit a legible copy of the manifest to ADEQ within thirty (30) days of each shipment. File an Exception Report with ADEQ if a copy of the manifest signed by the facility operator is not received within 45 days of the date the waste was accepted by the initial transporter.

15.3 RECORDS & RESULTS OF WASTE ANALYSES & WASTE DETERMINATIONS PERFORMED

As part of the RCRA Permit, the Waste Analysis Plan (WAP) (Permit Attachment 3) will be kept with the OB/OD MTF operating record. Modifications to the WAP may require approval by the ADEQ as permit modifications. Examples of such modifications are:

1. When changes are made to test methods that affect the overall quality of the analyses;

2. When waste streams or routine process operations are changed or modified, thus requiring a change in the parameters to be tested;

3. When regulations affecting the WAP are changed; and

4. When the permit is modified or reissued.

Due to national security or proprietary data concerns, there will be instances when the exact composition of the waste to be treated will not be specified. In such cases, the USAGYPG will provide a demonstration that the waste will fit into the general profile (see WAP) to the operating record. This demonstration must:

1. List any explosive compounds or underlying hazardous constituents present (any constituent or compound that is listed or characterized in A.A.C. R18-7-203, or is listed in 40 CFR 261 Appendix VIII or 40 CFR 264 Appendix IX);

2. Verify the compatibility of the treatment unit with the materials to be treated; and

3. Be retained in the facility operating record until closure of the facility.

At a minimum, samples will be collected and analyzed (Permit Attachment 3 (WAP)) for the following purpose: (i) hazardous waste characterization for disposal; (ii) cleanup verification from an accidental incident; and (iii) annual waste minimization certification. These characterization samples will be analyzed and traceable to the applicable data records (for example, chain-of-custody, field records, request for analysis, or laboratory ledgers) and retained in the facility operating record until closure of the facility.

Sample collectors will maintain permanent records and retain in the operating record all sampling activities. The record will include the following: purpose of sampling, date and time of collection, sample number, sampling location, sampling methodology, container description, waste description, description of process originating the waste, number and volume of samples, field observations, field measurements, destination and transporter, and signature of collector.

Copies of all notices, certifications, demonstrations, and other documentation produced to support the determination for restricted wastes treated on the site, or treated, stored, or disposed of off the site at an approved hazardous waste TSDF will be retained in the OB/OD operating record by the USAGYPG until closure of the facility.

15.4 QUALITY ASSURANCE PROJECT PLAN DOCUMENTATION

The following documents are required to be maintained in the operating record in support of the Quality Assurance Project Plan (QAPP) (Permit Attachment 13):

1. All project logbooks;

2. All sampling reports from soil investigations in accordance with QAPP requirements;

3. Attached laboratory data packets will include the completed chain of custody; and

4. Associated Sample Analysis Plans (SAP).

15.5 RANGE MAINTENANCE & CONTINGENCY PLAN DOCUMENTATION

15.5.1 Incidental Releases

As specified in Permit Attachment 6 (OB/OD Operations) and Permit Attachment 10 (Contingency Plan), there are certain actions that must be recorded when ordnance and explosives are ejected from the OB pad and/or OD Pit and does not meet the quantity criteria for contingency plan implementation and can be safely moved back to the pan or pit for destruction. At a minimum, this required documentation must include:

1. The date of the discovery;

2. The names of the person(s) responsible for cleanup;

3. The type and description of the material addressed;

4. The location of the material measured to a known survey point of reference (set be AZ registered land surveyor) to +/- 5 feet;

5. Any results of cleanup confirmation sampling; and

6. The disposition of the material.

15.5.2 Implementation of the Contingency Plan

As specified in Permit Attachment 10 (Contingency Plan), the Emergency Coordinator and OB/OD MTF personnel will conduct a review of the cause of an accident or incident. The operation that caused the accident or incident will not be restarted until adequate corrective and preventive measures have been determined and implemented. Any release or other emergency incident that necessitates implementing this OB/OD MTF Contingency Plan will be followed by a written report documenting review of the incident and necessary follow-up actions.

This report will be submitted to the ADEQ within 15 calendar days of the incident.

A copy of the incident report will be maintained in the OB/OD MTF operating record.

A copy of the Contingency Plan will be submitted to the USAGYPG installation emergency responders and the other facilities with coordination agreements as part of the Contingency Plan.

As described in the Contingency Plan, emergency situations could occur after OB/OD treatment activities where the response action requires that munitions or explosives be detonated or burned in-place rather than being moved back into the appropriate permitted OB/OD unit. In the event of such response actions, the USAGYPG Ammunition Recovery Branch will maintain, until facility closure, the following records (which are in addition to the reports described earlier in this section):

1. The dates of the response(s);

2. The names of the responsible persons responding;

3. The type and description of the material addressed;

4. The location of the material measured to a known survey point of reference (set be AZ registered land surveyor) to +/- 5 feet;

5. Any results of cleanup confirmation sampling; and

6. The disposition of the material.

15.6 INSPECTIONS

The operator will conduct daily inspections of the OB/OD MTF and of the support utility equipment, when operating. Weekly inspections will be performed and recorded on the appropriate checklists (see Permit Attachment 11, Attachment 11B-2). The USAGYPG will keep these records for at least three years from the date of inspection.

15.7 TRAINING RECORDS

The Training Director is responsible for ensuring the training records are maintained in accordance with this section. Training records for OB/OD MTF personnel will be maintained at the USAGYPG, and will include:

1. The job title for each position that is related to OB/OD Treatment Facility hazardous waste management operation and activities and the name of the employee filling each

position;

2. The job description specifying duties for each position, minimum qualifications required to fill the position, and required training for the position;

3. A description of the type and amount of introductory and continuing training that will be given to each employee;

4. The date each employee started working at the OB/OD MTF;

5. Course enrollment, attendance, and successful completion information;

6. Copies of course materials and instructional methods (outlines, schedules, instructional techniques, and materials); and

7. Medical surveillance records.

All training records and documentation on current OB/OD MTF personnel will be kept until closure of the facility. Training records on former OB/OD MTF personnel will be kept for at least 3 years from the date those personnel last worked at the facility.

15.8 POLLUTION PREVENTION CERTIFICATION

The USAGYPG completes a post-wide annual waste minimization certification. The program demonstrates reduction in volume and toxicity of hazardous waste that is generated. The program must be economically practicable and the proposed method of treatment, storage, or disposal is the practicable method currently available to the USAGYPG. This shows how the USAGYPG minimizes the present and future threat to human health and the environment. A copy of this certification will be obtained and maintained in the operating record.

15.9 RCRA BIENNIAL REPORT

The USAGYPG shall submit a Resource Conservation and Recovery Act (RCRA) Bienneial Report to ADEQ by March 1 of even years for the preceding calendar year in accordance with A.A.C. R18-8-264.A (40 CFR 264.75) and -264.H. A copy of the report submitted to ADEQ, as required in 40 CFR 262.41 and 40 CFR 264.75, and as amended in A.A.C. R18-8-262.H and -264.H, respectively, will be maintained on file.

15.10 RCRA AIR EMISSIONS

A drum log will be used to maintain compliance with 40 CFR §264.1086 and §265.173. This log will contain operational entries, including additions and removals of waste, with a verification statement that drum is closed. The working log will be stored in the Safety Bunker and when completed in the Operational Record.

15.11 ADDITIONAL ITEMS NOT COVERED

All requirements required under 40 CFR §264.1(j)(13) will be included as part of the RCRA Permit in which a copy will be stored in the operating record. Additional items not covered above, will also be maintained in the operating record, including but not limited to:

1. Minor changes or Class 1 modifications will be submitted to the ADEQ pursuant to A.A.C. R18-8-270A (40 CFR 270.42).

2. Copies of sampling events that occur that have not been previously described that will provide insight or information to update the closure sampling plan. Results and data reduction analysis will be submitted to ADEQ within 15 calendar days of the evaluation of the laboratory data.

3. When the Visitor Log is used, it will be stored in the facility operating record.

4. A copy of the hydrostatic testing of the connecting piping between the pads and retention basins conducted every five years will be maintained in the operating record.

ATTACHMENT 15A

TABLES

Table 15A-1 Retention and Primary Storage Location of Most Required Records, Plans, Reports, & Documents

TABLE 15A-1. RETENTION AND PRIMARY STORAGE LOCATION OF MOST REQUIRED RECORDS, PLANS, REPORTS, & DOCUMENTS

RECORD OR DOCUMENT	RETENTION PERIOD[a]	PRIMARY STORAGE LOCATION[d]	PERMIT CONDITION & REGULATION[d, e]
OPERATING RECORD (Elements listed Below)			P.C. I.F.5 & 15
Arizona HWMA/RCRA OB/OD Permit	C	ARM	
All Plans Required By The HW Permit	C	ESD	P.C. 15
All Reports Required By The HW Permit	B	ESD	270.30(j)(2)
Hazardous Waste Received o Treatment Summary Form o Transfer Record o Acceptability for Treatment Certification	C	ARM	P.C. 15.1 264.73(b)(1) 264.73(b)(2)
Secondary Waste o Scrap Certifcation Form o Waste Removal Documentation o Disposal Documentation o HAZMART Manifests o Manifest Exception Reports o Waste Characterization (see below)	C	ARM ARM YPG Hazmart YPG Hazmart ESD ESD	P.C. 15.2 264.73(b)(4)
Waste Analysis & Waste Determinations o Waste Analysis Plan (And Wap Modifications) o Proprietary Waste Profile Determination o Waste Compatibility Documentation o Characterization Sample Data Records o Sample Collection Records o LDR Waste Determination Records & Notices	C	ARM ARM ARM ESD ESD YPG Hazmart	P.C. I.F.1 P.C. 15.3 264.73(b)(4) 264.73(b)(12)
Quality Assurance Program Plan o Project Logbooks o Sampling Reports o Laboratory Data Package o Chain of Custody o Sample Analysis Plans	C	ESD	P.C. 15.4
Contingency Plan o Incident Reports o Official Contingency Plan o Copy of Contingency Plan o Responses Outside OD Pits or OB Pans	C	ARM ESD CFS Emergency Responders & Safety Bunker ARB	P.C. 15.5 264.73(b)(4) P.C. I.F.3 264.73(b)(4)
Inspections o Inspection Schedule o Inspection Log Sheets	C B	ARM	P.C. I.F.2 P.C. 15.6 264.73(b)(5)
Training Records o Current Employee Training Records o Former Employee Training Records	C B	ARM	P.C. I.F.4 P.C. 15.7
Pollution Prevention o Plans, Reports and Other Documents o Annual Waste Minimization Certification	C B	ESD	P.C. 15.8 264.73(b)(9) 270.30(j)(2)
RCRA Annual Report	C	ESD	P.C. 15.9
RCRA Air Emissions o Working Drum Log o Completed Drum Log	C	ARM	P.C. 15.10

TABLE 15A-1. RETENTION AND PRIMARY STORAGE LOCATION OF MOST REQUIRED RECORDS, PLANS, REPORTS, & DOCUMENTS

RECORD OR DOCUMENT	RETENTION PERIOD[a]	PRIMARY STORAGE LOCATION[d]	PERMIT CONDITION & REGULATION[d, e]
Permit Modifications	C	ARM	P.C. 15.11
Sampling Plans and Reports	C	ESD	P.C. 15.11
Visitors Log	C	ARM	P.C. 15.11
Hydrostatic Test Results	C	ESD	P.C. 15.11
Monitoring, & Testing and Analytical Data o 264 Subpart F Activities o Construction QA o Miscellaneous Units o Monitoring Records o Maintenance Records	 C C C B B	 ESD ESD ESD ESD ARM	264.73(b)(6) 270.30(j)(2) 270.30(j)(2)
Corrective Action	C	ESD	264.73(b)(6)
Other Items not Listed	C	ESD	P.C. 15.11
Permit Applications o All Data Used To Complete Application o Supplemental Information (Part A And Part B)	B	ESD	270.10(i)
SWMU Information	C	ESD	270.14(d)
Closure Plan	C	ARM	P.C. I.F.6
Remediation Waste Management (RWM) Site Records	C	ESD	270.30(j)

A. See notes B and C below for explanations. If only one code is given, then that code applies to all items listed for that document or record. The retention period of all records is automatically extended if there is a request to do so by ADEQ, or there is an unresolved enforcement action (40 CFR 264.74(b) and 40 CFR 270.30(j)(2)).

B. Records will be retained at least (3) three years after: the date of the inspection including the date of any correction of deficiencies (40 CFR 264.73(b)(5)); the date the employee last worked at the facility; the date the application is signed (40 CFR 270.10(i) and 270.30(j)(2)), and the date of the sample, measurement, report, or certification (40 CFR 270.30(j)(2)).

C. Records will be retained until OB/OD facility closure is acknowledged by ADEQ. (40 CFR 264.73(b)).

D. If only one organization is given, then that organization applies to all items listed for that document or record. ARM = Ammunition Recovery and Management; YPG Hazmart = YPG hazardous waste disposal contractor and <90-day storage; ESD = Environmental Services Directorate; ARB = Ammunition Recovery Branch; CFS = Central Fire Station; and P.C. = Permit Condition.

E. Regulations beginning with 264, 268, and 270 imply A.A.C R18-8-264.A (40 CFR 264), -268.A (40 CFR 268), and -270.A (40 CFR 270), respectively. Where multiple applicable regulations are cited, no specific order is implied with regards to the items listed for that document or record.

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