Permit Attachment 1. Waste Analysis Plan

SECTION C
WASTE CHARACTERISTICS AND WASTE ANALYSIS PLAN

This Waste Analysis Plan (WAP) describes the chemical and physical characteristics of wastes treated at the RCRA units on MCAAP. This plan also presents the parameters, rationale, and testing procedures for evaluating waste to ensure the safe handling of wastes. The information submitted was developed in accordance with the requirements of 40 CFR 270.14(b)(2) and 264.13.

As indicated in 40 CFR 264.13(a)(1), before an owner or operator treats, stores, or disposes of any hazardous waste, a detailed chemical and physical analysis of a representative sample of the waste must be obtained.

At a minimum, the analysis must contain information which allows effective treatment, storage, or disposal in accordance with 40 CFR 264.13 and 268. The required analysis may include information developed under 40 CFR 261, or published/documented data on the hazardous waste or hazardous waste generating process. The analysis must be repeated when the owner or operator has reason to believe that the process or operation generating the waste has changed.

The MCAAP RCRA units may receive wastes from both on-site and off-site facilities. Both types of waste fall into generic waste categories that are classified by particular physical and chemical properties, generating process or operation, and waste characteristics.

1. Wastes Incinerated

MCAAP conducts thermal treatment of waste munitions and Propellants, Explosives, and Pyrotechnics (PEP) at its incinerator. General information concerning the chemical and physical characteristics of PEP treated at the unit are described in this section.

The categories of wastes treated in the incinerator consist primarily of military energetic materials and ordnance that have exceeded their "shelf-life", off-specification versions of these items, or various waste components from manufacturing processes that cannot be recycled or otherwise disposed of safely. Due to the varying nature of these items, it is impossible to accurately describe each specific reject munitions item. Each item is manufactured within strict specifications. If an item falls outside these strict specifications at any time during loading, assembling, or packing, the munitions item is rejected and is handled as a waste item. Historical data, waste analyses, specifications and ordnance publications available at the facility are consulted to obtain information on these items to determine the suitability of the waste material for incineration.

a) Description of Wastes to be Treated at Incinerator

The 40 CFR 264.340 provides the regulatory basis for hazardous waste incinerators to be exempted from the RCRA regulations for air emissions. In order to qualify for the exemption, the owner/operator of unit must demonstrate compliance with the Maximum Available Control Technology (MACT) requirements of part 63 Subpart EE by conducting a Comprehensive

Performance Test and submitting a Notification of Compliance to the Administrator that documents compliance with these provisions. MCAAP has completed these tasks and therefore the unit qualifies for this exemption.

One key aspect of this exemption allows for the specific types of wastes to be treated in the unit to be controlled under the MACT's Feedstream Analysis Plan (FAP), rather than the traditional RCRA waste analysis plan. The FAP includes parameters for analyzing each waste, the method for performing the analysis, test and sampling methods, and frequency of analysis. Consequently, detailed sampling and analysis methodologies for wastes will not be included in this WAP, nor will the RCRA permit be modified in the future to accommodate additional wastestreams. The FAP will serve as the sole mechanism to regulate these requirements.

b) Waste Analysis Information

(1) General Explosive Information

Tables C-1 and C-2 provide a general description of chemical composition, hazard characteristics of the wastes, characteristics of explosives, and information on military specifications for explosives.

A number of reactive compounds are present in waste military munitions. These compounds fall into four general categories:

- Primary explosives
- Boosters and secondary explosives
- Propellants
- Pyrotechnics

Primary and secondary explosive compositions react by violently detonating. Propellants and pyrotechnics react by burning, generating large quantities of gas with intense light and heat. Table C-1 provides a summary of compositions potentially treated at the units, their chemical formulas, and their EPA Hazardous Waste Numbers. The primary hazardous waste number for all wastes treated at the incinerator is D003 (reactivity).

(2) Characteristics of Explosive Components

Table C-2 contains physical properties of PEP materials demilitarized at this site, which in conjunction with Tables C-1, demonstrates that incineration will successfully treat these materials.

Table C-1
Chemical Composition of Explosives

Explosive	Chemical Formula	Primary Hazardous Waste Number	Ancillary Hazardous Waste Number
Primary and Secondary Explosives			
Primary Explosives:			
Diazodinitrophenol (DDNP)	$C_6H_2N_4O_5$	D003	-
Lead azide	N_6Pb (71% Pb)	D003	D008
Lead mononitroresorcinate (LMNR)	$C_6H_3O_2Pb$ (57.5% Pb)	D003	D008
Lead stephynate	$C_6HN_3O_8Pb$	D003	D008
Mercury fulminate	$C_2HgN_2O_2$	D003	D009
Potassium dinitrofuroxane (KDNBF)	$C_6H_2N_4O_6K$	D003	-
Tetracene	$C_{18}H_{12}$	D003	-
Fuels:			
Antimony sulfide	Sb_2S_5	D003	-
Calcium silicide	$CaSi_2$	D003	D001
Lead thiocynate	$Pb(SCN)_2$(64% Pb)	D003	D008
Oxidizers:			
Ammonium perchlorate	NH_4ClO_4	D003	-
Barium nitrate	BaN_2O_6	D003	D005
Potassium chlorate	$KClO_3$	D003	-
Aliphatic Nitrate Esters:			
1,1,1-Trimethylolethane trinitrate (TMETN)	$C_5H_9O_9N_3$	D003	-
1,2,4-Butanetriol trinitrate (BTN)	$C_4H_7N_3O_9$	D003	
Diethyleneglycol dinitrate (DEGN)	$C_4H_8N_2O_7$	D003	-
Nitrocellulose	$C_{12}H_{16}(ONO_2)_4O_6$	D003	-
Nitroglycerin	$C_3H_5N_3O_9$	D003	
Nitrostarch	$C_6H_1O_5NO_2$	D003	-
Pentaerythritol tetranitrate (PETN)	$C_5H_8N_4O_{12}$	D003	-
Triethylene glycodinitrate (TEGN)	$C_6H_{12}O_4N_2O_4$	D003	-
Nitramines:			
2,4,6-Trinitrophenylmethylnitramine (tetryl)	$C_7H_5N_5O_5$	D003	-
Cyclotetramethylenetetranitramine (HMX)	$C_4H_8N_8O_2$	D003	-
Cyclotrimethylenetrinitramine (RDX)	$C_3H_6N_6O_6$	D003	-
Ethylenediamine dinitrate (EDDN Haleite)	$C_2H_6N_4O_4$	D003	-
Nitroguanidine	$CH_4N_4O_2$	D003	-
Nitroaromatics:			
1,3-Diamine-2,4,6-trinitrobenzene (DATB)	$C_6H_4N_6O_6$	D003	-
1,3,5-Triamino-2,4,5-trinitrobenzene (TATB)	$C_6H_6N_6O_6$	D003	-
2,2′4,4′6,6′-Hexanitroazobenzene (HNAB)	$C_{12}N_8O_{12}$	D003	-
2,4,6-Trinitrotoluene (TNT)	$C_7H_5N_3O_6$	D003	-
Hexanitrostilbenzene (HNS)	$C_{12}H_2N_6O_{12}$	D003	-
Ammonium nitrate	NH_4NO_3	D003	-
Black powder	$K(Na)NO_3$	D003	-

Explosive	Chemical Formula	Primary Hazardous Waste Number	Ancillary Hazardous Waste Number
Primary and Secondary Explosives (cont.)			
Various compositions, including compositions A, B, and C; ednatols; octols; tertylols; pentolite; tritonal; picratol; amatol; ammonal; plastic bonded explosives (PBX); minol; torpex; high blast explosive (HBX); and dynamite (military)	Mixtures of the above chemicals	D003	
Propellants			
Mixtures of nitrocellulose, nitroglycerin, and nitroguanidine (designated as M-series propellants–single, double, and triple base)	Varies	D003	D008 if lead is a component
Pyrotechnics			
Combinations of oxidizers, fuels, and binding agents. Typical components: ❑ Oxidizers are peroxides and perchlorates; ❑ Fuels are aluminum and magnesium; and ❑ Binding agents are resins, waxes, plastics, oils, retardants, waterproofing agents, and color intensifiers.	Varies	Varies	

Table C-2

Characteristics of Explosives

Material	Heat of Combustion, Calories per gram at Constant Pressure	Heat of Formation, Kilogram Calories per mole	Products of Explosion	
			Heat, Calories per gram (H20) gas	Gas, Milliliters per gram
Primary explosives				
Lead azide	-	-112 to -126.3	367	308
Mercury fulminate	938	-221 to -226	427	315
Diazodinitrophenol	-	956	820	
Lead styphnate	1,251	92.3	460	440
Tetracene	-	270	658	1,190
Aliphatic nitrate esters				
BTN	2,167	368	1,458	-
DEGN	2.792	-99.4	1,161	-
Nitrocellulose				
Pyroxlyn (12% N)	-	-216	1,020	-
Guncotton (13.35% N)	2,313	-200	1,020	883.2
High nitrogen (14.14% N)	-	-191	1,810	-
Nitroglycerin	1,603	-90.8	1,486	715
PETN	1,957	-128.7	1,510	790
TEGN	3,428	-603.7	750	-
TMETN	2,642	-422	-	-
Nitramines				
HMX	2,231 to 2,253	11.3 to 17.93	1,480	-
RDX	2,259 to 2,284	14.71	1,480	908

Table C-2

Characteristics of Explosives

Material	Heat of Combustion, Calories per gram at Constant Pressure	Heat of Formation, Kilogram Calories per mole	Products of Explosion	
			Heat, Calories per gram (H20) gas	Gas, Milliliters per gram
EDDN	2,013	156.1	128 to 159	-
Haleite	2,477	20.11	1,276	908
Nitroguanidine	2,021	20.29	880	1,077
Tetryl	2,914	4.67 to 7.6	1,450	760
Nitroaromatics				
Ammonium picrate	2,745	95.82	800	-
DATB	-	-97.1 to -119	910	-
HNAB	-	-58 to -67.9	1,420	-
HNS	3,451	-13.9 to 1.87	1,360	-
TATB	2,850	-33.46 to -36.85	1,018	-
TNT	3,563 to 3,598	-10 to -19.99	1,290	730
Ammonium nitrate	-	88.6	381	980

c) Parameters and Rationale [40 CFR 264.13(b)(1)]

This section presents the types of parameters evaluated and the rationale for selecting these parameters during the management of hazardous wastes at the incinerator.

(1) Pre-Acceptance Procedures

For both on and off-site generated waste, MCAAP personnel review information on the waste such as history of generation, hazardous constituents in waste, waste composition, hazardous properties, pertinent chemical and physical data, and MSDSs.

Before an off-site generated waste is accepted at MCAAP, the waste is visually inspected for consistency with pre-acceptance documents. If there are discrepancies between the waste received and the pre-acceptance paper work, the generator will be notified and the issue will be resolved.

As stated previously in this section, the FAP will regulate which specific items can be introduced into the unit.

(2) Post Treatment Procedures for Residues

Representative samples of ash residues generated from the incinerator are tested for explosives content to verify that all energetics have been effectively treated. If detectable levels are found, the waste is retreated. If the results indicate there are no detectable levels of explosives in the ash, it is subsequently analyzed for Toxicity Characteristic Leaching Procedure (TCLP) metals to determine if it contains any hazardous constituents above the regulatory levels.

(3) Test Methods

All analytical tests are conducted in accordance with the protocols specified in "Test Methods for Evaluating Solid Waste; Physical/Chemical Methods (SW-846)," Third Edition, July 1992, as amended; "Methods for Chemical Analysis of Water and Wastes" (EPA-600/4-79-020); or an equivalent method approved by the Regional Administrator. The apparatus, reagents, calibration methods, quality controls, analytical procedures, and calculation methods specified in these protocols are incorporated into this document by reference. Table C-3 identifies the test methods to be utilized.

d) Prohibited Compounds

The following items will not be introduced into the incinerator:

1) <u>Chemical Warfare Agents</u>

- Choking Agents
- Nerve Agents
- Blood Agents

- Blister Agents
- Incapacitating Agents
- Vomiting Agents
- Tear-producing Compounds
- Herbicides

2) Smokes

- Titanium tetrachloride
- Sulfur trioxide – chlorosulfonic acid
- Hexchloroethane (HC) mixture 6.68 % grained aluminum, 46.6 % zinc oxide, 46.66 % HC
- Bulk white phosphorus
- Bulk red phosphorus
- Plasticized white phosphorus
- Oil smoke
- Colored smokes (red, yellow, green, violet, white)

3) Incendiaries

- Eutectic white phosphorus
- Napalm B (50 % polystyrene, 25 % benzene, and 25 % gasoline)

4) Items Regulated under the Nuclear Regulatory Commission

Table C-3
Test Methods

Parameter	Procedure	Reference
pH	Electrometric	Method 9045A
Flash Point	Open Cup	Method 1010
TCLP	TCLP Leachate	Method 1311
Chromium	Atomic Absorption	Methods 7190/7191
Lead	Atomic Absorption	Methods 7420/7421
Silver	Atomic Absorption	Methods 7760A/7761
Mercury	Atomic Absorption	Methods 7470/7471
SVOC	GCMS	Method 8270
Explosives	GC/LC	Method 8330

(4) Methods Used to Obtain Samples of the Ash [40 CFR 264.13(b)(3) and 264.13(c)(2)]

The sampling equipment and collection/handling methods used for waste analyses follow EPA-approved sampling protocols contained in the most recent edition of SW-846. The following procedures will be followed:

- Choose a stainless steel or Teflon-lined scoop;
- Clean sampling devices and containers before use. All used nondisposable containers and samplers will be washed with warm detergent solution (e.g., Liquinox, Alconox, or equivalent), rinsed at least three times with tap water, rinsed with distilled water, and air dried or wiped dry;
- Wear necessary protective clothing and gear, and observe required sampling precautions;
- Remove a sample of the waste generated during the treatment event from the collection drum;
- Once the sample container is full, cap the sample container; attach label and seal; record in field logbook; and complete analysis request sheet.

e) Additional Waste Analysis for Wastes Generated Off-Site [40 CFR 264.13 (c)]

MCAAP may potentially accept waste munitions or waste PEP shipments from other DOD facilities for treatment at the incinerator. MCAAP will provide written notifications to off-site generators in accordance with 40 CFR 264.12, stating that they have the appropriate permits for, and are willing to accept the waste the generator is shipping. Copies of these notices will be retained at MCAAP as part of the operating record.

2. Wastes in Miscellaneous Units (Open Burn/Open Detonation) [40 CFR 270.23]

a) General Explosive Information

MCAAP conducts thermal treatment of waste munitions PEP at its OB and OD units. These units are defined as miscellaneous units under 40 CFR 264. The chemical and physical characteristics of PEP treated at the OB and OD units are described in this section.

A number of reactive compounds are present in waste military munitions. These compounds fall into four general categories:

- Primary explosives,
- Boosters and secondary explosives,
- Propellants, and
- Pyrotechnics.

Primary and secondary explosive compositions react by violently detonating. Propellants and pyrotechnics react by burning, generating large quantities of gas, together with intense light and heat. Table C-4 provides a summary of compositions potentially treated at the OB and OD units, their chemical formulas, and their EPA Hazardous Waste Numbers. The primary hazardous waste number for all wastes treated at the OB and OD units is D003 (reactivity).

Primary explosives are used to initiate larger, less sensitive energetic components and may sometimes act as a booster charge between propellant and intermediate or explosive charges. These low detonation rate explosives, due to their capacity to cause detonation in less sensitive explosives, are also called initiating explosives or agents. The rate of burn for these explosives is controlled to ensure excessive pressure does not develop and that desired ballistic effects are achieved. Primary explosives are mixtures that are very sensitive to shock or friction and are a mixture of fuel, oxidizer, and explosive compounds. Typical fuels are antimony sulfide and lead thiocyanate; oxidizers include barium nitrate and potassium nitrate. The primary initiators are lead azide and lead styphnate.

Booster and secondary explosives create large volumes of hot gas in a short time after initiation. In explosives, a fast reaction produces a very high-pressure shock in the surrounding medium capable of shattering objects. These noninitiating explosives are too insensitive to be initiated by means of impact, friction, or brief application of heat. These explosives are primarily nitrates, nitro compounds, and nitramines. The most common high explosives are cyclotrimethylenetrinitramine (RDX), trinitrotoluene (TNT), trinitrophenylmethylnitramine (tetryl), cyclotetramethylenetetranitramine (HMX), and various combinations of these compounds. High explosive ordnance may have waxes or aluminum powder as additives.

Propellants are low detonation rate explosives that generate large volumes of hot gas. In propellants, a slower reaction time produces lower pressure over a longer period of time. This lower, sustained pressure is used to propel objects. The propellant mixtures are typically classified as single or double based. Single-based propellants are composed mainly of nitrocellulose, while double-based propellants are mixtures of nitrocellulose and nitroglycerin. A number of miscellaneous chemical compounds are added to the propellant charge to control deflagration characteristics or to promote stability during storage. These additives include various nitrated organic compounds, metals, and metal salts. The additives incorporated into the propellant fuels generally account for 3% of the mixture and are oxidized during the deflagration reaction. For this reason, they are of minor consequence relative to their impact on the environment. All components of military propellants are in solid form and contain no free liquids.

Pyrotechnics generate large amounts of heat but much less gas than propellants or explosives. Pyrotechnics use exothermic chemical reactions, which are generally non explosive, self-sustaining, and self-contained. Pyrotechnic compositions are generally finely divided fuels such as metals, alloys, and hydrocarbons mixed with an oxidizer. Typical oxidizers consist of metal nitrates, ammonium, or metal perchlorates, chlorates, and peroxides. Secondary constituents also present in pyrotechnic mixtures are binders, ignition agents, retardants, and colorants. A variety of chemical compounds are present in these additives. Typical minor components include black powder, chlorinated organics, waxes, sugar, asphalt, polyvinyl chloride, and vegetable oils. The thermal treatment of these devices generates gaseous combustion products and solid particulates.

b) Published Data

Prior to treatment of wastes at the OB and OD units, historical data, specifications, and ordnance publications are used to obtain information regarding the nature of the waste to be treated. Information contained in the item's military specification (MILSPECs) that may be used to characterize the various propellant compositions presented in different munitions and ordnance items.

The MILSPECs for these items are strict and tolerances (variations) are small. The off-specification versions of these munitions will not vary significantly in chemical composition from the original specification. As testing of these substances to determine exact chemical characteristics would be dangerous (as would delays in routing wastes for treatment), full chemical characterization is not performed prior to treatment.

Off-specification materials contain the same raw materials as usable items, but are generally deficient in meeting some performance specification. Since off-specification items do not contain significantly different chemicals or concentrations compared to the same on-specification explosive, the original product information can be used to ensure proper OB or OD treatment. Therefore, waste analysis will not be required for these items.

If there is a difference in the composition of off-specification materials that may render them unacceptable for OB or OD purposes, the user/generator will provide this information. This information is then reviewed to determine if the waste is suitable to OB or OD. In some cases, a small test burn of the material may be performed to assist in this determination.

c) Explosive Compositions and Classifications

MCAAP may treat over 60 different types of explosive compounds and munitions each year. The specific type of explosive varies from year to year, depending on types of munitions generated and the manufacturer. Table C-4 presents a series of constituent-derived families developed to categorize munitions by the primary energetic. These constituent families, drawn from air emissions test data, Material Safety Data Sheets (MSDSs), and manufacturers' specifications, were used to assist in waste characterization.

Table C-4 was developed based on the four general categories of military explosives. It summarizes the major types of explosives and lists specific explosives for each type. The last column of the table presents the constituent family names developed to summarize and consolidate similar explosive compounds. For example, since Composition A and Composition C explosives are blends of nitramines, plasticizers, and various binders, they are consolidated into the constituent family Nitramine Blends.

Constituent families are primarily based on the chemical constituents that comprise the energetic, as well as the expected method of constituent breakdown during deflagration or detonation. In cases where primary chemical types (e.g., nitramines and nitroaromatics) are blended to create boosters or explosives, a family was created to represent this binary or ternary composition.

Table C-4

Military Explosive Compositions and Classifications

Explosive Types	Description	Example Compounds	Constituent Families
Primary Explosives			
Lead azide	Salt of hydrazoic acid (initiator)	Lead azide	Primary explosives compounds: ❑ Mercury fulminate ❑ Lead azide ❑ DDNP ❑ Lead stephynate ❑ Tetracene ❑ Lead thiocynate
Mercury fulminate	Salt of a fulminic or paracyanic acid, used as initiator		
DDNP	DDNP, used as initiator	DDNP	
Lead stephynate	Anhydrous salt, used as primer	Lead stephynate	
Tetracene	Intermediate booster and primer (rare)	Tetracene	
Primary compositions	Initiators for high explosives, propellants, and pyrotechnics	Consists of combinations of: ❑ Lead stephynate ❑ Tetracene ❑ Barium nitrate ❑ Antimony sulfide ❑ Aluminum ❑ Lead thiocynate ❑ Potassium chlorate	
Boosters and Secondary Explosives			
Nitramines	N-type nitration where nitrogroup is attached to a nitrogen atom being nitrated	HMX, RDX, EDDN (Haleite), tetryl (pyrolite, tetralite)	Nitramines
Nitroaromatics	C-types nitration where nitrogroup is attached to a carbon atom being nitrated	TATB, TNT	Nitroaromatics
Aliphatic nitrate esters	O-type nitration where nitrogroup is attached to an oxygen atom being nitrated	BTN, nitrocellulose (NC), nitroglycerin (NG), PETN, TEGN, TMETN, and DEGN	Aliphatic nitrate esters
Binary compositions	Composition C (such as C-4)	RDX/plasticizer	Nitramine blend
	Composition A	RDX/desensitizer	
	Composition B	RDX/TNT (60/40) Others called cyclotols	Nitroaromatic and nitramines blend
	Ednatols	Haleite/TNT	
	Octols	HMX/TNT	
	Tetrytols	TNT/Tetryl	Nitroaromatic and nitramines blend
	Pentolite	PETN/TNT	Aliphatic nitrate ester and Nitroaromatic blend
	Tritonal	TNT/flaked aluminum	Nitroaromatic blends

Table C-4

(Continued)

Explosive Types	Description	Example Compounds	Constituent Families
Boosters and Secondary Explosives (continued)			
Binary compositions (cont.)	Picratol	Ammonium pictrate/TNT	
	Amatol	Ammonium nitrate/TNT	Ammonium nitrate blend
	Ammonal	Ammonium nitrate/aluminum with TNT/DNT/RDX mixture	
Plastic bonded explosives	Water gel/slurry explosives	Water gel/slurry explosives	
Ternary compositions	Minol	Ammonium nitrate/TNT/aluminum	
	Anatex	Ammonium nitrate/TNT/RDX	
	DBX (depth charges)	Ammonium nitrate/TNT/RDX	
	High Blast Explosive (HBX)	RDX/TNT/Aluminum	Nitroaromatic and nitramines blend
	Torpex	RDX/TNT/Aluminum powder	
	PBX	>% RDX/HMX/PETN with polymeric binder	Aliphatic nitrate ester and nitramine blends
Quaternary compositions	Dynamite	Dynamite	
Industrial explosives	Mixtures of NC/NG/NQ to achieve ballistic requirements	M-series, including: ❑ Single-base ❑ Double-base ❑ Triple-base ❑ Composite ❑ Ball (modified double-base)	Single-base Double-base Triple-base
Propellants			
Propellants	Mixtures of NC/NG/NQ to achieve ballistic requirements	M-series, including: ❑ Single-base ❑ Double-base ❑ Triple-base ❑ Composite ❑ Ball (modified double-base)	Single-base Double-base Triple-base
Pyrotechnics			
Delays and fuzes	Delays and fuzes	Mixtures of oxidants and powered metals	High particulate loading (explosive) or high particulate
Incendiaries	Incendiaries	Thermite (aluminum and rust) Phosphorous Napalm Bombs with magnesium casing	Loading (burning)

Table C-4

(Continued)

Explosive Types	Description	Example Compounds	Constituent Families
		Pyrotechnics (continued)	
Photoflash	Photoflash compositions	Mixture containing: ❑ Aluminum or magnesium (fuel) ❑ Barium nitrate or potassium perchlorate (oxidizer)	High particulate loading (explosive)
Tracers and fumers	Tracers and fumers	Contain mixtures of: ❑ Strontium peroxide ❑ Magnesium ❑ Potassium perchlorate (oxidizer)	Double-base
Flares and signals	Thermal radiation from the product oxide particles and the spectral emission from excited metals	Consist of: ❑ Sodium nitrate (oxidant) ❑ Magnesium ❑ Aluminum (fuel at times) ❑ Binder	High particulate loading (burning)
Ignitors and initiators	Ignitors and initiators (between primary ignitor and main charge)	Black powder Ignition mixtures containing: ❑ Aluminum ❑ Barium chromate ❑ Laminac ❑ Magnesium	Black powder Ignition mixtures

d) Miscellaneous Waste Streams Treated at OB/OD Unit

(1) Plastic Bonded Explosives/PF141IG Sludge

Plastic Bonded Explosives (PBX) are produced in building 190 and placed in large tub-sized kettles. After the explosives are poured into steel bomb casings, the kettles are cleaned with a non-halogenated solvent (PF141IG). This process generates a sludge-like mixture of explosives and solvent that is too dangerous to transport off-site for treatment. MCAAP has determined that on-site open burning of this waste stream is the safest and most effective method of treatment available. Based on the language in 261.23(a)(6),(7), and (8), this waste stream is classified as a D003 waste in the Explosives Subcategory.

(2) Methyl Ethyl Ketone Peroxide

In the production buildings, a thermal coat is sprayed on bomb bodies to create a heat shield designed to provide personnel with more escape time in the event of a fire. This two part mixture consists of a thick, pasty resin, and plastic jugs of methyl ethyl ketone peroxide (MEPK). When the MEPK exceeds its shelf life, or is determined to be off-specification, it can be extremely unstable and may spontaneously combust. In the last several years, the plant has had explosions and building fires caused by the storage of this material. Due to the dangers involved with handling this waste, it is transported to the OB area for treatment. Based on the language in 261.23(a)(6),(7), and (8), these wastes are classified as D003 wastes in the Explosives Subcategory.

(3) Hypersolve

Hypersolve is used to clean out all bomb bodies during the explosive melt out operations. Cloth rags, gloves, and other personal protective equipment are routinely generated during this process and must be treated at the OB area due to the presence of explosives. Based on the language in 261.23(a)(6),(7), and (8), these wastes are classified as D003 wastes in the Explosives Subcategory.

(4) Explosives Contaminated PPE

Explosives contaminated PPE is generated throughout the munitions processing buildings and is treated at the OB area. Based on the language in 261.23(a)(6),(7), and (8), this waste stream is classified as a D003 waste in the Explosives Subcategory.

(5) Lab Waste

Spent heptane and acetone reagents that contain measurable amounts of explosives are occasionally generated at the laboratory. Based on the language in 261.23(a)(6),(7), and (8), these wastes are classified as D003 wastes in the Explosives Subcategory.

(7) Waste PBX

Scrap PBX is routinely generated from explosive fill operations. Due to contamination, this material cannot be reused and is treated at the OB area. Based on the language in 261.23(a)(6),(7), and (8), this waste stream is classified as a D003 waste in the Explosives Subcategory.

e) Management of Residues from Open Detonation

Metallic shrapnel is the only treatment residue generated from OD. It is formed as a result of an explosion; therefore, its presence is evidence that the reactivity characteristic has been deactivated. However, shrapnel is visually inspected for evidence that the energetic component of the items has been successfully treated. This inspection is conducted by site personnel specially trained for this task. Any shrapnel observed or suspected to contain unreacted energetics is retreated to ensure complete deactivation. After the inspection, shrapnel is certified as being free of an explosive hazard and sold as scrap metal.

The shrapnel is not analyzed for toxicity characteristics, provided that it meets the definition of scrap metal in 40 CFR 261.

f) Management of Residues from Open Burning

OB treatment operations may generate two classes of solid waste: ash residue and solid residue such as recoverable metal casings, fragments, and pieces of untreated munitions filler material. Metal casings and fragments are managed as scrap metal, while untreated material is re-burned to ensure complete deactivation.

Ash generated from the OB unit is accumulated in 55 gallon drums identified with the ash type designation (PBX, TNT, M76, etc). Since these ash types have different characteristics they are considered different waste streams with different waste profiles. Containers of ash types will be accumulated in lots of 25 to 100 prior to a composite sample being drawn on the particular lot. After the sampling is conducted, the containers in the area will be identified with signage stating "Waiting For Analysis". Upon receipt of analytical results, the wastes will be managed accordingly.

g) Chemical Warfare Agents

Materials that may have been contaminated with military chemical warfare agents are not accepted for thermal treatment at the OB or OD units. Examples of such chemical warfare agents include the following:

- Choking Agents
- Nerve Agents
- Blood Agents
- Blister Agents
- Incapacitating Agents

- Vomiting Agents
- Tear-producing Compounds
- Herbicides

In addition, smoke and incendiary compounds listed in Table C-5 are not treated at the OB or OD units.

Table C-5
Compounds Not Treated by OB/OD

Smokes

- Titanium tetrachloride (FM)
- Sulfur trioxide – chlorosulfonic acid (FS)
- Hexchloroethane (HC) mixture 6.68 % grained aluminum, 46.6 % zinc oxide, 46.66 % HC
- White phosphorus (WP)
- Bulk red phosphorus (RP)
- Plasticized white phosphorus (PWP)
- Oil smoke
- Colored smokes (red, yellow, green, violet, white)

Incendiaries

- Eutectic white phosphorus (EWP)
- Napalm B (50 % polystyrene, 25 % benzene, and 25 % gasoline)

h) Waste Analysis Procedures

All materials treated introduced into the OB/OD units are assumed to be hazardous wastes. A detailed waste analysis is not necessary to ensure successful treatment by OB/OD, as the constituents of the PEP and their ballistic properties are well known prior to treatment. The MSDSs and MILSPECs for the constituents being subjected to OB/OD are maintained on file at this facility. Table C-2 contains physical properties of PEP materials demilitarized at this site, which in conjunction with Table C-1 demonstrate that OB/OD will successfully treat these materials.

i) Parameters and Rationale

The need for PEP residues to be tested for the RCRA characteristics of reactivity and the TCLP depends on the nature of the PEP material. Historical data exists from the U.S Bureau of Mines Gap Test over a period of several years indicated that the ash residue at MCAAP does not exhibit the characteristic of reactivity. Nevertheless, representative samples of the ash are collected and tested for explosive content and TCLP metals. The explosive content test also serves as a measure of the effectiveness of thermal treatment for the PEP material.

j) Test Methods

All analytical tests are conducted in accordance with the protocols specified in "Test Methods for Evaluating Solid Waste; Physical/Chemical Methods (SW-846)," Third Edition, July 1992, as amended; "Methods for Chemical Analysis of Water and Wastes" (EPA-600/4-79-020); or an equivalent method approved by the Regional Administrator. The apparatus, reagents, calibration methods, quality controls, analytical procedures, and calculation methods specified in these protocols are incorporated into this WAP by reference. Table C-6 identifies the test methods to be utilized.

Table C- 6

Test Methods

Parameter	Procedure	Reference
pH	Electrometric	Method 9045A
Flash Point	Open Cup	Method 1010
TCLP	TCLP Leachate	Method 1311
Chromium	Atomic Absorption	Methods 7190/7191
Lead	Atomic Absorption	Methods 7420/7421
Silver	Atomic Absorption	Methods 7760A/7761
Mercury	Atomic Absorption	Methods 7470/7471
SVOC	GCMS	Method 8270
Explosives	GC/LC	Method 8330

k) Methods Used to Obtain Representative Samples of the Ash [264.13(b)(3) and 264.13(c)(2)]

The sampling equipment and collection/handling methods used for waste analyses follow EPA-approved sampling protocols contained in the most recent edition of SW-846. The general procedures and precautions listed below are followed to ensure that a representative sample is collected from each container of waste ash

- Choose a stainless steel or Teflon®-lined scoop.
- Clean sampling devices and containers before use. All used nondisposable containers and samplers are washed with warm detergent solution (e.g., Liquinox®, Alconox®, or equivalent), rinsed at least three times with tap water, rinsed with distilled water, and air dried or wiped dry.

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®Liquinox is a registered trademark of
®Alconox is a registered trademark of

- Wear necessary protective clothing and gear, and observe required sampling precautions.

- Remove a sample of the waste generated during the treatment event from the collection drum.

- Once the sample container is full, cap the sample container; attach label and seal; record in field logbook; and complete analysis request sheet.

l) Frequency of Analyses [40 CFR 264.13(b) (4)]

The frequency in which the OB ash is analyzed is described above in paragraph 2 (f) of this section.

m) Additional Waste Analysis for Wastes Generated Off-site [40 CFR 264.13 (c)]

MCAAP may potentially accept waste munitions or waste PEP shipments from other DOD facilities for treatment at the OB/OD units. Prior to acceptance of any such waste, MCAAP will coordinate with the generating facility and review all applicable information related to the item(s). No wastes will be received unless MCAAP personnel are satisfied that both the physical and chemical data are sufficient to ensure the selected treatment process is appropriate, and that the composition of the item(s) is consistent with the information provided in this document.

MCAAP will provide written notifications to off-site generators in accordance with 40 CFR 264.12, stating that they have the appropriate permits for, and are willing to accept the waste the generator is shipping. Copies of these notices will be retained at MCAAP as part of the operating record.