ATTACHMENT V

OPEN BURNING/OPEN DETONATION (OB/OD)

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ATTACHMENT V: OPEN BURNING/OPEN DETONATION

A. PART A APPLICATION

The Part A application precedes the introduction of the entire application. There is no separate Part A application for the individual units at CRANE.

B. FACILITY DESCRIPTION

B-1 General Description

B-1a Applicability of Part B to This Facility

CRANE has three operations that are used for treatment of munitions by open burning and open detonation (OB/OD): Ammunition Burning Ground (ABG), Old Rifle Range (ORR) and Demolition Range (DR). These three operations are subject to the management standards of 40 CFR 264.600 through 264.603. **Table V.B-1** lists the specific treatment units and materials treated at the three facilities.

The locations of the OB/OD treatment units are as follows:

- ABG – NW1/4 Sec. 28, T5N, R3W - Indian Springs, IN quad.
- DR – NE1/4 Sec. 34, T5N, R4W – Indian Springs, IN quad.
- ORR – SW1/4 Sec. 26 and NW ¼ Sec. 35, T5N, R4W – Indian Springs, IN quad.

Exhibit V.B-1 is a map of the CRANE facility showing the locations of the three treatment operations (ABG, DR, and ORR) and the storage facility (CSF).

Surrounding land use information is shown on the maps provided for Section B.2.a, Topographic Maps – General Requirements.

B-2 Topographic Map/General Requirements

B-2a General Requirements

Topography of each site is addressed in each Attachment. Due to the size of CRANE, the various requirements of 40 CFR 270.14(b)(19) are shown on different maps. All maps show orientation, date and scale. The following items are depicted on the corresponding Exhibits submitted with this application.

Requirements	Location
Topographic Map	
Entire Crane Facility	Exhibit V.A-1.4 (B-1)
ABG	Exhibit V.A-1.2
DR/ORR	Exhibit V.A-1.3
Legal Boundaries	
Entire Crane Facility	Exhibit V.A-1.4 (B-1)
ABG	Exhibit V.B-2
DR/ORR	Exhibit V.B-7
Surface Waters Including Intermittent Streams	
Entire Crane Facility	Exhibit V.A-1.4 (B-1)

ABG	Exhibit V.B-2(a)
DR/ORR	Exhibit V.B-7(a)
Surrounding Land Use	
Entire Crane Facility	Exhibit V.A-1.4 (B-1)
ABG	Exhibit V.A-1.2
DR/ORR	Exhibit V.A-1.3
100-Year Floodplain (applicable to entire CRANE site)	Exhibit B-13
Wind Rose	Exhibit B-11
Access Control	
Entire Crane Facility	Exhibit V.A-1.4
ABG	Exhibit V.B-2
DR/ORR	Exhibit V.B-7
Injection/Withdrawal Wells	
Entire Crane Facility	Not Provided
ABG	Exhibit V.B-2
DR/ORR	Not Applicable
Building, Structures within 1,000 ft.	
Entire Crane Facility	Not Provided
ABG	Exhibit V.B-2
DR/ORR	Exhibit V.B-7
Barriers for Drainage or Flood Control	
Entire Crane Facility	Not Applicable
ABG	None
DR/ORR	Exhibit V.B-7
Operational Units in HWM Facility Locations	
Entire Crane Facility	Not Applicable
ABG	Exhibit V.B-2, V.B-2(a)
DR/ORR	Exhibit V.B-7, V.B-7(a)
Lead Monitoring Locations	Exhibit V.B-15

B-2b Additional Requirements for Land Disposal Facilities

B-2b(1) Distance to Property (Nearest) Boundaries

a	Ammunition Burning Grounds	Eastern Boundary	4,900 feet
b	Demolition Range/Old Rifle Range	Eastern Boundary	16,400 feet
b	Demolition Range/Old Rifle Range	Western Boundary	13,100 feet

B-2b(2) Distance to Buildings On- and Off-Site

CRANE considers the installation boundary to be point of concern for noise control, not inhabited buildings. Using the property line is obviously more restrictive than inhabited buildings with regard to the demolition range (OD area), the western boundary is 13,100 feet while the southeastern boundary is 16,400 feet. With regards to the ABG (OB area), the eastern boundary is 4,900 feet. Closest occupied buildings (estimated distance) to areas are:

a	Ammunition Burning Grounds	B-2908 (Office)	800 feet
b	Demolition Range	B-600	5,500 feet
b	Demolition Range	B-2805	5,000 feet
b	Demolition Range	B-198	7,000 feet
b	Demolition Range	B-3230 (Office)	3,500 feet
c	Old Rifle Range	B-3230 (Office)	3,000 feet
c	Old Rifle Range	B-3325	1,000 feet

As noted above, the closest building to any of these operations is the office building for the site. The nearest occupied building to the ABG other than the office would be estimated to be 10,000 feet away. The nearest daily occupied office building to the DR would be B-2805. Due to the nature of the business conducted at CRANE, occupied buildings are not allowed to locate near to these operations.

B-2b(3) Distance to Public Roadways

There are no public highways involved with this permit. Distance to the nearest public highways is:

a	Ammunition Burning Grounds	Hwy. 58, which starts at Bedford Gate	20,000 feet
a	Ammunition Burning Grounds	Old County Road south of ABG	7,500 feet
b	Demolition Range/Old Rifle Range	State Road 645, Burns City Gate	15,000 feet

B-2b(4) Distance to Passenger Railroads

There are no passenger railroads in the immediate area of these operations. There is a railroad line which crosses CRANE, but it does not carry passenger traffic.

B-2b(5) Distance to Closest Receptor

ABG	B-2908	Retreat building for operations personnel	Approx. 800 feet
DR	B-3230	Retreat building for operations personnel	Approx. 3,500 feet
ORR	B-3325	Ammunition Shipping/Receiving Facility	Approx. 1,000 feet

B-2b(6) Additional Information on the Topographic Map

All of the information required by 40 CFR 270.14(c)(3) is included in the Ground Water Management Plan (Section E) submitted by CRANE to IDEM as part of this permit application.

The following information pertaining to ambient air monitoring for Lead (Pb) from the Open Burning/Open Detonation operations is provided as background information. Per Title V Permit 101-7341-00005, NSA Crane was required to perform ambient air monitoring for Lead (Pb) from the Open Burning/Open Detonation operations for 36 consecutive months. The USEPA requested Cadmium (Cd) and Manganese (Mn) monitoring, as well. NSA Crane performed Pb, Cd, and Mn ambient air monitoring from 5 Oct 2002 to 6 Dec 2006. Approval to stop monitoring was received from IDEM on 8 Dec 2006 due to non-detects for all Pb samples taken in this timeframe. The sampler site locations were at the Golf Course (gold dot); Rockeye (blue dot); and Purdue Ag (purple dot); and are provided in **Exhibit V.B-15.**

B-3 Location Information (Seismic/Floodplain)

The ABG, ORR, and DR are not located in a 100-year floodplain. The 100-year floodplain map is shown on **Exhibit V.B-11**. The floodplain information was taken from Flood Insurance Maps 180470 0001-0007, published by the Federal Insurance Administration. A watershed map is also included in **Exhibit V.B-12**.

The requirements of 40 CFR 264.18(a) do not apply to these facilities since they are not located in the 100-year floodplain.

B-4 Traffic Information

B-4a Number and Types of Vehicles Around the Facilities

Table V.B-4 lists the number and types of vehicles used at the ABG and DR/ORR facilities. Transport specific to the OB/OD operations include:

- Red phosphorous contaminated sludge is transported from pyro production area B-133 to ABG treatment unit number 11-ABG, dewatering unit no. 3 using a 500-gallon tank situated on a wagon chassis. Sludge is pumped out of sumps/holding tanks using pump and hoses that come with the tank.
- Explosives contaminated sludge is hauled from explosive production areas via a three-ton pump truck with a 1,250-gal tank to ABG treatment unit number 10-ABG, dewatering unit nos. 1 and 2. Sludge is removed from sumps/holding vessels using pump on truck.
- Ash generated from ABG units is hauled in hoppers by forklift to a designated roll-off box at the ABG facility.
- Roll-off boxes are hauled off-site by contractor owned semi-trucks.
- The Army uses ¾- and 1-ton trucks to pick-up propellants, explosives, and pyrotechnics (PEP) production scrap from the various production buildings. After pick-up the PEP scrap is delivered to the treatment facility for thermal treatment. Scrap cans are used to store production scrap while awaiting pickup. Various sized containers are used but most common is 30-gallon aluminum container with lid. Most of the production areas have covered pads or scrap sheds where the containers of scrap PEP are stored while awaiting pickup.
- PEP and munition items for the ABG, ORR, and DR are transported by 2-ton stake truck or by 5-ton truck (van or flat bed).
- Forklifts are used at ABG, DR and ORR to transport PEP material and waste ash. The loading capacity of the forklifts ranges from 6,000 pounds to 12,000 pounds.
- Bulldozers are used at the DR to bury the explosive wastes to be treated and to move sediment from existing sedimentation ponds and dry dams back to the top of the DR.

B-4b Waste Transfer or Pickup Stations

Many of the materials to be treated at the CRANE treatment units will be stored in Conditionally Exempt (CE) Magazines, provided in Table V.B-5. Storage magazines that have been designated as CE magazines may be used to store Waste Military Munitions (WMM) for longer than 90 days. Pursuant to 40 CFR 266, WMM that is placed into a CE magazine is conditionally exempt from management as a waste. The WMM are subject to the jurisdiction of the Department of Defense Explosives Safety Board (DDESB),

and will be stored in accordance with the DDESB storage standards applicable to WMM. There is no storage time limit on WMM stored in CE magazines. CE storage sites may either be classified as active or inactive. In accordance with provisions of 40 CFR 266.205, incorporated by reference at 329 IAC 3.1-1-7, CRANE will notify the IDEM when CE magazines are removed from the active roster. Magazines will remain on the roster of CE storage sites, but will be classified as inactive. If a magazine for CE storage is to be returned to the active roster, then in accordance with the provisions as stated above, CRANE will advise IDEM of the change in status within 90 days of the date when the CE magazine is used to store the first amount of WMM. Quarterly inspections and an annual inventory of all WMM in CE magazines will be performed. While in a CE magazine, all WMM will be clearly identified and segregated from the active inventory using the Waste Military Munitions label described in Section D-1.

Materials are transported from Conditionally Exempt storage magazines or trucked directly from the generation, transfer, or accumulation site to the ABG for treatment. The materials are moved to the ABG facility and are either offloaded to three Mil-vans located on a paved lot or taken directly to one of the treatment units. The Mil-vans are used for temporary, on-site storage of the materials to be processed. Materials handling equipment is used to move the material to the applicable treatment unit where it is burned. Ash resulting from the burn is moved in hoppers to unit 9-ABG where it is flashed to ensure all reactive characteristics have been removed. Materials handling equipment then moves the ash from unit 9-ABG to roll-off boxes located on a gravel lot within the facility boundary. A contractor semi-trailer truck removes the boxes to an off-site disposal location. An exception to this procedure is the management of ash residue generated in the solvent burn pans of units 4-ABG and 5-ABG. This ash remains in the pans and is re-burned before being manually placed into a 55-gal drum. When full, the drum is sent to the CSF for storage and eventual disposal by contractor at an off-site facility.

Materials are transported from Conditionally Exempt storage magazines or trucked directly from the generation, transfer, or accumulation site to the DR for treatment. At the DR facility munitions awaiting treatment are stored in three boxcars and two Mil-vans. Materials handling equipment is used to move the munitions to Building 2920 where they are packaged for detonation and then moved onto the range to be detonated. If required, packaging of munitions for detonation may occur at Building 174 located outside the DR facility boundary. In this case, trucks move the munitions to the range where materials handling equipment is used to offload the items.

Materials are transported from Conditionally Exempt storage magazines or trucked directly from the generation, transfer, or accumulation site to the ORR for treatment. Once at the ORR, materials handling equipment is used to move the Yellow D items to the treatment units and after treatment to move ash into roll-off boxes located on a gravel lot within the facility boundary. A contractor semi-trailer truck removes the boxes to an off-site disposal location.

B-4c Quantity of Waste Moved per Movement per Vehicle

This information is provided in Section B-4a and **Table V.B-3**.

B-4d Traffic Control Signs and Persons

Existing traffic controls along the routes consist of stop signs, railroad markings, yield signs, speed limit signs, lane control, and directional signs. Traffic signals are located at 2 (two) intersections: H-5a with H-45, and H-5 with H-2 and H-100. All roads, intersections, and railroad crossings are marked sufficiently to control and maintain traffic in an adequate manner. A Traffic Engineering Study was prepared for CRANE in August, 1978 (MTMC Report TE 78-5: 55 pp), by the Military Traffic Management Command, Transportation Engineering Agency.

Intersections included in the study that are on the hazardous waste traffic routes include the following intersections:

- H-45 with H-101
- H-45 with H-58
- H-5, H-2, with H-100
- H-5 with H-45
- H-45 with H-99

Present traffic control is adequate at all the preceding intersections. as well as other intersections along the haul routes not on the primary system studied. Signing and controls at these locations are adequate for the conditions and the traffic volumes.

Metal gates and/or chains across drives are used to prevent access of unauthorized personnel to the ABG, DR and ORR facilities. At the DR/ORR area, personnel from the DR ensure all unnecessary personnel are cleared from the facility area prior to closing metal gates on the perimeter highway to prevent vehicle traffic in the area during times of treatment.

B-4e Road Surface Composition and Load Bearing Capacity

The routes described in Table V.B-2 are all paved roads. All roadways are of adequate width for safe hauling operations and are properly designed, constructed, and maintained for these purposes and volumes. The pavement of all roads of the primary road system, is a minimum of 24 (twenty-four) feet in width, marked and striped and capable of H-20 highway loading. At satellite locations, the ABG/DR/ORR areas, and the Central Storage Facility (CSF), access to specific waste storage or generation points may traverse gravel drives and parking areas. In all conditions, the roadways are compatible with the needs of the wastes hauling operations.

The major, routine haul routes between points of generation and treatment areas are shown on Exhibit V.B-13.

C. WASTE CHARACTERISTICS

C-1 Chemical and Physical Analyses

Hazardous wastes are generated at CRANE as a result of production, demilitarization, research and development, and associated functions. All wastes handled at the OB/OD facilities possess the hazardous characteristic of reactivity (D003) because of the reactive properties of energetics contained in the wastes. Propellants, explosives, and pyrotechnics (PEP) are designed, formulated and manufactured to be an explosively reactive material. Although there is a varying degree of reactivity within the broad range of PEP used in ordnance, its primary purpose is to react; therefore, it is reactive by design. Some PEP might be classified as a hazardous waste for reasons over and above the reactivity characteristic, but the primary concern for treatment is to eliminate the acute safety hazard inherent with PEP material.

Other considerations are addressed by analyzing the ash or residue generated from the thermal treatment operation as described in test parameters found in Table V.C-5. All ash removed from treatment units is combined in hazardous waste bulk containers such as roll-off dumpsters, with the exception of the ash produced from solvent burning which is segregated and stored in drums.

Finished ordnance items usually consist of PEP encased in some device, usually a metal case. These ordnance items are designed to preclude coming apart during use until initiation is desired. Examples of such ordnance items are gun projectiles, grenades, and bombs. Access to the PEP material loaded in these ordnance items for the purposes of sampling is extremely difficult, and, in most cases unsafe.

Therefore, sampling of well documented ordnance and PEP material is not proposed for the following reasons:

1. The composition of the ordnance is well described by military specifications, and the reactive properties are well known. The military specifications essentially constitute the waste specification. An example of a military specification is included in Exhibit V.C-1.
2. Sampling of ordnance items presents an acute safety hazard.

In those cases where CRANE is not certain of the waste characteristics or it is not well defined by a specification, sampling and analysis will be done to the extent possible without compromising human safety. These analyses would include tests for explosive reactivity, and possibly other characteristics and constituents. Whether it is classified as a hazardous waste or not, CRANE handles all ordnance and PEP as a dangerous, reactive material.

Off-specification or obsolete PEP or ordnance is also treated, but differs little from that of the accepted product due to the inherent quality control standards required during munitions production. Typical OB/OD treatment of off-specification or obsolete items results in hazards that are substantively indistinguishable from that of PEP items that do meet DOD specifications. Consequently, it is not necessary to submit additional data for these off-specification or obsolete wastes.

Some PEP wastes contain impurities, waste products, or other materials which were placed in the original PEP deliberately. An example would be the use of sawdust as a substrate on which liquid PEP is soaked. Exact physical or chemical analyses of these impurities are not necessary, because no practical methods exist for extracting these impurities so that they may be treated separately. Furthermore, any potential additional hazard these impurities might add is minute in relation to the hazard that the PEP itself may cause.

C-1a: Containerized Waste

Ash from all open burning operations will be managed as hazardous waste and all but the PEP contaminated solvents (F001 – F005) burning ash will be transported by use of bulk containers (roll-offs on dump trailers) to an off-site permitted disposal facility. Containerized ash from OB operations will not be stored at the treatment facility for longer than 90 days if the quantity is greater than 55 gallons. The waste ash generated by the burning of the F001 – F005 waste solvents is collected in drums and segregated from other ash streams at the ABG.

The three treatment facilities are used primarily to treat wastes that are generated from processes on-site. Wastes accepted from other military installations (off-site waste) will provide a secondary source of waste input to the treatment facilities. The amount of off-site waste that will be accepted is difficult to predict at this time but it is expected that it will be a minimal amount because most of the available treatment days will be used in treating wastes that are generated on-site. Wastes that are obtained from off-site in emergency situations or accepted from other agencies make-up a third, minor category of wastes.

The primary RCRA characteristic associated with the waste military munitions/explosives treated in the OB/OD units is reactivity (D003) due to the presence of energetic materials. Some of these wastes may have a secondary characteristic of toxicity, due to the presence of metals (D004 through D011), 2,4-DNT (D030), and hexachlorobenzene (D032). In addition, ABG has the capability to treat explosive-contaminated solvents that carry a primary reactivity characteristic (D003) but also carry a F001 – F005 listed waste code.

Military wastes are generated in several ways. In the interest of national security, enormous inventories of military ordnance items and bulk propellants/explosives/pyrotechnics (PEP) are maintained at various military installations around the country. Because the ordnance items and PEP held in this military readiness stockpile are subject to deterioration and obsolescence, action has to be taken to safely remove and thermally treat these items on an ongoing basis. Other explosive wastes are generated at on-site manufacturing and demilitarization facilities. This source of hazardous waste is generally composed of

off-specification energetic materials. These off-specification materials are generally composed of the exact ingredients that the specification materials are composed of but do not meet some performance specification. Useable off-specification items are either sold as foreign sales to allied countries; reprocessed through a procedure known as renovation; or demilitarized. The term demilitarize means to render the item no longer functional for the intended military use and to free it of hazard to the point that materials (i.e., metal parts) may be sold as salvage to the general public. Demilitarization also includes disassembly of munitions for the purpose of recovering components from the item for recycling or reuse. Off-specification materials are usually demilitarized. A large portion of the existing and projected demilitarization workload can be thermally treated safely through OB/OD practices.

The Munitions Rule has clarified what constitutes a waste when dealing with munitions and other energetic materials. Of particular importance to CRANE operations is the handling of unused munitions. The regulations, at 40 CFR 266.202(b)(1)–(4), state that an unused munition becomes a solid waste when any of four conditions apply:

- The unused munition is abandoned by being disposed of, burned, incinerated, or otherwise treated prior to disposal.
- The unused munition is removed from storage for purposes of disposal or treatment prior to disposal.
- The unused munition is deteriorated, leaking, or damaged to the point that it can no longer be returned to serviceable condition, and cannot be reasonably recycled or used for other purposes.
- The munition has been determined by an authorized military official to be a solid waste.

Open burning/open detonation or incineration of unused munitions (except when done during an emergency response or during training in the use of a product, see above) is regulated, including the permit requirements. Thus, the treatment operations at CRANE are regulated. However, no military chemical warfare agents or related compounds, or materials contaminated with or suspected of being contaminated with these agents or compounds will be open burned or open detonated at the OB/OD operation.

Examples of On-site Generated Wastes

Types of waste that are generated on-site include the following:

- Off-specification or unstable bulk PEP
- PEP contaminated packaging materials
- Excess PEP materials from munitions loading operations
- PEP materials contained in demilitarized munitions
- PEP contaminated materials from R&D efforts
- PEP waste materials from analytical laboratories
- PEP contaminated materials from testing operations
- Munitions in an imminently hazardous condition
- PEP contaminated sludges from munitions operations

Examples of Off-site Generated Wastes

Types of waste that are generated off-site include the following:

- Suspect items that may contain explosive devices

- PEP-containing items confiscated by law enforcement
- Waste military munitions from other DOD installations

C-1b Waste in Tanks

The only tanks used at the ABG are those associated with the dewatering units. Currently, CRANE does not manage any ignitable, reactive, or incompatible waste(s) in tanks. PEP-contaminated sludges are managed in the three dewatering units at the ABG. The sludges themselves are not reactive since they are transported to the dewatering units in water. The purpose of the units is to dewater the sludges and enable them to be thermally treated. The water collected in the generator tanks from the dewatering process is not a reactive waste. The sludges (based upon knowledge of the processes and composition) are considered to be compatible. Compositions of contaminants in sludge are provided in **Table V.C-4**.

C-1c Waste in Piles
C-1d Landfilled Wastes
C-1e Wastes Incinerated and Wastes Used in Performance Tests
C-1f Wastes to be Land Treated

CRANE does not manage wastes in these types of treatment units in the OB/OD facilities.

C-1g Waste in Miscellaneous Treatment Units

Reactive wastes are treated in several different treatment units at the ABG, ORR and DR. In most cases, CRANE knows exactly what is being treated for reactivity by thermal treatment. Ordnance and PEP is manufactured to rigidly controlled specifications. Close compositional tolerances are maintained, and ordnance which is released for field use is well documented with respect to composition and reactivity properties. **Table V.C-1** lists typical munitions constituents treated by OB/OD operations. Once generated, most wastes are temporarily accumulated in a designated area and subsequently taken to ABG, ORR or the DR for treatment. Some wastes go directly to the aforementioned when generated. Waste generated that meets the definition of military munitions could be stored in conditionally exempt magazines. Following is a brief discussion of the waste materials treated at each of the units.

Demolition Range

Detonation. This unit will be regulated as an OD method of operation. Most OD is conducted under earth cover, which provides for muffling of the sound and blast effects and reduction of fragmentation. Some small detonations are conducted on the surface. The typical composition of wastes to be open detonated at this area are indicated by the unit symbol DE on the list of wastes shown in **Table V.C-1**.

Old Rifle Range

Burning Pans/Pads. The majority of the open burning activity which takes place at the ORR, is thermal treatment of bulk ammonium picrate, projectiles which have been loaded with ammonium picrate (also known as Composition D, Comp D or Yellow D) or items that are contaminated by ammonium picrate. Flashing of scrap metal retrieved from the adjacent demolition range also occurs at the ORR. Ammonium picrate is bright yellow in color and is quite water soluble. Projectiles are commonly washed or drilled out to remove the majority of the explosive filler. The remaining contamination is removed by providing an open fire under and around the projectiles. Most of the time, these units will be used for the treatment of Composition D items. However, there is a possibility that some of the materials normally burned at ABG might be treated in Unit 3a-ORR. If ABG is not available for treatment operations, then ORR would be used in the interim to treat some PEP wastes until the ABG is operational. The typical compositions of the wastes to be open burned in pans are indicated by the unit symbol PA on the list of wastes shown in **Table V.C-1**.

Ammunition Burning Grounds

Burning Pans. The typical compositions of the wastes to be open burned in pans are indicated by the unit symbol PA on the list of wastes shown in **Table V.C-1** and is shown on specific operations in **Table V.C-3**. Below is a summary of burning operations conducted in pans:

1. Solid bulk propellant and explosives are open burned (thermally treated) in treatment units 3a-ABG and 3b-ABG, clay lined steel pans measuring 14' X 7' X 12".
2. High explosive production scrap is thermally treated in treatment unit 3c-ABG, ten clay-lined steel pans which measure 14' x 7' x 12".
3. Waste scrap pyrotechnics desensitized in #2 fuel oil is burned in treatment unit 7-ABG, two unlined steel pans. Each pan is 4' x 8' x 12" in depth and is constructed of ½-in carbon steel and is provided with aluminum lid.
4. Scrap black powder desensitized in water is burned in treatment unit 8-ABG, one unlined steel pan. This pan is 4' x 8' x 12" in depth and is constructed of ½-in carbon steel.
5. Waste red phosphorous in #2 fuel oil is burned in treatment unit 6-ABG, eight unlined steel pans which measure 4' x 4' x 12" in depth. Currently at the site, two sets of four pans are set up for this operation.
6. PEP-contaminated solvents (F001 - F005) are burned in 4-ABG and 5-ABG, two unlined steel pans. These pans are 4' x 8' x 12" in depth and are constructed of ½-in. carbon steel. The PEP-contaminated F001-F005 solvents are generated by the following operations:
    - F-listed solvents are used in munitions production process to clean equipment and tools. These solvents when used for cleaning become contaminated with PEP.
    - F-listed solvents are used in the production of pyrotechnic compositions as carriers for rubber binders. F-listed solvents most commonly used for this purpose are hexane and/or acetone. After mixtures are blended, they are allowed to settle and the solvents are then decanted off and sent to ABG where it is managed as a PEP-contaminated waste.
    - Solvents are also used during the research, development, and production of explosive and pyrotechnic munitions items. The solvents used during these operations would include (but not be limited to) toluene, cyclohexanone, 1,1,1-trichloroethane and carbon disulfide. Minor quantities of other solvents (such as acetonitrile, ethyl acetate, methanol, dimethyl sulfoxide, chloroform, dichloromethane, and alcohol) may be generated by laboratory activities.
    - Toluene and acetone are currently used for tool and machine/equipment cleaning. The primary wastes generated in these operations are rags containing explosive-contaminated solvents.

These materials are considered explosive hazardous waste and are handled and labeled as such.

Burning Pads. Two 30' x 50' concrete burn pads, designated treatment unit 9-ABG, have been provided for the flashing or thermal treatment of minutely-explosive contaminated and suspect explosive contaminated materials. Suspect explosive contaminated materials include primarily cardboard, paper, or metal packaging, or other items, which may have been in physical contact with a propellant, explosive or pyrotechnic materials. Minutely-explosive contaminated material would include expended flare casings, metal casings, component parts, etc., which have been in contact with PEP material and are generated from production operations (i.e., Research and Development and Test and Evaluation activities and Load Assembly and Pack operations). CRANE does not consider the suspect explosive contaminated materials/items to be hazardous waste, however, this operation is obviously open burning in the form of safety flashing and is physically located in a general area which is and will continue to be regulated. It is certain that these operations must continue according to Army Technical Bulletin 700-4.

Primer Pit. This unit, 12-ABG, will be regulated as an OB method of operation in a containment system. Small explosive components such as hand grenade fuses and cartridge primers are gravity fed into tapered heavy steel pans which measure 7' x 5.5' x 3'. The pans are constructed of 1 ¼-in. carbon steel. The pans are covered by a wire mesh cage to control fragmentation. The typical composition of the wastes to be open burned at this unit are indicated by the unit symbol PP on the list of wastes shown in **Table V.C-1** and specific operational list provided in **Table V.C-3**.

Incendiary Cage. This operation, treatment unit 13-ABG, will be regulated as an OB method of operation in a containment system. It is a burn box covered with a cage in which all-up pyrotechnic devices and components are fed by mechanized conveyor. The typical composition of the wastes to be open burned at this unit are indicated by the unit symbol C on the list of wastes shown in **Table V.C-1** and specific operational list provided in **Table V.C-3**.

Dewatering Units (DU). These units, 10-ABG (two units) and 11-ABG, will be regulated as an OB method of operation in a containment system. The DUs will be used to dewater explosive and pyrotechnic contaminated sludge. Two of the DUs (10-ABG) will accept explosive contaminated waste from the load, assemble, and pack area at Building 146, Minefill A and the Rockeye loading area. The third DU (11-ABG) will receive red phosphorus waste from Building 133 and the red phosphorus production area. The typical compositions of the contaminants in the sludge to be open burned at the DU unit are indicated by the unit symbol DU on the list of wastes shown in **Table V.C-1** and specific operational list provided in **Table V.C-3**.

Treatment Residuals. Ash residue is generated from the open burning of the reactive waste items in containment devices. The various treatment units at the ABG and ORR generate ash residues. (Ash residue is discussed in Section C-1b.) However, detonation operations at the DR do not generate ash residues.

Ash from all open burning operations will be managed as hazardous waste and transported by use of bulk containers (roll-offs on dump trailers) to an off-site permitted disposal facility. Ash from OB operations will not be stored at CRANE for longer than 90 days, with the exception of the solvent ash which can be stored at the CSF for longer than 90 days. Residues will be analyzed as described in test parameters found The filtrate drained from 10-ABG will be hauled to a carbon treatment plant, treated and discharged under an NPDES permit. The filtrate from 11-ABG will be sampled and tested for red phosphorus composition. The red phosphorus waste water will be sampled and analyzed for parameters shown in **Table V.C-5** on an annual basis or more frequently is the composition of red phosphorus is believed to have changed. Unless testing indicates the filtrate is a RCRA waste, it will be discharged into the CRANE sanitary sewer system. Should the test indicate contamination, the filtrate will be containerized and hauled to the CSF and managed as a hazardous waste.

C-1h Waste in Boilers and Industrial Furnaces

CRANE does not manage wastes in these types of treatment units at the OB/OD facilities.

C-2 Waste Analysis Plan

The Waste Analysis Plan is a waste characterization rationale which will ensure successful storage and treatment of wastes handled and received at CRANE. A Waste Analysis Plan, in accordance with 40 CFR 264.13(b) is included in the following sections.

C-2a Parameters and Rationale

Waste Treated. The primary concern in the treatment of PEP and ordnance wastes is the inherent explosive reactivity hazard. Although PEP may be hazardous for reasons beyond its explosive reactivity, the primary concern is to treat the waste for reactivity so that it can be safely investigated further. After the thermal treatment has made the waste non-reactive, additional tests are conducted to characterize the resulting ash/residues.

For known ordnance wastes with well documented histories, the explosive reactivity is known from process knowledge, therefore no reactivity test is needed before thermal treatment. After treatment the ash/residue is characterized by the test parameter analysis conducted as shown in **Table V.C-5**.

In certain rare cases, unknown PEP wastes may have to be treated, if they can be safely sampled, the explosive reactivity test is conducted in accordance with the U. S. Bureau of Mines protocol. If positive, the PEP is thermally treated. If non-reactive, the PEP is further characterized to determine proper disposition.

For most of the hazardous wastes to be treated at the OB/OD units, the physical and chemical characteristics required to prove that adequate treatment of those wastes will occur is well known among DOD personnel. Characteristics analyses can be based either on historical or available data (such as MSDS, military specifications, or MIDAS), or an analysis of representative waste samples. Well-known historical data will be sufficient for the waste PEP and ordnance whose properties have not changed from similar PEP and ordnance presently considered to be useable materials. The primary parameters of the representative waste samples to be analyzed include reactivity, flash point, stability test, and propellant burning rate.

For wastes with less well-known compositions, analyses of representative waste samples will most probably be required in addition to using historical data. In this case, the choice of analytical parameters, selected as a function of waste type, must basically address the question as to whether the waste can be successfully and safely treated at the OB/OD units utilizing typical operation.

Treatment Residuals. The waste ash from the thermal treatment activity is analyzed for reactivity and TCLP characteristics. The waste analysis parameters chosen for the ash are: (1) reactivity, and (2) applicable TCLP characteristics that will include: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver using TCLP. Of the TCLP list of organics, only dinitrotoluene (DNT) will be analyzed for, as this is the only TCLP organic constituent that could be present in OB treatment ash based on the original energetic constituents. The waste will also be analyzed for the reactivity characteristic to ensure that the reactive (D003) waste code does not apply to the waste. The TCLP characteristics listed above were chosen based on the possible presence of the constituents in the ash based on the known constituents present in the items being treated. Analyses will be conducted only for those constituents that may be present in a particular treatment scenario. **Table V.C-5** summarizes the sampling parameters, analysis method, and rationale.

TC analysis is conducted only after it has been confirmed that the reactive waste code no longer applies.

General Information Pertaining to PEP

Energetic materials used in ordnance are chemical compounds or mixtures of chemical compounds, and can be divided into three broad classes according to use: propellants, explosives, and pyrotechnics (PEP). The three classes of energetic materials are described as follows:

Propellants. Propellants in Navy use include various types of smokeless powder used primarily in propellants for gun ammunition, and solid and liquid propellants primarily in rockets and missiles. When ignited, the propellant produces large quantities of hot, gaseous products. Complete combustion or deflagration of the propellant occurs in milliseconds in guns, and the pressure produced accelerates the projectile down the barrel. In propellants, a slower reaction produces lower pressure over a longer period of time. This lower sustained pressure is used to propel objects or to power auxiliary devices. Propellants can be distinguished from high explosives by the chemical rate of reaction.

Propellants characteristically react (burn) at a rate that is much lower than the reaction rate of explosives. It is difficult to distinguish between propellants and explosives based on chemical composition alone. Propellants are characterized by their ability to burn at reproducible, controllable, and predetermined rates. When confined to the breech and barrel of a gun, the evolved gases produce high pressures, which provide the propulsion for the projectile. Under certain conditions, however, propellants can be made to detonate, and conversely, explosives that characteristically detonate may simply burn if the proper conditions of confinement, dimensions, degree of consolidation, and other factors are chosen.

Smokeless powder is manufactured in the form of small flakes, strips, sheets, and perforated cylindrical grains. It is manufactured under uniform conditions, grained to a uniform size, and blended to a standard percent of residue volatile substances.

Propellants can be grouped into primarily four classes. Division into these classes is on the basis of composition, not use. A given propellant composition may be suitable for use in several applications.

- Single-base propellant compositions are used in cannons, small arms, and grenades. These compositions contain the propellant nitrocellulose as their major ingredient. In addition to containing a stabilizer, they may also contain inorganic nitrates, nitro-compounds, and non-explosive materials such as metallic salts, metals, carbohydrates, and dyes.
- Double-base propellant compositions are used in cannons, small arms, mortars, rockets, and jet propulsion units. This term generally applies to compositions containing both nitrocellulose and nitroglycerin. They can also be defined as a propellant containing nitrocellulose and a liquid organic nitrate that will gelatinize nitrocellulose. The presence of an active gelatinizer makes double-base propellants more energetic than single-base propellants. The ballistic potential is increased correspondingly. The flame temperature and resulting barrel erosion is also increased. Additives are frequently used in addition to a stabilizer. Ballistite is a double-based propellant procured in the form of sheets, carpet-rolls, and grains used in various forms as the propellant in rocket motors and some guided missile boosters and sustainers.
- Triple-base propellant compositions are used in cannon units. This term is applied to propellants containing three explosive ingredients, with nitroguanidine as the major ingredient and the other two usually nitroglycerin and nitrocellulose. The nitroguanidine as an additional energizer increases the energy content of the formulation.

- Mixed nitrate esters are a propellant composition developed to replace the triple-base composition during a time of nitroguanidine shortages. As an example, the XM35 composition contains nitrocellulose, 1,1,1-trimethylolethanetrinitrate (TMETN), triethylene glycol dinitrate (TEGDN), and diethylene glycol dinitrate (DEGN). As another example, the XM34 composition contains nitrocellulose, TMETN, TEGDN, and 1,2,4-butanetrioltrinitrate (BTTN). The combination of mixed nitrate ester yields a higher gas volume and lower flame temperatures than the use of nitroglycerin alone. Composite propellants contain neither nitrocellulose nor an organic nitrate. They are usually a physical mixture of a fuel such as metallic aluminum, a binder (which is normally a synthetic rubber that is also a fuel), and an inorganic oxidizing agent such as ammonium perchlorate. Composite propellants are used primarily in rocket assemblies and chemical fuel jet propulsion units. Ball propellants are used for small arms. The major ingredients are nitrocellulose and nitroglycerin.

Explosives. Explosives are substances or mixtures capable by chemical reaction of producing gas at high temperature and pressure as to cause damage to the surroundings. Explosives can include high explosives, low explosives, propellants, igniters, primers, initiating, and pyrotechnic compositions. Fuel-air explosives, together with liquid fuels and oxidants, are included in this definition even though the individual substances may not be explosives.

Primary Explosives. Primary explosives are often used in ordnance items in small quantities to initiate an explosive reaction. Primary explosives are very sensitive and relatively easy to detonate by heat, impact, or friction. In large quantities these materials are extremely hazardous because of their great sensitivity. Primary explosives can be used in combination with fuels and oxidizers in ordnance. The other ingredients are used to increase the sensitivity of the mixture to the desired property such as percussion or heat. These primary explosives are:

- Lead azide
- Mercury fulminate
- DDNP (5,7-dinitro-1,2,3-benzoxadiazole)
- Lead styphnate
- Tetracene
- KDNBF (potassium dinitrobenzofuroxane)
- LMNR (lead mononitroresorcinate)
- Primary compositions.

Primary Compositions. Primary compositions are mixtures of primary explosives, fuels, oxidizers, and other ingredients used to initiate detonation in high explosive charges or to ignite propellants and pyrotechnics. Fuels commonly used in priming compositions are lead thiocyanate, antimony sulfide, and calcium silicide. Oxidizing agents include potassium chlorate and barium nitrate. Several other ingredients may include primary explosives and binders.

Secondary Explosives. The second element in the explosive train is the booster, which contains a larger quantity of less sensitive but more powerful material called a secondary high explosive. The booster is used either as an intermedial stage to detonate material that is too insensitive to be detonated by the relatively weak initiator or to ensure complete detonation of the main charge. The main charge is also a

secondary explosive. It is the least sensitive material but comprises the bulk of the explosive charge. Secondary explosives can be divided into several classes that are less sensitive than primary explosives. These consist of the following:

1. Aliphatic nitrate esters. There are several common compounds in this category. These compounds are prepared by attaching an oxygen atom to the compounds being nitrated.
    - BTTN (1,2,4-butanetriol trinitrate) is a good gelatinizer for nitrocellulose and can be used as a substitute for nitroglycerin in double-based propellants.
    - Diethyleneglycol dinitrate can be used as an explosive and can be used in propellants as a colliding agent for nitrocellulose.
    - Nitrocellulose is a mixture of nitrates obtained by nitrating cellulose. There are five recognized and used grades of nitrocellulose that include pyroxylin, pyrocellulose, guncotton, high nitrogen nitrocellulose, and blended nitrocellulose.
    - Nitroglycerin is a clear, colorless, odorless, oily liquid with a sweet, burning taste and a molecular weight of 227.1. Nitroglycerin is used extensively in propellant compositions as a gelatinizing agent for nitrocellulose as well as in dynamites and for the shooting of oil wells.
    - Nitrostarch is a mixture of nitrates obtained by nitrating starch. The structure of starch is the same as for nitrocellulose, with the exception that the polymer chains are spiral rather than straight. Nitrostarch has a wide variety of gelatinizing agents and is used rather than nitrocellulose in explosive compositions chiefly as a substitute for nitroglycerin.
    - Pentaerythritol tetranitrate (PETN) is a white solid with a molecular weight of 316.2. PETN is used in the explosive core of industrial detonating fuses, in the charge of commercial blasting caps, and as the entire explosive charge in exploding bridge wire detonators. PETN is also used in certain plastic bound explosives and in a mixture with TNT called pentolite.
    - Triethylene glycoldinitrate (TEGN) is a light yellow, oily liquid with a molecular weight of 240.20. TEGN is used as a gelatinizing agent for nitrocellulose in propellants or as a component in a liquid explosive, a plasticizer in the fabrication of flexible explosive sheets, and as a plasticizer in pyrotechnic flares.
    - 1,1,1-Trimethylolethanetrinitrate (TMETN) is slightly turbid, viscous oil with a molecular weight of 255.15.
2. Nitramines. Compounds in this class include:
    - Cyclotetramethylenetetranitramine (HMX)
    - Cyclotrimethylenetrinitramine (RDX)
    - Ethylenediamine dinitrate (EDDN)

- Ethylenedinitramine (Halite)
- Nitroguanidine (NQ)
- 2,4,6-trinitrophenylmethlnitramine (Tetryl)

3. Nitroaromatics. Compounds in this class include:
   - Ammonium picrate
   - 1,3-diamino-2,4,6-trinitrobenzene (DATB)
   - 2,2',4,4',6,6'-hexanitroazobenzene (HNAß)
   - Hexanitrosostilbene (HNS)
   - 1,3,5-triamino-2,4,6-trinitrobenzene (TATB)
   - 2,4,6-trinitrotoluene (TNT)
4. Ammonium nitrate. Ammonium nitrate is in the crystal form with a molecular weight of 80.05.
5. Compositions. Compositions are explosives in which two or more explosive compounds are mixed to produce an explosive with suitable characteristics for a particular application. Normally the characteristics of the compositions are an intermediate between the characteristics of the individual explosive ingredients. Compositions can include binary mixtures, ternary mixtures, and quaternary mixtures.

- Binary Mixtures
  - Amatols are mixtures of ammonium nitrate and TNT. Composition A consists of a series of formulations of RDX and a desensitizer. Composition B consists of mixtures of RDX and TNT. Composition C contains about 88.3 percent RDX and 11.7 percent of a nonexplosive oily plasticizer. Composition CH6 is an explosive mixture containing RDX, calcium stearate, graphite, and polyisobutylene. Composition CH-6 is primarily used for boosters and leads. Ednatols are mixtures of Haleite and TNT. Ednatols are used for the satisfactory bursting of charges in ammunition.
  - Octols are mixtures of HMX and TNT. Octols are used as an oil well formation agent and in fragmentation and shaped charges.
  - Pentolites are unstable explosive mixtures containing PETN and TNT.
  - Picratol is a mixture of ammonium picrate and TNT.
  - Tetrytols are mixtures of TNT and Tetryl. The United States no longer uses Tetrytols. Tetrytols are cast into munitions.
  - Tritonal is a mixture of TNT and flaked aluminum. Tritonal is used as a filler in bombs and shells.
- Ternary Mixtures
  - Amatex 20 consists of RDX, TNT, and ammonium nitrate and is used as filler in ammunition items.

- Ammonals are mixtures containing as principle ingredients, ammonium nitrate and powdered aluminum incorporated with high explosives such as TNT, DNT, and RDX. The major use of this composition is as a projectile filler.
- High blast explosives have three compositions: HBX-1, HBX-3 and H-6. HBX-1 and HBX-3 consist of RDX, TNT, aluminum, wax and lecithin. The formulation of H-6 is the same except for the deletion of TNT.
- HMX, TNT, and aluminum mixture 3 (HTA-3) is cast as a munition.
- Minol-2 consists of TNT, ammonium nitrate, and aluminum and is used in four types of ordnance: underwater depth bombs, block buster bombs, concrete fragmentation bombs, and general purpose bombs.
- Torpex consists of RDX, TNT, aluminum powder, and is cast into munitions.

- Quaternary Mixtures
  - The depth bomb explosives (DBX) is the only explosive covered under this category and consists of TNT, RDX, ammonium nitrate, and aluminum. The DBX is a binary explosive. It is an unstable mixture consisting of 40 percent TNT, 21 percent RDX, 21 percent ammonium nitrate, and 18 percent powdered aluminum. It is normally cast at a density between 1.61 and 1.69 and is used as a bursting charge in depth charges.
- Plastic-bonded Explosives
  - Plastic-bonded explosives are explosive materials such as RDX or ammonium perchlorate (AP) that are held together by various plastic bonding agents, including polystyrene, viton, rubber epoxies, and polyurethane. Explosives coated with plastic materials are also referred to as plastic bonded explosives.
- Black Powders
  - Black powders are explosive materials composed of a mixture of potassium nitrate or sodium nitrate, charcoal, and sulfur. The Navy uses black powder in the form of grains or granules of varying sizes and degrees of fineness depending on its specific purpose or function. There are two primary types of black powder: potassium nitrate-based black powder and sodium nitrate-based black powder.
- Fuel-air Explosives
  - Fuel-air explosives (FAE) are liquids or slurries that exhibit explosive properties when mixed with air. The individual substances may not be explosives. By the nature of the role they are required to perform, fuel-air mixtures are sensitive to a range of thermal and electrical stimuli. Currently, two division of FAE are employed: ethylene oxide (EO) or propylene oxide (PO).

6. Pyrotechnics. Pyrotechnics compositions are substances or mixtures of substances which, when ignited, undergo an energetic chemical reaction at a controlled rate intended to produce, on demand and in various combinations, specific time delays or

quantities of heat, noise, smoke, gas, light, or infrared radiation, etc. These compositions comprise a wide range of formulations because of the various roles they are required to perform. Many pyrotechnic compositions are insensitive. However, some pyrotechnic compositions are relatively sensitive and can give rise to a rapid deflagration which appears to be an explosion similar to that produced by a high explosive.

Pyrotechnics adapted to military purposes are divided into signaling, simulators, smoke screening, incendiary, and illuminating types. These classes are further subdivided into surface and aircraft pyrotechnics, although some items are common to both subdivisions.

C-2b Test Methods

Table V.C-5, which is located at the end of this section, lists test parameters and method references; Table V.C-6a lists sample container types, volume, and preservatives; Table V.C-6b lists maximum holding times for samples before analysis. These methods are taken from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, Third Edition, or the most recent edition. Any laboratory that will be performing analysis for CRANE will be required to use these methods or other EPA approved methods.

The specifications for all analytical contracts will require the contractor to provide CRANE with a QAAP that follows guidelines set forth in SW-846, Chapter One. The Quality Assurance/Quality Control Plans for the laboratory currently performing analytical work for the hazardous waste program is included by reference (See Test America Quality Assurance Manual, dated November 1, 2011).

C-2c Sampling Methods

Sampling methods and detailed procedures are given in the Introduction, Section C-2c. In general, solid wastes will be sampled in the following manner:

1. Ash/residues and non-combustible material residues. Ash/residues will be sampled from the collection container using a thief or trier. These samples will be composited into a single sample for each ash/residue container. These composite samples will be analyzed for the characteristics and parameters shown in Table V.C-5.
2. Unknown PEP wastes. Unknown PEP wastes could originate during inspection of production and storage areas. The primary concern with sampling unknown PEP materials is the safe conduct of the procedure. Non-sparking stainless steel or conductive plastic spoons and spatulas will be used to collect at least two grab samples from different portions of the container (if feasible) such that the composite sample represents the container's contents. The composite sample will be analyzed for explosive reactivity. Based on the result, the sample will be thermally treated or subjected to additional tests to characterize the non-reactive material.

Compositing of waste from different processes will not be done.

Sample containers, preservation methods and sample amount, as specified by EPA Publication SW-846, 3rd Edition, or most recent edition, are described in Table V.C-6a.

C-2d Frequency of Analyses

Waste streams that are consistent will be reviewed annually and re-analyzed when the process changes and/or when the receiving facility requires new analytical results.

If enough information is available, and when acceptable with the receiving disposal facility, waste characterization determination will be based on generator knowledge.

All wastes which have no prior history, and all wastes of unknown characteristics generated at CRANE, will be analyzed between the time their presence is detected and the time such wastes are treated.

Wastes known to contain chemical constituents which may change with time to form unstable compounds (e.g., peroxides) will be tested annually for the reactive of concern.

Stable wastes of known origin will not be analyzed. Adequate information for safe handling and disposal of these wastes will be obtained from material safety data sheets and other various published sources.

For wastes whose compositions are expected to be relatively constant, the following criteria should be included in deciding whether or not to perform additional tests:

- Use of different raw materials (different formulation) in the production of the PEP or ordnance.
- A change in the results of the OB/OD process where similar wastes have been treated. Such changes could include a difference in the visible characteristics of the emissions plume, or a change in the composition or volume of the residue.
- Visual inspections of the waste indicate a change in the waste characteristics.
- Unexpected events, such as premature detonation during handling of the wastes.

C-2e Additional Requirements for Waste Generated Off-Site

This unit could treat wastes generated from off-site. This information is covered in the Introduction, Section C-2e.

EOD Responses

The Explosive Ordnance Detachment (EOD), at CRANE, may respond to requests to pick up sensitive items (explosive wastes, unstable chemicals, etc.) from various agencies for detonation or burning at the DR or ABG. These items are usually so sensitive in nature that they cannot safely be handled for sampling or analysis. Responses are classified as Level 1 or Level 2 Waste Military Munitions or non-Waste Military Munitions. (Refer to **Exhibit V-C-3**, Memorandum of Understanding between EODMU Two Detachment Crane and the State of Indiana Regarding Responses to Explosives or Munitions Emergencies for specific details on requirements and notifications within the State of Indiana.)

When material/sensitive items are received on-Center, they are treated/disposed of immediately or placed in a conditionally exempt magazine. These wastes are disposed of at the DR or ABG either by detonation or open burning. CRANE Environmental Protection is notified when the material is picked up, arrives on-site, and disposed of completely.

Acceptance of Off-Site Waste Military Munitions

Waste military munitions from other DOD facilities will be accepted only after verification of type and quantity of waste and feasibility for treatment by OB/OD. CRANE places a priority on treating on-site wastes and generally would accept wastes from off-site facilities only after other treatment options had been considered. These wastes will be managed in accordance with the Military Munitions Rule. The generators of the waste munitions will identify and profile their wastes prior to sending it to CRANE. This information will be used as the waste analysis for the items that will be treated. In no case will CRANE accept waste munitions that differ from those typically treated at ABG, DR, or ORR. No military

chemical warfare agents or related compounds, or materials contaminated with, or suspected of being contaminated with these agents or compounds, will be accepted for treatment.

Agreements with Other Federal Facilities

In some cases, other Federal Agencies such as the Bureau of Alcohol, Tobacco and Firearms have promulgated agreements with DOD on the handling of confiscated explosives and fireworks from illegal operations. As the recognized experts on explosives, DOD has the facilities and the knowledge to dispose of these illegally manufactured items confiscated as a result of law enforcement actions. On occasion CRANE has been asked/requested to store and treat those illegally manufactured items. Before CRANE accepts these items the generator will be required to show documentation that confirms the items contain energetic materials of a similar nature to those that are currently treated.

Under 10 U.S.C. §2692, DOD is prohibited by law from using DOD installations for the storage or treatment of non-DOD owned conventional explosive ordnance or explosive material except when providing temporary storage or treatment of conventional explosives in order to provide emergency lifesaving assistance to civil authorities, or to otherwise assist law enforcement agencies in accordance with established agreements between DOD and the head of the Federal agency concerned. An example of such an agreement is the MOU with the Bureau of Alcohol, Tobacco, and Firearms. A copy of the MOU is included in **Exhibit V.C-2**.

C-2f Additional Requirements for Ignitable, Reactive or Incompatible Wastes

Specific precautions to prevent accidental ignition or reaction of wastes are taken during all OB/OD operations, loading and unloading, and transportation. Procedures are clearly described in the Ammunition and Explosives Safety Ashore, NAVSEA OP 5 Volume 1 (current version); the Army Safety Manual, AMC-R 385-100; Army Environmental Protection and Enhancement, AR 200-1; Army Regulation Authorizing, Accomplishing and Reporting Demilitarization of Class V Material, AMC-R 755-8; and OB/OD Standing Operating Procedures. The following are key precautions taken:

- Adverse Weather Conditions. A weather forecast is obtained prior to beginning each day's operation. Operations will not be initiated during the following conditions:
  - Electrical storms within three miles.
  - Sand, snow or dust storms within three miles.
  - Wind velocity greater than 15 mph.
  - No open detonation operations during periods of heavy, low overcast skies.
  - No OB/OD operations during hours of darkness.
- Personnel Safety Precautions. The following safety precautions are observed to prevent accidental ignition or reaction of wastes:
  - No smoking or open flames allowed in the area.
  - Only authorized spark resistant tools allowed.
  - Prior to placement of waste materials for treatment, the area will be carefully inspected to ensure against the presence of heat retaining embers, sparks, or burning material from previously treated wastes.
  - All nearby ordnance or similarly hazardous material placed at a safe distance from the OB/OD operation and protected from flying embers, fragments, or sparks.

- Containers of hazardous materials handled carefully at all times. They shall not be dragged over the floor of the truck or over the ground, and not thrown, pushed, or dumped from the truck to the ground. If the truck is not equipped with an elevator-type tailgate, the individual containers shall be lifted and placed on the ground by hand, one at a time.

In accordance with AMC-R 755-8 and local procedures, OB/OD operators will record and maintain weather data whenever OB/OD operations are conducted. In order to ensure favorable weather conditions exist, a weather forecast will be obtained and recorded prior to scheduling daily demilitarization operations for that shift. The operating record shall include the date, time of weather measurement, temperature, sky condition, wind speed, wind direction, and material destroyed. Weather conditions will be obtained from the weather station located in the ABG Office and information from the National Weather Service or local weather service via internet.

The composition of wastes treated at the OB/OD facilities can generally be described as energetic material. Other than radiological, biological and chemical munitions, any munition in the inventory of the DOD is a candidate for treatment at the facilities. Additionally, other energetic waste materials from outside agencies for which no other disposal alternatives exist may be treated.
The list munition items treated is provided in Tables V.C-1, V.C-2, and V.C-3. These tables indicate constituents in the typical munition items, the facility used for treatment and the applicable EPA waste codes.

C-2g Additional Requirements Pertaining to Boiler and Industrial Furnace Facilities
This Section is Not Applicable to operations at OB/OD Facilities.

C-3 Waste Analysis Requirements Pertaining to Land Disposal Restrictions

All hazardous wastes including treatment residues must meet land disposal restriction (LDR) standard prior to land disposal. Treatment standards for hazardous wastes are contained in 40 CFR 268.40.

The waste analysis plan (Introduction. Section C-2) provides information necessary to determine whether wastes treated in the OB/OD units and treatment residues are being managed properly under LDR requirements.

C-3a(1) Spent Solvent and Dioxin Wastes
This section is not applicable to operations at OB/OD Facilities.

C-3a(2) California List Wastes
This section is not applicable to operations at OB/OD Facilities.

C-3a(3) and (4) Listed and Characteristic Wastes
The primary hazard characteristic associated with the waste military munitions/explosives treated in the OB/OD units is reactivity (D003) due to the presence of energetic materials. Some of these wastes may also be classified as toxicity characteristic wastes, due to the presence of metals (D004 through D0011), 2,4-dinitrotoluene (D030), and hexachlorobenzene (D032). The land disposal restriction (LDR) treatment standard for D003 wastes [explosives subcategory based on 40 CFR §§261.23(a)(6), (7), and (8)] is deactivation and meet 40 CFR 268.48 standards for underlying hazardous constituents.

Treatment in the OB/OD units deactivates the reactivity characteristic. Therefore, thermal treatment residues (shrapnel and ash) are not reactive and meet the LDR treatment standard. Some of the treatment residues (shrapnel and ash), however, may contain underlying hazardous constituents. No hazardous

thermal treatment residuals are disposed onsite at CRANE. All hazardous thermal treatment residues are shipped to off-site treatment, storage, and disposal facilities.

C-3a(5) Radioactive Mixed Waste

CRANE does not manage radioactive mixed wastes. Therefore, this section is not applicable.

C-3a(6) Leachates

Leachates are not land disposed at this site. Therefore, this section is not applicable.

C-3a(7) Lab Packs

Lab packs are not land disposed at this site. Therefore, this section is not applicable.

C-3a(8) Contaminated Debris

Contaminated debris is not land disposed at this site. Therefore, this section is not applicable.

C-3a(9) Waste Mixtures and Waste with Overlapping Requirements

This section is not applicable to OB/OD operations.

C-3a(10) Dilution and Aggregation of Wastes

This section is not applicable to CRANE operations.

C-3b Notification, Certification, and Recordkeeping Requirements

C-3b(1) Retention of Generator Notices and Certification

CRANE may receive wastes that do not meet LDR treatment standards from off-site facilities for treatment at the CRANE treatment facilities. Copies of generator notifications required under 40 CFR §268.7(a) will be retained in the files.

C-3b(2) Notification and Treatment Requirements for Treatment Facilities

Hazardous waste residues from the treatment of waste military munitions/explosives at the CRANE treatment facilities that meet LDR requirements may be sent to off-site land disposal facilities. Hazardous waste residues that do not meet LDR requirements may be sent to off-site storage or treatment facilities to be further managed. Records of notices provided to off-site storage, treatment, and land disposal facilities will be maintained in CRANE records.

C-3b(3) Notification and Certification Requirements for Land Disposal Facilities

CRANE does not manage hazardous wastes in onsite land disposal facilities. Therefore, this section is not applicable.

C-3b(4) Wastes Shipped to Subtitle C Facilities

Hazardous waste residues that do not meet LDR requirements may be sent to off-site Subtitle C storage or treatment facilities to be further managed. Records of notices provided to off-site storage, treatment and land disposal facilities will be maintained in CRANE records.

C-3b(5) Wastes Shipped to Subtitle D Facilities

CRANE treatment residues that are not hazardous may be sent to off-site Subtitle D facilities for further management. Records of notification to IDEM and certification that the waste residue is not hazardous will be placed into the CRANE files. Information specified in 40 CFR 268.9(d) will be supplied.

C-3b(6) Recyclable Materials

CRANE does not use recyclable materials in a manner constituting disposal. Therefore, this section is not applicable.

C-3b(7) Recordkeeping

CRANE maintains records of all treatment, storage, and/or disposal facilities that manage wastes generated onsite, make determinations if the waste is restricted from land disposal, and keep documentation of that determination and maintain documentation to indicate where, if any restricted wastes were treated, stored, and/or disposed.

D. PROCESS INFORMATION

The OB/OD facilities are considered miscellaneous processes in this framework; the description is found at Section D-8. A brief description of the containers in which materials to be treated arrive at the treatment location and are stored and labeling of those containers is given at Section D-1.

D-1 Containers

This section applies to the OB/OD operations to the extent that materials that are treated in these operations arrive at the locations in various containers and remained stored in those containers until they are treated. Temporary storage, or staging, of these wastes prior to treatment will be allowed for a period of ten (10) hours at OB/OD facility locations. Any wastes that are not treated within the ten (10) hours will be returned to a permitted or exempt storage facility.

Waste military munitions to be treated at CRANE's thermal treatment units are contained in cardboard boxes and drums; wooden crates; metal drums, cans, and containers; lined plastic cans and containers; cloth containers; shell; projectile; and component bodies that are Performance Oriented Packaging as regulated under the Department of Transportation (DOT). Waste Military Munitions are never placed in containers which previously held incompatible wastes. Waste military munitions are typically placed in containers that previously held military munitions.

Exhibit V.D-5 is a label that is used by CRANE to meet labeling requirements for reactive/explosive waste, PEP-contaminated materials, and Waste Military Munitions (WMM) that are generated on Center from the various demilitarization, renovation and production of military ordnance items. This label is used on containers that are used in transport. It is also used on containers that are used in the temporary storage of materials to be incinerated, open burned or open detonated at any of the treatment facilities at CRANE.

All labels must have four pieces of information completed on the label. They are as follows:

- Hazardous Waste – regulatory requirement
- Contents – describes the material;
- Contact – the building Supervisor; and
- Date – the start accumulation date for the containers.

Material Potentially Presenting an Explosive Hazard (MPPEH) may be referred to as, generated from, or included in the following categories of material: Ammunition, Explosives, and Dangerous Articles (AEDA); AEDA residue, range residue; range, demil, or metal scrap; munitions debris, range-related debris, explosive contaminated property; explosive contaminated scrap; tooling, hardware, equipment and building debris from facilities used in munitions processing; and Munitions and Explosives of Concern (MEC). Items that are destined to be released to the public will be evaluated and documented as "safe" (MDAS) or as an explosive hazard (MDEH). A chain of custody will be maintained for each item or set of items. Each item or container will be labeled as "MDAS" or "MDEH".

D-2 Tank Systems

This section does not apply to the OB/OD operations.

D-3 Waste Piles

This section does not apply to the OB/OD operations.

D-4 Surface Impoundments

This section does not apply to the OB/OD operations.

D-5 Incinerators

This section does not apply to the OB/OD operations.

D-6 Landfills

This section does not apply to the OB/OD operations.

D-7 Land Treatment

This section does not apply to the OB/OD operations.

D-8 Miscellaneous Units

Engineering drawings are shown in the following Exhibits:

V.B-3	ABG/ORR burn pans, Units 3a,3b,3c,4,5,6,7,8-ABG and 3a-ORR
V.B-4	ABG primer pit, Unit 12-ABG
V.B-5	ABG incendiary cage, Unit 13-ABG
V.B-5(a)	ABG concrete burn pads, Unit 9-ABG
V.B-6	ABG dewatering units, Unit 10,11-ABG
V.B-14	ORR burn pads, Units 3a,3b-ORR

D-8A Description of the Miscellaneous Units

D-8A(a) Physical Characteristics, Materials of Construction, and Dimensions of the Unit

The OB units are located as shown in **Exhibit V.B-1**. OB units are detailed in **Exhibit V.B-2**. Waste military energetic materials are open burned in specially constructed burning pans. Routine open burning operations are not permitted to be conducted directly on the surface of the ground by Department of Defense internal regulations. All OB/OD operations are conducted in accordance with AMC Regulation No. 755-8 (AMC-R 755-8) shown in Exhibit V.F-1, and with Chapter 13 of OP 5 (latest edition), Ammunition and Explosives Ashore Safety Regulations for Handling, Storing, Production, Renovation and Shipping. Typically, bulk propellants or other energetic materials are poured into the burning pans to a few inches in depth, primed, and remotely initiated. Some all-up or component items are fed into a contained burn device on a continuing basis (i.e., the 13-ABG incendiary cage and 12-ABG primer pit). General descriptions of the types of OB operations and equipment used at the Ammunition Burning Grounds (ABG) are listed in paragraphs a through k of this section. The units/operations at the ABG which are being permitted as Hazardous Waste Treatment units are covered by paragraphs a, b, and d-k. The units described in paragraph c is not considered a hazardous waste treatment unit, but are located within an area which is regulated as a TSD. The two OB operations conducted at the Old Rifle Range (ORR) are discussed in paragraph m. A summary of OB operations conducted at the ABG and ORR is provided in **Table V.B-1**.

Design information provided in **Exhibit V.B-3** is for one size burn pan (7' x 14'). The other sizes of burn pans are 4' x 4' and 4' x 8'. The only difference in the construction of the aforementioned pans is in size.

Construction materials specified in **Exhibit V.B-3** are used in the construction of the three various sized pans.

The following operations are conducted at the ABG:

a. Units 3a & 3b-ABG. Solid bulk propellant and explosives are open burned (thermally treated) in clay lined steel pans. This serves the purpose of insulating the steel pan from the direct heat which keeps the pan from warping and losing tensile strength. The clay is also used to meet the intent of internal DOD Safety regulations which requires CRANE to burn on clay versus other surface materials (sand, rock, bare steel). There are twenty pans set up for this operation. The drawings for these pans are represented at **Exhibit V.B-3**. The pans are 14' x 7', 12" in depth and are constructed of 3/8", carbon steel. The pans have aluminum lids to be used when the pans are not in operation. The maximum net bulk propellant weight for each pan is 1,500 pounds while the maximum net bulk high explosive is 500 pounds.

Prior to placing the bulk propellant or explosive in the burn pan, the propellant/explosive container is electrically bonded to the pan by a ground strap to prevent stray static electricity discharge. After bonding is completed, the operator is then allowed to pour and spread the propellant/explosive out evenly/uniformly across the width of the pan. These pans are set up in six rows of three each. Every other row is loaded as mentioned above. Remote initiation for each pan is accomplished by using a non-electric time fuze and a small anti-static bag containing less than 1 pound of propellant. The operator pulls the igniter which starts the time fuze on each pan and then exits the area and goes to the office at the ABG. The time fuze initiates the propellant, thus starting the fire in the pan. The average time taken for 1,500 pounds of bulk propellant to burn is 15--30 seconds while 500 pounds of bulk explosive can take 4-60 minutes depending upon the type of high explosive being burned.

These burns are witnessed by the area supervisor from the office at the ABG to verify completeness of the burn or any indications of problems with the burn. After all visible flames have subsided, the supervisor then enters the area and verifies that unsafe conditions do not exist. The operators then return to the unit, mist the pan with a small amount of water, and remove ash and any pop-out. Cleanup is accomplished using non-sparking hand tools such as brass shovels, wooden rakes etc. The choice is then made to reload and start the process again or put on the lid and shut down operation. During the process of removing ash and cleaning up of pop-out or putting the lid on the pan the operator notes any structural defects on the daily inspection form (e.g. warping, broken welds, missing ground straps, damage to lids or if clay liner material needs to be added). If a pan is found to have structural defects that would impede its use, it is immediately removed from service and replaced with a backup unit of the same construction and design. The damaged pan is either repaired or flashed and turned into the Defense Reutilization Marketing Office (DRMO) as scrap metal.

The operators then return to the unit, mist the pan with a small amount of water, and remove ash and any pop-out. The choice is then made to reload and start the process again or put on the lid and shut down operation.

In the future, the process for loading the pans may change. Personnel are designing a new material handling system that will make the loading of the pans more ergonomically suitable. A sketch of the design of this system is located in **Exhibit V.A-3**. This system will be located on an asphalt pad inside the ABG. The system will consist of two loading stations that will be used to transfer the PEP material into large, covered hoppers for transport to the pans. The operators will use a manipulator to lift the cans of PEP in order to place the contents into the hoppers. Once the material is loaded, an operator will use a forklift to move the hopper to the pan. During transport, a cover will be placed on the hopper to ensure that no material is spilled. After the forklift operator dumps the material in the pan, another operator will rake out the PEP to ensure the material is spread out uniformly. The initiation of the material will be unchanged from the description above.

b. Unit 3c-ABG. High explosive production scrap is thermally treated in ten pans of identical construction as the ones used for bulk propellant. The maximum net explosive weight permitted for each pan is 1,500 pounds for propellant scrap, and 500 pounds for explosive scrap. The same procedure as

outlined in subsection a above is followed. Length of burn time varies from 4 minutes to 1 hour for this operation due to the type of high explosive production scrap being burned and if it contains large amounts of wax or moisture.

c. One additional 14' x 7' pan is provided near the primer pit area for the purpose of inspection of treated components. No thermal treatment occurs in this inspection pan. Components which have been treated at the primer pit (12-ABG) are placed in this pan and are visually inspected by the CAAA personnel to ensure all have functioned. These components, after they have been inspected, are then turned into DRMO to be offered for sale as scrap metal.

d. Units 4 & 5-ABG. PEP contaminated solvents (F001-F005) are burned in one unlined steel pan at each unit. This pan is 4' x 8', 12" in depth and is constructed of ½" carbon steel. This pan is also equipped with an aluminum lid which measures 4' x 8'. The maximum net explosive weight permitted to be treated at one time in this pan is 50 pounds for Unit 4-ABG and 100 pounds for Unit 5-ABG. Prior to placing the contaminated solvents in the burn pan the container is electrically bonded to the pan by a ground strap to prevent stray static electricity discharge. After bonding is complete the operator is then allowed to pour the contaminated solvent into the pan. Remote initiation for each pan is accomplished by using a non-electric time fuze. The operator pulls the igniter which starts the time fuze on the pan and then exits the area and goes to the office at the ABG. The time fuze initiates the propellant, thus starting the fire in the pan. Average length of time required for burn is 30-45 minutes. These burns are witnessed by the area supervisor from the office at the ABG to verify completeness of the burn or any indications of problems with the burn. After all visible flames have subsided, the supervisor then enters the area and verifies that unsafe conditions do not exist. The operators then return to the unit, mist the pan with a small amount of water, and remove ash and any pop-out. Cleanup is accomplished using non-sparking hand tools such as brass shovels, wooden rakes etc. The choice is then made to reload and start the process again or put on the lid and shut down the operation. During the process of removing ash and cleaning up of pop-out or putting the lid on the pan the operator notes any structural defects (e.g. warping, broken welds, missing ground straps, damage to lids). If a pan is found to have structural defects that would impede its use, it is immediately removed from service and replaced with a backup unit of the same construction and design. The damaged pan is either repaired or flashed and turned into DRMO as scrap metal.

These PEP-contaminated F001–F005 solvents are generated by the following operations:

- F-listed solvents are used in munitions production process to clean equipment and tools. These solvents when used for cleaning become contaminated with PEP.
- F-listed solvents are used in the production of pyrotechnic compositions as carriers for rubber binders. F-listed solvents most commonly used for this purpose are hexane and/or acetone. After mixtures are blended, they are allowed to settle and the solvents are then decanted off and sent to ABG where it is managed as a PEP-contaminated waste.
- Solvents are also used during the research, development and production of explosive and pyrotechnic munitions items. The solvents used during these operations would include, toluene, cyclohexanone, 1,1,1 trichloroethane and carbon disulfide.
- Toluene and acetone are currently used for tool and machine/equipment cleaning. The primary wastes generated in these operations are rags soaked with explosive contaminated solvents.

The waste ash generated by the burning of these waste solvents is collected and segregated from other ash streams at the ABG. Additional information pertaining to waste generation and storage is found in Section D-8Aj (Ash/Residue Management).

e. Unit 6-ABG. The waste red phosphorous and #2 fuel oil mixture is burned in unlined steel pans. Currently at the site, two sets of four pans are set up for this operation. The set of pans that will be used for each burn is dependent on the prevailing wind direction for that day. These pans are 4' x 4' x 12" in depth and are elevated two to three feet off the ground by metal stands. The pans are constructed of ½" carbon steel. These pans are also provided with aluminum lids. The maximum net explosive weight permitted to be treated in these pans is 100 pounds per pan. Before placing the red phosphorous/fuel oil mixture in the burn pan, the container is electrically bonded to the pan by a ground strap to prevent stray static electricity discharge. After bonding is complete the operator is then allowed to pour the red phosphorous/fuel oil mixture into the pan. Remote initiation for the pan is accomplished by using a non-electric time fuze. The operator pulls the igniter which starts the time fuze on the pan and then exits the area and goes to the office at the ABG. Average length of time required for burn is two hours. This lighting takes place prior to leaving the area for their break. After initial ignition the operators are allowed to enter areas not immediately adjacent to these operations. These burns are witnessed by the area supervisor from the office at the ABG or other non-adjacent areas to verify completeness of the burn or any indications of problems with the burn. After all visible flames have subsided, the supervisor then enters the area and verifies that unsafe conditions do not exist. The operators then return to the unit, mist the pan with a small amount of water, and remove ash and any pop-out. Cleanup is accomplished using non-sparking hand tools such as brass shovels, wooden rakes, etc. The choice is then made to reload and start the process again or put on the lid and shut down operations. During the process of removing ash and cleaning up of pop-out or putting the lid on the pan the operator notes any structural defects (e.g. warping, broken welds, missing ground straps, damage to lids). If a pan is found to have structural defects that would impede its use, it is immediately removed from service and replaced with a backup unit of the same construction and design. The damaged pan is either repaired or flashed and turned into DRMO as scrap metal.

f. Unit 7-ABG. Waste scrap pyrotechnics desensitized in #2 fuel oil are burned in two unlined steel pans. Each pan is 4' x 8', 12" in depth and is constructed of ½" carbon steel and is provided with an aluminum lid. The maximum net explosive weight permitted to be treated per pan is 100 pounds per burn. Prior to placing the oil/pyrotechnic mixture in the burn pan the container is electrically bonded to the pan by a ground strap to prevent stray static electricity discharge. After bonding is complete, the operator is then allowed to pour the fuel oil/pyrotechnic mixture into the pan. Remote initiation for the pan is accomplished by using a non-electric time fuze. The operator pulls the igniter which then starts the time fuze on the pan and the operator then exits the area and goes to the office at the ABG. Average length of burn is 30-45 minutes. These burns are witnessed by the area supervisor from the office at the ABG to verify completeness of the burn or any indications of problems with the burn. After all visible flames have subsided, the supervisor then enters the area and verifies that unsafe conditions do not exist. The operators then return to the unit, mist the pan with a small amount of water, and remove ash and any pop-out. Cleanup is accomplished using non-sparking hand tools such as brass shovels, wooden rakes etc. The choice is then made to reload and start the process again or put on the lid and shut down operations. During the process of removing ash and cleaning up of pop-out or putting the lid on the pan the operator notes any structural defects (e.g. warping, broken welds, missing ground straps, damage to lids). If a pan is found to have structural defects that would impede its use, it is immediately removed from service and replaced with a backup unit of the same construction and design. The damaged pan is either repaired or flashed and turned into DRMO as scrap metal.

g. Unit 8-ABG. Scrap black powder desensitized in water is burned in one unlined steel pan. This pan is 4' x 8' x 12" in depth and is constructed of ½" carbon steel. This pan is also equipped with aluminum lid. The maximum net explosive weight permitted to be treated at one time in this pan is 125 pounds. Same procedure as followed in subsection (e) above is used here. Average length of time required for a burn is 60 minutes.

h. Unit 9-ABG. Two 30' x 50' concrete burn pads have been provided for the flashing of explosive contaminated and suspect explosive contaminated materials. The overall design is shown in drawings

found in Exhibit V.B-5A. Suspect explosive contaminated materials include primarily cardboard, paper or metal packaging, gloves, containers, and other items, which may have been in physical contact with PEP materials. Explosive contaminated material would include expended flare casings, metal casings, component parts, etc., which have been in contact with explosive material and is generated from production operations (i.e. Research & Development and Test & Evaluation activities and Load Assembly and Pack operations). The concrete burn pads are 8", reinforced concrete sloped towards the center where a graded collection system directs any precipitation to a collection sump. The pads are surrounded by 6' tall chain link fencing and gates to aid in containing small bits of paper or cardboard prior to flashing or thermal treatment. In practice, the floor of these concrete pads is covered with six inches of sand to prevent the concrete floor from spalling due to intense heat of the burning operations. If explosive contaminated or suspect materials are readily combustible, additional materials are not needed. If materials are primarily metal, lumber (dunnage) is used. Strict procedures are enforced to prohibit the use of PCP (pentachlorophenol) treated materials for this purpose.

Remote initiation of the burn pads is accomplished by using a non-electric time fuze in combination with the fuel oil and propellant. The operator pulls the igniter which starts the time fuze on the pad and then exits the area and goes to the office at the ABG. The time fuze initiates the propellant and fuel oil, thus starting the fire in the pan. This lighting takes prior to leaving the area for their break. After initial ignition the operators are allowed to enter areas not immediately adjacent to these operations. These burns are witnessed by the area supervisor from the office at the ABG or other non-adjacent area to verify completeness of the burn or any indications of problems with the burn. After all visible flames have subsided, the supervisor then enters the area and verifies that unsafe conditions do not exist. The operators then return to the unit, mist the pan with a small amount of water, and remove ash and any pop-out. Cleanup is accomplished using non-sparking hand tools such as brass shovels, wooden rakes etc and heavy equipment. During the process of removing ash the operator notes any structural defects (e.g. cracking of concrete, broken welds on fence, damaged fencing). The findings of these inspections are noted on the inspection sheet for that day. The area supervisor is responsible for insuring action is taken immediately to correct any deficiencies noted on the inspection. If a burn pad is found to have structural defects that would impede its use, it is immediately removed from service until repairs can be made. Repairs to concrete or damaged fencing would be handled by contract with private contractor. In some cases if the damage was great enough the entire concrete pad might have to be replaced. This determination would be made as the specifications and cost estimates are being put together for the repair. Broken welds would in most cases probably be handled by CRANE welders.

i. Units 10 & 11-ABG. CRANE has three Dewatering Units (DUs) with double walled underground tanks which are equipped with automatic leak detection. DU 10-ABG consists of 2 units used for PEP other than red phosphorus. DU 11-ABG consists of one unit used solely for red phosphorus. The DUs receive explosive and pyrotechnic contaminated sludges from production operations at Building 146, Minefill A Area, the Rockeye area, Building 200, and the Pyro-Production Building 133. As indicated in Table V.B-1, the maximum amount of sludge that could be treated per month in the DUs is 10,000 gallons. A more detailed description of the sludges is provided in Section C (Waste Characteristics). The DUs are located as shown in Exhibit V.B-2. The sludges are transported to the ABG in a 1,250-gallon tank truck and placed in the DUs, dewatered by gravity and an under drain system, air dried to an optimum point, ignited, and burned in place. Each of the three subunits is separate from the others and has its own under drain and filtrate storage system (STI-P3 double walled underground tanks). The waste stream being dewatered is considered to be a reactive waste.

The filtrate is collected and stored in 2,000-gallon double-walled underground steel tanks (ea. approx. 5'4" diameter x 12 ft. long (Exhibit V.C-4). The collected filtrate from DU 10-ABG is returned to one of the carbon pretreatment facilities for treatment and discharged to the sanitary sewer. The filtrate from the DU 11-ABG is collected and returned to the sanitary sewer. Each unit rests on a reinforced concrete pad (ea. approx. 8'4" W x 15' L x 20" thick). The steel burning component of the DUs measure 8' x 14' x 6' with the sides being lined with 4 inches of concrete which is then covered with a ½" sheet of steel. The

concrete containment vessels measure 14' x 22' x 5'-8" D. Each subunit is equipped with a cover when the pan is not in use. The covers for the burn pans are constructed of fiberglass and urethane composite planks. The planks are additionally supplemented with tarps.

Detailed drawings of the DUs are shown in Exhibit V.B-6. Design and operation of the DUs and ancillary equipment comply with the applicable portions of 40 CFR 265.192 and 265.193.

Overflow protection is provided through double walled piping from the DUs to the underground tanks. The piping from the DUs to the underground tanks is 2-inch PVC (schedule 80) encased in a 6-inch PVC (schedule 80) which is equipped with an inspection port. The approximate length of pipe needed to connect the DUs to the underground tank shown on the drawing is 23 feet. Should overfilling occur, excess material backs into the concrete containment of the burn pan. This material would be pumped out and put back through the DUs after water has been removed from the underground tank.

The three filtrate collection tanks have been provided with automatic leak detection. The leak detection system is connected to phone lines through a modem which allows alarm conditions to be relayed to the 24-hour security desk. The tanks each have a two inch probe tube allowing for the monitoring of free liquid in the space between the walls of the double wall tanks. Information on the automatic leak detection system is provided in Exhibit V.A-2. A stick gauge can be used to monitor for the presence of free liquid in this space. If free liquid is found between the primary and secondary containment, the tank will immediately be treated as though the secondary containment is not sound. In the event that automatic leak detection is not operational and personnel will be unable to gauge the probe tube within the 24-hour time frame, free liquid will be removed from the tank, thus eliminating the possibility of a release. Please note the tanks are also cathodically protected.

Prior to placing the sludge in the DU the tanker is electrically bonded to the unit by a ground strap to prevent stray static electricity discharge. After bonding is complete the operator is then allowed to drain the sludge into the pan. After the pumper truck has emptied its load the tank will be rinsed and the storage tank for the DU pumped. Maximum amount of water that can be stored in the individual tank is 2000 gallons. Remote initiation for each pan is accomplished by using a nonelectric time fuze in combination with the fuel oil, propellant, and wood. The operator pulls the time fuze on the pan and then exits the area and goes to the office at the ABG. The time fuze initiates the materials in the DU, thus starting the fire in the pan. These burns are witnessed by the area supervisor from the office at the ABG to verify completeness of the burn or any indications of problems with the burn. After all visible flames have subsided, the supervisor then enters the area and verifies that unsafe conditions do not exist. The operators then return to the unit, mist the pan with a small amount of water, and remove ash and any pop-out. Cleanup is accomplished using non-sparking hand tools such as brass shovels, wooden rakes etc. The choice is then made to reload and start the process again or put on the cover and shut down operations. During the process of removing ash and cleaning up of pop-out or putting the cover on the pan the operator notes any structural defects (e.g. warping, broken welds, missing ground straps, damage to covers). If a pan is found to have structural defects that would impede its use it is immediately removed from service and action taken to have it repaired. The damaged pan is either repaired or flashed and turned into DRMO as scrap metal.

j. Unit 12-ABG. The primer pit operation involves treatment of small explosive components such as hand grenade fuzes and cartridge primers. This operation consists of a small building (2126), two gravity feed chutes and two heavy steel pans with grated covers. The pans are constructed of carbon steel, 1-¼" thick. The top of the pans are 7' x 5.5' and are tapered to 2.5' x 3.5' at the bottom. Drawing of this unit is provided as Exhibit V.B-4. The pans stand approximately 2.5' to 3' tall. The lids are constructed of the same material with half inch slots which allow oxygen to enter and hot gases to vent. A 12" hole is

provided in the lid through which the components are directed into the burn box. The two burn boxes are separated and contained on three sides by metal clad concrete walls. The walls are approximately 3 feet tall. The feed chutes are designed with double gates which allow the items to be directed into the fire box without a direct opening being present which would expose operators to possible fragmentation hazards. The amount of items to be fed in each increment is limited by explosive safety standards. The primer pit, when operated, runs for eight hours at a time.

k. Unit 13-ABG. The incendiary cage is set up primarily to allow the functioning of all-up pyrotechnic devices and components. The overall design is further represented by the drawings found in **Exhibit V.B-5**. One mechanized conveyor runs from Building 3329 and ends over a caged burn box. The burn box is contained within a reinforced concrete structure that has three walls, concrete floor and heavy steel frame covered with a fine stainless steel screen. The screening serves to contain burning embers thereby reducing fire hazards. The structure is equipped with run-on, run-off protection in the form of graded, perforated pipe. collection trough and covered sump. The floor of the structure is in practice insulated with sand to protect the concrete from spalling created by the intense heat produced by functioning of some illuminating devices.

The following operations are conducted at the Old Rifle Range:

m. Units 3a & 3b-ORR. The majority of the open burning activity which takes place at the ORR is thermal treatment of ammonium picrate (also known as Comp D, Composition D or "Yellow D"). Unit 3b-ORR represents the burning of bulk ammonium picrate in pans placed on the concrete pads of Unit 3a-ORR. Unit 3b-ORR represents the flashing of ammonium picrate-loaded projectile bodies and other ammonium picrate-contaminated materials. Some flashing of scrap metal retrieved from the adjacent demolition range also occurs at the ORR. Ammonium picrate is bright yellow in color and is quite water soluble. Projectiles are commonly washed or drilled out to remove the majority of the ammonium picrate explosive filler. The bulk filler is treated in Unit 3a-ORR. The remaining ammonium picrate in the projectile bodies is removed by providing an open fire under and around the projectiles. Prior to any operations, the two gates that are located on the access road are closed to ensure no unauthorized personnel enter into the ORR area. The operation is conducted within the 30' x 50' concrete burn pads shown in **Exhibit V.B-14**. The concrete burn pads are 8" reinforced concrete sloped towards the center where a grated collection system directs any precipitation to a collection sump. The pads are surrounded by 6' tall chain link fencing and gates. In practice, the floor of these concrete pads is covered with six inches of sand to prevent the concrete floor from spalling due to intense heat of the burning operations. If materials are primarily metal, lumber (dunnage) is used. Strict procedures are enforced to prohibit the use of PCP (pentachlorophenol) treated materials for this purpose. Once inspected for complete removal of explosive contamination, the steel projectile bodies are excessed as scrap metal. Each concrete pad is situated over a polyethylene-lined, earthen containment area that was previously used for these operations.

Any minute amount of Comp D which pops out of the treatment pans can discolor considerable quantities of water. Control of any possible run-off which may contact unconsumed ammonium picrate is thereby provided. Run-off is collected in a concrete sump for eventual removal to the sanitary sewer or treatment in one of the ORR units. A net explosive weight limit has been established for explosive safety considerations. This limit is 5,000 pounds per concrete pad. Because of explosive safety distance requirements, only one pad can be in operation at one time.

Burn pans, identical to those used at the ABG, are used when treating bulk Comp D. Up to three pans can be placed on each concrete pad. One pan contains a 4' x 8' smaller pan used to thermally treat liquids which have contacted ammonium picrate. Typical liquids include water or denatured alcohol. In practice, the amount of dissolved ammonium picrate is thermally consumed after the liquid portion is boiled and vaporized or burned.

Before placing the projectiles which have been loaded with ammonium picrate in the burn pads the container is electrically bonded to the pad by a ground strap to prevent stray static electricity discharge.

Bonding is not required if cardboard boxes or wooden pallets are being used. After bonding is complete the operator is then allowed to place the projectiles which are loaded with ammonium picrate into the pad. Remote initiation for the pad is accomplished by using a non-electric time fuze in combination with fuel oil and propellant. If bulk Comp D is being treated, the operator will bond the container to the pan during loading operations. The operator pulls the igniter which starts the time fuze on the pan and then exits the area and goes to the office at the Demolition Range. The time fuze initiates the propellant and fuel oil, thus starting the fire in the pan. Personnel are not allowed to work in the immediate area until the burn is complete. Average length of time required for a burn is two hours for projectiles and 30 minutes for bulk yellow D. Personnel can work at the Demolition Range (DR) while burning is taking place at the ORR. The DR supervisor is responsible for verifying completeness of burn. After all visible flames have subsided, the supervisor then enters the area and verifies that unsafe conditions do not exist. The operators then return to the unit, mist the pan with a small amount of water, and remove ash and any pop-out. Cleanup is accomplished using non-sparking hand tools such as brass shovels, wooden rakes etc. The choice is then made to reload and start the process again or shut down operations. During the process of removing ash and cleaning up of pop-out or putting lids on pans, the operator notes any structural defects (e.g. warping, broken welds, missing ground straps, damage to lids, or if clay liner material needs added). If the operation is to be shut down for an extended period of time, the pans will be flashed to remove all contamination and will be placed face-down on a storage pad at the ORR. If a pan is found to have structural defects that would impede its use, it is immediately removed from use and replaced with a backup unit of the same construction and design. The damaged pan is either repaired or flashed and turned into DRMO as scrap metal. A pan which had broken welds would be repaired by:

** Removing pan from use and removing liner material from area where weld was broken or damaged.*

** Have portable welder and operator brought in who would repair broken weld by re-welding it.*

Any projectile bodies or scrap metal from the burning operation is turned over to DRMO as scrap metal for resale.

Most of the time, these units will be used for treatment of Composition D items. However, there is the possibility that some of the materials normally burned at ABG might be treated in Unit 3a-ORR. If the ABG is not available for treatment operations, then ORR would be used to in the interim to treat some PEP wastes until the ABG is operational. The procedures used at ABG would be followed in the event that operations might be conducted in Unit 3a-ORR.

The ash generated by the thermal treatment process (open burning) is collected, burned a second time, containerized in bulk containers, and disposed of off-site at a permitted Hazardous Waste TSD Facility. The ash is burned a second time by placing the collected ash on top of the contaminated material and dunnage being burned on the ORR concrete burn pads. This is done because of Army and Navy safety regulations that require the facility to flash/burn each item to ensure that it is no longer reactive.

Some of the PEP solvents that are burned are also F001-F005 listed solvents. Since these solvents are restricted from land disposal unless established treatment standards are met for the waste, the ash from PEP/solvent treatment is placed in drums and segregated from the other ash.

D-8Aa.1 Containment Device Description

See Section D-8.a for a description of containment devices.

D-8Aa.2 Engineering Drawing of the Fabricated Device

These drawings are provided in exhibits:

- V.B-3 Design Drawings for Burn Pans (ABG & ORR)

- V.B-4 Design Drawings for Primer Pit Boxes
- V.B-5 Design Drawings for the Incendiary Cage
- V.B-5(a) Design Drawings for ABG Concrete Burn Pads
- V.B-6 Design Drawings for the ABG Dewatering Units
- V.B-14 Design Drawings for the ORR Burn Pads

D-8Aa.3 Lining Material within Device

There are no established specifications for liner material used in burn pans. For the most part they are materials indigenous to the Region. The continuing basic desirable "property" or "specification" of the sand or clay linings is thermal protection for the concrete or metal surfaces from the intense heat of open burning PEP materials. Temperatures in the range of 4,000–5,000 °F are not unusual. In the late 1960's and through the 1970's, DOD explosive safety manuals came to recommend clay as a preferred soil type on which to open burn PEP substances or items. When DOD initially mandated use of pans as a means of further containing OB operations, references still existed with regards to burning on clay pads. To comply with the letter and intent of the regulations, a decision was made to line the inside of the pans with clay. Continued use demonstrated provision of the insulating material extended the service life of steel pans. Exposure to the extreme temperatures generated as a result of reacting PEP materials will tend to cause surfaces to warp and lose tensile strength. The probability of a burn pan burning-through and releasing ash and residue to the environment is much higher with pans not protected by a liner.

A similar circumstance exists with concrete surfaces. Extreme heat will cause unshielded concrete to spall. Metal jacketing and/or providing six inches of sand as barrier have proven effective in extending service life of concrete containment.

These "linings" only indirectly prevent releases of hazardous waste or residues to the environment by helping maintain the integrity of the containment devices. However, the primary means to prevent releases remains the routine, thorough, frequent and documented visual inspections of devices and structures. Upon identification of defects, removal from use is the immediate and effective means of prevention of releases. Extra pans and lids are kept in reserve in the treatment area which makes prompt replacement of defective or damaged containment devices possible. The decision is then made to repair the damaged containment device or decontaminate it and dispose of it as scrap metal. Additional liner material is readily available and is added to the containment device as needed.

D-8Aa.4 Lining Material below Devices

Liners, as such, beneath the containment devices, do not currently exist except at units 3a-, 3b-ORR. Information about the ORR liners is given in Section D-8Aa(m).

Other units (3a-ABG, 3b-ABG, 3c-ABG, 4-ABG, 5-ABG, 6-ABG, 7-ABG, 8-ABG) are suspended off the ground by means of concrete parking blocks. The area under and immediately around these pans is covered with a bed of sand to facilitate the routine clean-up of pop-out material. Any pop-out (ash) will be cleaned up prior to removal of the discolored sand. Discolored sand and/or ash materials are routinely removed and managed out of the area as hazardous waste. The sand, which is cleaned out approximately four times per year, is flashed in Unit 9-ABG.

Clean up of sand around the burn pan is accomplished using a front-end loader and shovels. The discolored sand is removed to Unit 9-ABG for use as lining material in this burn operation. As ash is cleaned up from this operation, the sand is removed with the ash and is therefore disposed of as hazardous waste. The area supervisor, while completing the required inspections, is responsible for determining when sand is sufficiently discolored to warrant replacement.

D-8Ab Leak Detection Provisions

Leak prevention and detection systems are integral to treatment system design and are thus discussed with the actual design elements of the systems; see Section D-8Aa and **Exhibit V.A-2** for information pertaining to leak detection systems/provisions.

D-8Ac Precipitation Cover

Please note that all devices have run-on and run-off controls in the form of lids for pans or drains with sumps. The lids are held in place on the pan by tie-down straps when the pans are not in use.

D-8Ad Control of Releases of PEP Ashes and Residue during OB

See Sections D-8Aa and D-8Ah for information on the control of releases of ashes and residue from burning of PEP.

D-8Ae Methods to Control Deterioration of Fabricated Devices

Insulating materials such as clay and sand are employed to prevent deterioration. Plate metal shielding serves the same purpose for poured concrete walls. Reapplication of sealants or periodic "testing" is not required.

D-8Af Prevention of Accumulation of Precipitation

Accumulation of precipitation in the fabricated devices is controlled by the lids or covers placed on the units after a burn is completed and it is safe to do so. These lids/covers are discussed in SECTION D-8AC.

D-8Ag Handling of Precipitation Accumulated in Fabricated Devices

Precipitation that could possibly collect in the fabricated devices prior to the lids being replaced after a burn is completed will be disposed of with the next burn conducted in that pan. Accumulated Precipitation may remain in the pan for an estimated 18-24 hours before the next burn is conducted. Water which has collected in the sumps for the concrete pads (Units 9-ABG, 3a, 3b-ORR), the dewatering units (10 & 11-ABG), and the incendiary cage (13-ABG) is analyzed to determine proper management. If testing indicates that the water is a hazardous waste it will be containerized (drum or bulk tanker) and shipped off-site for disposal. If testing indicates that the water is not a hazardous waste it will either be discharged to the sanitary sewer system or transported to a holding tank for removal to an off-site treatment facility. A vacuum truck and/or tank truck equipped with a pump is used to remove water which has collected in sumps for concrete flashing pads and the incendiary cage. The collected waste water is either placed into the proper HW or Non-HW container or dumped into the sanitary sewer system for treatment at the Sewage Treatment Plant.

D-8Ah Controls to Avoid Wind Dispersal of Ash

As discussed in Section D-8Aa dealing with OB/OD operations, after all visible flames have subsided, the supervisor then enters the area and verifies that unsafe conditions do not exist. The operators then go back in and remove ash and any pop-out. Cleanup is accomplished using non-sparking hand tools such as brass shovels, wooden rakes etc. The choice is then made to reload and start the process again or put on the lid and shut down operations. Cleaning up ash and covering the burn pan as soon as possible after the burning operation is complete eliminates potential for wind dispersal of the ash. A pan should not remain uncovered for more than 8 hours.

In addition, as indicated in Section F-6, Noise Considerations, all OB/OD is conducted in accordance with AMC-R 755-8 and the applicable air pollution permit conditions issued to CRANE by the IDEM in

the site's Title V air quality operating permit. A copy of the AMC Regulation is included as **Exhibit V.F-1**. The administrative procedures used to assure controls on open burns are as follows:

The ordnance derived wastes treated at CRANE are composed of ingredients designed to burn or react. Under and over limit situations are the two possible conditions to be controlled administratively and will be discussed here. Typically, under limit burns do not create unmanageable problems. Use of too much secondary combustible (fuel) materials still result in complete treatment of PEP wastes but does represent inefficient use of resources. Too little fuel can result in incomplete treatment of some items. However, this occurrence is quite detectable by required routine 100 percent visual inspections. To correct the situation once identified, means for re-treatment are readily available.

Great care has been exercised in formulation of explosive limits on single burn or continuous burn activities. Explosive limits are one of the primary means to control worker safety exposure to OB operations. The primary goal of explosive limits is to prevent reactions which have the potential to produce dangerous amounts of overpressure, flame or fragmentation. Not only are explosive limits important for single event burns but also continuous burn operations. Feed rates are established-for incendiary cage and primer pit operations. Feed rates limit amounts of net explosive weight likely to be burned at any one point in time. As an example to describe additional procedural controls, net explosive weight per pan for bulk propellant is not the only relevant parameter used to control open burns. The arrangement of the propellant in a layer of 2" to 3" will prevent excessively violent reactions and undo pop-out. Explosive limits therefore serve the dual purpose in containment of open burn operations from the safety and environmental perspective.

Burning operations will operate in compliance with the following conditions:

a. *Operations will not be conducted during electrical storms, thunder storms, or during periods of forecasted high probability (50 percent or greater is given by the local National Weather Service (NWS) or as determined by experienced OB/OD operations personnel) of such.*

b. *Operations will not be conducted during periods of precipitation or high probability (75 percent or greater as given by the NWS or as determined by experienced OB/OD operations personnel) of such.*

c. *Operations shall be restricted to periods when surface average wind-speed is equal to or greater than 3 miles per hour and equal to or less than 20 miles per hour, with gusts less than 30 miles per hour and from a direction which will not carry emission products over any publicly accessible area with 1 mile of the demilitarization site.*

c. *During periods of reduced visibility (less than 1 mile).*

d. *When the estimated cloud cover is greater than 80 percent and the cloud ceiling is estimated at less than 2000 feet.*

e. *Until at least one-half hour after sunrise and will be concluded by at least one-half hour before sunset.*

f. *During periods of local air quality advisories/alerts.*

D-8Ai Inspections and Maintenance

The burns are witnessed by the area supervisor from the office at the ABG to verify completeness of burn or any indications of problems with the burn. After all visible flames have subsided, the supervisor then enters the area and verifies that unsafe conditions do not exist. During the process of removing ash, and cleaning up pop-out material or putting the lid on the pan, the operator notes any structural defects on the daily inspection form (e.g., warping, broken welds, missing ground straps, damage to lids, or if clay liner material needs to be added). Repairs of minor defects in pans, for example, re-welding a broken weld, can be accomplished in place. If a pan is found to have structural defects that would impede its use, it is immediately removed from service and replaced with a back-up unit of the same construction and design. The damaged pan is either repaired or flashed and turned in to the Defense Reutilization Marketing Office (DRMO) as scrap metal.

Additional information pertaining to inspections is provided in Section F-2.

D-8Aj Ash/Residue Management

The ash generated by the thermal treatment process (open burning) is collected using non-sparking hand tools such as brass shovels, wooden rakes, etc. The ash is burned a second time by placing the collected ash on top of the contaminated material and dunnage being burned on the concrete burn pads. This is done because of Army and Navy safety regulations which require the facility to flash/burn twice to ensure that the ash is no longer reactive. Finally, the ash is containerized in bulk containers and disposed of off-site at a permitted Hazardous Waste TSD Facility.

As previously discussed in this section and Section C (Waste Characterization), the facility does open burn (thermally treat) PEP-contaminated F001–F005 solvents in steel pans at the ABG. The waste ash generated by the burning of these waste solvents is burned a second time, then collected and segregated from other ash streams at the ABG. This ash is collected and stored in 55-gallon drums. This operation generates 2-3 drums of ash per year (estimated). Based upon this estimate it takes estimated 4 to 6 months to fill a drum. These drums are kept closed unless material/waste is being added to them. These drums, after they have been filled, are moved to the Central Storage Facility where they are stored until being shipped off-site for disposal. The operating record for the Central Storage Facility will show them as being land ban waste. When paperwork is submitted to the disposal facility to gain approval for disposal of this waste all of this information is provided on the waste disposal profile sheet. CRANE requires its Hazardous Waste Disposal contractor to sample and establish a waste profile for each waste stream. To date this process generates very small amounts of waste.

D-8Ak Copy of SOP

Attempts to include and maintain within the RCRA permit current copies of DOD explosive safety required SOP's for open OB/OD operations will not be made. DOD SOP's for explosive operations are living documents which are frequently reviewed and updated. To formally include these SOP's would require an inordinate amount of administrative effort to continually modify an existing permit in attempts to keep the documentation current. However, equivalent information is being provided in a more generic format for this permit application. SOP's in force at any point in time are and will continue to be made available to regulatory agencies for technical information. Exhibit V.D-4 is provided as an example of a DOD explosive safety SOP.

D-8B Waste Characterization

Process knowledge is utilized to obtain information on the physical and chemical characteristics of wastes treated in the CDC. Sampling and analysis of well documented ordnance and energetic material is not proposed. This unit could treat wastes generated from off-site.

The primary RCRA characteristic associated with the waste military munitions/explosives treated in the OB/OD units is reactivity (D003) due to the presence of energetic materials. Some of these wastes may have a secondary characteristic of toxicity, due to the presence of metals (D004 through D011), 2,4-DNT (D030), and hexachlorobenzene (D032). In addition, ABG has the capability to treat explosive-contaminated solvents that carry a primary reactivity characteristic (D003) but also carry a F001 – F005 listed waste code.

D-8C Treatment Effectiveness

Open burning and detonation at ABG, ORR, and DR are effective treatments for D003 and F001-F005 explosive contaminated waste materials. The military energetics (propellants, explosives, and pyrotechnics) contained in the item result in the classification of these items as reactive (D003) due to their potential to explode. Energetics are designed to explode or burn vigorously and react completely when exposed to an initiating source. These explosions or vigorous reactions occur whether they are used as designed in warfare or treated through open burning and detonation.

The OB/OD treatment process is designed to ensure that complete reaction occurs. In the case of open detonation, the quantity and placement of donor explosive material is designed to direct explosive forces toward the waste item to ensure that all of the energetics contained in the waste materials are destroyed. In the case of open burning, the energetic items are subjected to burning operations and any resultant residue from the burning is inspected to no energetic materials still exist. All ash and metal from open burning operations are flashed in Units 9-ABG to ensure all residues are non-reactive.

The major differences between the open burning and the detonation processes are the speed with which this adiabatic, oxidation-reduction reaction proceeds through the energetic material and the pressures and temperatures involved. In open burning the oxidation-reduction reaction occurs on the surface of the energetic material at close to atmospheric pressure and takes seconds to a few minutes to go to completion. The rate determining factors in open burning are the rate of heat transfer into the material and the rate of decomposition of the energetic material itself. There is no shock wave. In contrast, in detonation processes, the oxidation-reduction reaction proceeds through the material at a velocity (detonation velocity) between 7,000 and 35,000 ft/s, and the reaction is completed within a few microseconds. Detonations produce pressures as high as 350,000 atmospheres (35,300,000 kPa) and temperatures as high as 6,000°K.

Test Data: The DOD has sponsored numerous tests to analyze emissions. The US EPA has reviewed these studies and prepared a report summarizing the emission factors and assessing their quality. The report, titled "Emission Factors for the Disposal of Energetic Materials by Open Burning and Open Detonation (OB/OD)" (EPA/600/R-98/103), concluded that OB/OD is an effective treatment method. The emission factors contained in this US EPA report show that the energetics have been destroyed.

D-8Ca Description of OD unit [Open Detonation on the Ground Surface]

CRANE currently conducts detonation of munitions, deteriorated compressed gas cylinders, suspect inert items, and emergency items that, because of their condition, present a possible hazard.

Note that the Explosive Ordnance Disposal Detachment (EOD) operates nonregulated open detonation activities within the facility boundary of the DR. The EOD detonations are emergency treatment and, as such, are exempt from the TSDF permitting requirements. Additionally, function testing of ordnance

items is conducted within the facility boundary of the DR. The DR is utilized for testing when the explosive weight of the test item exceeds the amount that can be safely functioned at the CRANE test facilities.

Information pertaining to the operations conducted at Demolition Range are found as **Exhibit V.A-1**. The DR/ORR unit is located as shown in **Exhibit V.B-1**. DR/ORR units are detailed in **Exhibit V.B-7**.

Ammunition or explosives to be destroyed by detonation are usually placed in evacuated, earthen pits 0-9 feet deep. The depth of a hole is based on encasement of the munitions item & fragmentation range. Items are placed in these pits in a position that exposes the largest surface area to the influence of the initiating explosive charge. An adequate number of detonating blocks are placed in the donor material which is in intimate contact with the items to be detonated.

The detonating blocks are primed with detonating cords, and the pits are covered with 0-9 feet of earth. The earthen cover provides a muffling of the sound, blast effects, and reduction of fragmentation. Detonation is performed remotely using dual non-electrical initiation devices.

A one-time treatment (surface detonation) of out-of-date, and potentially unstable laboratory chemicals was conducted at the demolition in June/July 2012 by the activities EOD detachment. The chemicals contained peroxide forming compounds, and presented a potential explosion hazard for laboratory personnel. Exhibit V.D-8 provides the list and quantities of chemicals to be treated, hazardous waste codes, and EOD standard operating procedures describing how the treatment will be conducted. Upon closure, extensive sampling and analysis will be conducted to determine the area and extent of contamination. A detailed closure plan will then be developed and submitted as described in Section Ib-1(a).

The existing OD unit consists of 70 subunits (pits). The demolition range where these pits are located is approximately 2,500 feet in length and 1,000 feet in width. Each pit measures approximately 12' (Width) x 12' (Length) x 10' (Diameter). The materials to be detonated are typically palletized (unitized), packed into open top drums, banded to pallets and placed into the pits by use of all-terrain forklifts. The lid is placed back on the drum after it is packed with the item to be detonated.

The existing OD unit was placed in operation during the 1940's. The OD unit is located as shown in **Exhibit V.B-1**.

Quantities of explosives detonated per pit vary depending on atmospheric conditions and the explosive item being treated. Generally, 500 pounds per pit are detonated between late spring and early fall, 250 pounds per pit are detonated between early fall and late spring. During peak operational summer months, a minimum of nine feet of earthen cover is required to provide adequate noise attenuation. Once the range has been loaded, the area supervisor assures all personnel have been cleared from the range. The supervisor and two other employees remain to initiate the time fuzes. All personnel assemble at a safe distance and independently count the number of detonations. After detonations, the supervisor tours the range to assure all units have fired and no unsafe conditions have resulted. As a result of the supervisor's verification, range personnel are allowed to again enter the area, police up metal fragmentation and prepare pits for reloading the next round of shots. Any scrap metal retrieved from the range is "flashed" or exposed to fire in pans at the ORR to assure no explosive contamination remains prior to being excessed as scrap metal.

The demolition range ceases operation when the soil is frozen or extremely wet. The maximum amount of material treated per week (7 days) is 385,000 pounds. On average, the amount of material treated would be 87,500 pounds per week (5 days). A more detailed description of the waste is provided in the section of this permit application entitled Chemical and Physical Analysis of the Hazardous Waste (Section C).

D-8Ca.1 c. Physical Characteristics, Materials of Construction, and Dimension of the Unit

This information is provided in Section D-8Ca.

D-8Ca.2 Engineering Plan and Drawing of the OD Unit

There are no engineering plans or specifications other than those described in Section D-8Ca available for the open detonation area.

D-8Cb Ash/Residue Management

Ash/residue management practices are described in Section D-8Ca. Since there is no ash generated, these management practices are limited to picking up fragments that did not get consumed.

D-8Cc Runon/Runoff Management Devices

Location of the dry dams and sedimentation ponds at the DR are shown on **Exhibit V.B-7**. The current NPDES permit allows discharge limits as follows for the four sedimentation ponds located around the DR:

- Flow -- measure 2x/month
- Total Suspended Solids -- measure 2x/month -- report results
- Total Settleable Solids -- measure 2x/month -- daily
  - Monthly Average: 35 mg/l -- Report
  - Daily Maximum: 70 mg/l -- Report
- pH -- measure 2x/month -- maintain 6.0 - 9.0

One of the problems encountered at the DR and ABG is soil erosion. These areas are very susceptible to erosion because of the Army and Navy safety regulations that require the area around burning/detonation operations to be devoid of vegetation. The sedimentation ponds and dry dams were built at the DR to help control the erosion by trapping the sediment that was being carried off-site by runoff which was beginning to impact Turkey Creek and Boggs Creek. The dry dams serve as the primary sediment trap with the ponds serving as the secondary sediment trap. The sediment trapped in the dry dams can be removed by CRANE personnel by using heavy equipment and spreading the sediment back on the DR.

D-8Cd Copy of SOP

This information is provided in Section D-8Ak.

D-8d Environmental Performance Standards for Miscellaneous Units

Documentation that the design and operation of OB/OD units is sufficient to protect human health and the environment is provided in the Current Contamination Conditions Risk Assessment &Air Emissions Health Risk Assessment.

In order to demonstrate protection of public health from lead (Pb) emissions from operations at the Ammunition Burning Grounds, CRANE conducted monthly ambient monitoring for lead from July 2003 to July 2006. The monitoring was performed using U.S. EPA approved methods, procedures, and quality assurance programs. Two monitoring sites were established near the two closest populous locations along the prevailing annual wind direction. An additional monitoring site was established on-base to provide background samples. The results of the monitoring resulted in 36 consecutive months of compliant lead levels at the three sampling sites. The data is available at CRANE, and was also submitted to the IDEM Office of Air Quality.

The following treatment table is submitted to support the proposed waste treatment rates:

			Treatment Quantity (lbs NEW)	
Treatment Unit	**Reactive Materials**	**SOP Limit Per Event**	**24 Hours**	**Annual**
3a-ABG	Propellants	15,000	75,000	7,000,000
3b-ABG	Explosives	5,000	25,000	2,310,000
3c-ABG	Production Scrap	15,000	75,000	7,000,000
4-ABG	Explosive Residue in Flammable Liquids	200	250	22,400
5-ABG	Contaminated Flammable Liquids	200	2,315	22,400
6-ABG	Red Phosphorus	800	1,600	89,600
7-ABG	Pyrotechnics	100	400	11,200
8-ABG	Black Powder Slurry	125	250	14,000
9-ABG	Contaminated Waste Materials	200	200	22,400
10-ABG	Contaminated Sludges	2,000	2,000	112,000
11-ABG	Red Phosphorus Sludge	200	200	11,200
12-ABG	Pyrotechnics Fuses & Small Items	300	300	16,800
13-ABG	Explosives & Pyrotechnics	50,000	50,000	1,400,000
3a-ORR	Yellow D	1,500	6,000	120,000
3b-ORR	Projectile Bodies	9,000	8,000	180,000
3-DR	Explosive Materials	55,000	55,000	5,500,000

D-8e Monitoring, Analysis, Inspection, Response, Reporting, and Corrective Action

The information required by 40 CFR 264.602 is addressed in the following:

a. General inspection requirements: Section V.F-2.a, V.F-2.b, Section O.F-2
b. Testing and maintenance of equipment: Section V.F-2a, V.F-2b, Section O.F-2
c. Additional reports: Supplement G, Section G-8
d. Corrective Action: Section V.J

Biennial reports: A biennial report shall be submitted covering facility activities from the previous calendar year, and will be submitted to the Regional Administrator by March 1 of each even-numbered year.

Unmanifested waste report: If CRANE accepts for treatment, storage, or disposal of any waste from an off-site source without an accompanying manifest and the waste is not excluded from the manifest requirement, then CRANE must prepare and submit an unmanifested waste report to the Regional Administrator within 15-days after receiving the waste.

D-9 Boilers and Industrial Furnaces (BIFs)

This section does not apply to the OB/OD operations.

D-10 Containment Buildings

This section does not apply to the OB/OD operations.

E. GROUND WATER MONITORING

Ground water monitoring for the OB/OD activities is conducted in accordance with the CRANE Ground Water Monitoring Plan (GWMP), which is maintained as a separate document. The original plan was approved as part of the initial Subpart X permit; the plan is now incorporated by reference. Maintaining this plan as a separate document facilitates reasonable changes to the plan.

Pertinent summary facts from the complete ground water monitoring plan are provided in the regulatory sections below, which provides a cross reference to sections and tables in the GWMP.

E-1 Exemption from Ground Water Protection Requirements

If a waiver from Subpart F ground water monitoring requirements is requested [under 40 CFR 270.14(c)], the owner or operator must demonstrate that one of the following applies to the facility. No such exemption is requested for CRANE operations.

E-1a Waste Piles

REQUIREMENT [40 CFR 270.18(B), 264.90(B)(2) AND (5)]	DISPOSITION
Demonstrate that the waste pile is designed and operated to meet the conditions specified in Sections D-3b(1), D-3b(2), or D-3l	Not applicable

E-1b Landfill

REQUIREMENT [40 CFR 264.90(B)(2)]	DISPOSITION
Demonstrate that the landfill is designed and operated to meet the conditions specified in Section D-6b(4)	Not applicable

E-1c No Migration

REQUIREMENT [40 CFR 264.90(B)(4)]	DISPOSITION
Demonstrate that there is no potential for migration of liquid from a regulated unit to the uppermost aquifer during the active life of the requested unit (including the closure period) and the post-closure care period. (Predictions must be based on assumptions that maximize the rate of liquid migration). The demonstration must be certified by a qualified geologist or geotechnical engineer.	Not applicable

E-2 Interim Status Ground Water Monitoring Data

CRANE is no longer under interim status monitoring; therefore, Section E-2 does not apply.

E-2a Description of Wells

REQUIREMENT [40 CFR 265.91]	DISPOSITION
A copy of the topographic map provided for Section 270.14(b) on which the location and identification on each interim status monitoring well is indicated	Not applicable
An indication of which wells are downgradient of the disposal area, and which are upgradient.	Not applicable
Details of the design and construction of each interim status monitoring well (e.g., screen and casing depths, water levels at time of drilling, any water level changes within 24 hours, filter pack and sealing materials placement, dates of construction, boring logs, etc.)	Not applicable

E-2b Description of Sampling/Analysis Procedures

REQUIREMENT [40 CFR 265.92]	DISPOSITION
A copy of the facility's ground water sampling and analysis plan [required under §265.92(a)] that includes the procedures used and the protocol followed in: • sample collection, • sample preservation and shipment, • analytical procedures, • chain-of-custody.	Not applicable
Provide a complete Quality Assurance Project Plan (QAPjP) for the ground water sampling and analysis plan. Guidelines for developing the QAPjP are found in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846), Chapter One.	Not applicable

E-2c Monitoring Data

REQUIREMENT [40 CFR 265.92]	DISPOSITION
Provide all interim status monitoring results, including the following:	
Copies of each quarterly (from first year) analytical results for each well	Not applicable
Copies of subsequent (annual or semi-annual) analytical results for each well	Not applicable
Copies of any notifications of significant change in analysis parameters made to the Regional Administrator (or State Director) pursuant to 265.93	Not applicable
Results of ground water surface elevation measurements for each sampling event	Not applicable
Calculations of the initial background arithmetic mean and variance for each indicator parameter based on replicated measurements from upgradient wells during the first year	Not applicable

E-2d Statistical Procedure

REQUIREMENT [40 CFR 265.93]	DISPOSITION
Provide information relating to statistical procedures, including the following:	
A description of the statistical procedures used (if applicable) in processing the data submitted (as in the use of a Student's t-test and the level of significance used)	Not applicable
Results of statistical comparison between upgradient and downgradient well sampling results and first year background values for each indicator parameter	Not applicable

E-2e Ground Water Assessment Plan

REQUIREMENT [40 CFR 265.93(D)(2)]	DISPOSITION
If required, based on statistical comparison results, provide the specific plan for a ground water quality assessment program along with results from implementation of the plan. Where required, include results of the following determinations made under the ground water quality assessment (considering at a minimum, the hazardous constituents listed in Appendix VIII to 40 CFR 261):	
Whether hazardous waste or hazardous waste constituents have entered the ground water	Not applicable
The rate and extent of migration of hazardous waste or hazardous waste	Not applicable

constituents in the ground water	
The concentrations of hazardous waste or hazardous waste constituents in the ground water	Not applicable

E-3 General Hydrogeologic Information

REQUIREMENT [40 CFR 270.14(C)(2)]	DISPOSITION
Identify the uppermost aquifer and any hydraulically interconnected underlying aquifers (i.e., all likely subsurface flow paths for hazardous constituents that may leak from the facility), and describe their hydrogeologic properties (e.g., hydraulic gradient, ground water flow, rate and direction); provide the supporting data used to identify this information (i.e., the information obtained from hydrogeologic investigations of the facility area). This identification must include a report written by a qualified hydrogeologist on the hydrogeologic characteristics of the facility property supported by at least the drilling logs of on-site borings and wells and the available professional literature. Include a description of the regional geologic and hydrogeologic setting. In addition, include the following site-specific data:	GWMP 3.1.4 p. 3-6, GWMP 3.2.4.1– ABG p. 3-12, GWMP 3.2.4.2 –ABG p. 3-15, GWMP 3.3.4.1 – DR p. 3-24, GWMP 3.3.4.2 – DR p. 3-26, GWMP 3.4.4.1 – ORR p. 3-31, GWMP 3.4.4.2– ORR p. 3-32, Figure 3-15, Table 3-2, Table 3-4, Ref. GWMP Sect. p. 3-1, Sect. 3 p. 3-1
An analysis of topographic or geomorphic features that might influence the ground water flow system	GWMP 3.1.1 p. 3-2, GWMP 3.1.2 p. 3-2, GWMP 3.1.3.3 p. 3-6, GWMP 3.2.1 p. 3-7, GWMP 3.3.1 p. 3-22, GWMP 3.4.1 p. 3-28, Figure 3-1
A classification and description of the hydrogeologic properties (hydraulic conductivity, porosity, texture, thickness, etc.) of all of the hydrogeologic units found at the site (i.e., the aquifers and any intervening saturated and unsaturated units)	GWMP Table 3-2, GWMP Table 3-4
Using the §270.14(b)(19) topographic map as a base, isopach and structural contour maps and/or geologic cross sections showing the extent of the hydrogeologic units contained in the uppermost aquifer, and any intervening aquitards or other units within the facility boundary	Figure 3-5, Figure 3-10, Figure 3-11, Figure 3-12, Figure 3-13, Figure 3-14, Figure 3-16, Figure 3-18, Figure 3-19, Figure 3-20, Figure 3-21, Figure 3-22, Figure 3-23, Figure 3-24, Figure 3-25, Figure 3-26, Figure 3-27
A description of the field methods used in the study, and a summary of which data were collected by each method	GWMP Sect. 3.2.4.3, Page 3-1

E-4 Topographic Map Requirements

REQUIREMENT [40 CFR 270.14(C)(2), (3), (4)(I)]	DISPOSITION
Unless exempt from ground water monitoring requirements, surface impoundments, waste piles, land treatment, and landfill facilities must include the following information on the topographic map:	
Ground water flow direction and rate (isometric graph)	GWMP Figures 7-1, 7-2
Point of compliance	GWMP Figure 7-2
Ground water monitoring wells	GWMP Figure 7-1 ABG, Figure 8-1 ORR, Figure 9-1 DR
The extent of any plume (horizontal and vertical)	GWMP Sect. 5 p. 5-1
Hazardous waste management area	GWMP Figures 7-1, 3-17
Property boundary	GWMP Figure 3-3
The following required information may be incorporated into the topographic map if possible, or at least should be discussed in the text:	
Boundaries of uppermost aquifer and Underlying interconnect between uppermost aquifer and lower aquifer	GWMP Sect. 3.2.4.1 p.3-12, Sect.3.2.4.6 p.3-19, Sect.. 3.3.4.1 p.3-24, Sect. 3.4.4.2 p.3-32

(Although many of these items can be shown on a single map, it is allowable to use additional maps to display some of the information. Presentation of all of this information on a single map may sacrifice clarity.)

E-5 Containment Plume Description

REQUIREMENT [40 CFR 270.14(C), (2), (4) AND (7)(II); PART 261, APPENDIX VIII]	DISPOSITION
For existing facilities suspected of contaminating ground water, provide a description of any plume of contamination that has entered the ground water from a regulated unit at the time the application is submitted that:	
• Delineates the extent of the plume on the topographic map of §270.14(b)(19); • Identifies the concentration of each constituent listed in Appendix VIII of Part 261 throughout the plume or identifies the maximum concentrations of each Appendix VIII constituent in the plume; and • Delineates the vertical extent of the plume in cross section.	GWMP Sect. 5.1.1 p.5-1, Sect. 5.1.2 p.5-2, Sect. 5.1.3 p.5-4, Sect.5.2 p.5-7

This requirement is applicable to all existing facilities where interim status monitoring shows the presence of hazardous constituents downgradient from the regulated units, unless it can be proven that such

constituents are coming from another source. In addition, this requirement may be applied to other existing facilities where interim status monitoring data are non-existent or deficient if these facilities are suspected of contaminating ground water, or if the Regional Administrator determines that a facility's interim status monitoring program is incapable of determining whether hazardous constituents have entered the ground water from a regulated unit.

NOTE: In some cases, contaminant plumes may be defined under ground water quality assessment programs carried out during the interim status period as required by §265.93(d). Normally, such assessment programs do not address the complete list of Appendix VIII constituents as required under §270.14(c)(4). Additional monitoring will be required to identify the concentration of each Appendix VIII constituent in the plume.

E-6 General Monitoring Program Requirements

Each ground water monitoring plan must contain some general monitoring requirements such as detailed plans and an engineering report describing the proposed ground water monitoring program to meet these general ground water monitoring requirements. The following subsections list the information is required and their locations within CRANE's Ground Water Monitoring Plan:

E-6a Description of Wells

REQUIREMENT [40 CFR 264.97(A), (B), (C)]	DISPOSITION
Number of wells	GWMP Sect. 6.2.1 p.6-2, Sect. 6.2.2 p.6-2, Sect. 6.2.3 p.6-3, Sect. 6.2.4 p.6-3, FSP Sect. 3.2.1 p.3-1, Sect. 3.2.2 p.3-2
Locations	GWMP Tables 3-1, 3-3
Depths	GWMP Tables 3-1, 3-3
Materials of construction (casing, screens, etc.)	GWMP Sect. 6.2 p. 6-2, Sect. 6.2.1 p.6-2, Sect. 6.2.2 p.6-2, Sect. 6.2.3 p.6-3, FSP Sect. 3.2.2 p.3-2, Sect. 3.2.1 p.3-1
Assurance of unaffected background ground water measurement	FSP 4.2.2 p. 4-3, GWMP Figures 3-14, 3-23, 3-27, 7-1
Assurance of compliance point ground water measurement	FSP 4.2.2 p.4-3, GWMP Figures 3-14, 3-23, 3-27, 7-1

E-6b Description of Sampling/Analysis Procedures

REQUIREMENT [40 CFR 264.97(D), (E), (F)]	DISPOSITION
Sample collection methods	FSP Sect.4.2.5 p.4-3, 4.2.6 p.4-4, SOP 5, SOP 6, QAPP Sect. 4 p.4-1
Sample preservation/shipment	FSP Sect. 4.2.11 p.4-5, SOP 10, QAPP Sect. 5 p.5-1
Analytical procedures	QAPP Sect. 7.2 p.7-1, Laboratory SOPs
Chain-of-custody	FSP Sect 4.2.12 p.4-5, SOP 11, QAPP Sect. 5 p.5-1

Documentation of proper sampling and analysis procedures	QAPP Sect. 4 p.4-1
Procedure for determination of ground water elevation with each sample	FSP Sect. 4.2.2, SOP 2
Provide a complete Quality Assurance Project Plan (QAPjP) for the ground water sampling and analysis plan. Guidelines for developing the QAPjP are found in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846), Chapter One	QAPP provided

E-6c Procedures for Establishing Background Quality

REQUIREMENT [40 CFR 264.97(A)(1), (G)]	DISPOSITION
Ground water samples must be representative of background quality not affected by releases from the regulated unit.	Background monitoring wells were selected based upon ground water flow directions within each respective aquifer so as to not be affected by releases from the corresponding unit.
Background ground water quality must be established for each monitoring parameter or constituent.	Background ground water quality was established during the first four rounds of sampling. Background ground water samples are taken as part of the ongoing monitoring and statistical comparisons are made to downgradient wells. [GWMP Sect. 10]
Procedures for establishing background quality may include wells not hydraulically upgradient of the waste management area where: • upgradient cannot be determined due to hydrogeologic conditions, • other wells provide background ground water quality that is representative or more representative of background than upgradient wells	GWMP Sect. 1.3.1.1 p.1-6, Sect. 6.1 p.6-1

E-6d Statistical Procedures

REQUIREMENT [40 CFR 264.97(H); (I)(1), (5) AND (6)]	DISPOSITION
Provide a description of the statistical procedures that will be used in evaluating ground water monitoring data. The following statistical methods [E-6d(1) - (5)] have been approved by IDEM for use in evaluating ground water monitoring data for each hazardous constituent. The description provided must demonstrate compliance with the following performance standards:	
Testing should be conducted separately from each hazardous	GWMP Sect 10.4 p. 10-13

constituent in each well	
Method should be appropriate for distribution of chemical parameters or hazardous constituents. More than one method may be needed if distributions differ	GWMP Sect. 10.1 p. 10-1
Method must account for data below the detection limit	GWMP Sect. 10.2 p.10-2
Any practical quantification limit (PQL) used in the method shall be the lowest concentration level within levels of precision and accuracy for routine lab operations	GWMP Sect. 10.2 p.10-2
Method shall include procedures to control or correct for seasonal and spatial variability and temporal correlation in data	NA

E-6d(1) Parametric Analysis of Variance (ANOVA)

REQUIREMENT [40 CFR 264.97(H)(1), (I)(2)]	DISPOSITION
ANOVA followed by multiple comparisons procedures:	
Include estimation and testing of contrasts between each compliance well's mean and the background mean levels for each constituent	GWMP Sect. 10.3.1.4 p.10-8
If using individual well comparison procedure, Type 1 error level of no less than 0.01 shall be maintained. If using multiple comparison procedure, Type 1 error level no less than 0.05 for each testing period must be used	GWMP Sect. 10.3.1.4 p.10-8

E-6d(2) Non-parametric ANOVA (Based on Ranks)

REQUIREMENT [40 CFR 264.97(H)(2), (I)(2)]	DISPOSITION
ANOVA based on Ranks followed by multiple comparison procedures:	
Estimation and testing of each compliance well's median and background median levels for each constituent	GWMP Sect. 10.3.2 p.10-11
If using individual well comparison procedures, Type 1 error level of no less than 0.01 shall be maintained. If using multiple comparison procedure, Type 1 error level no less than 0.05 for each testing period must be used	GWMP Sect. 10.3.2 p.10-11

E-6d(3) Tolerance or Predication Interval Procedure

REQUIREMENT [40 CFR 264.97(H)(3), (I)(4)]	DISPOSITION
Establish interval for each constituent based on distribution of background data	Not Applicable
Compare level of each constituent in each compliance well to the upper tolerance or prediction limit	Not Applicable

Prepare levels of confidence and/or percentage of the population that the interval must contain considering number of samples in the background data base, data distribution, and range of concentration values for each constituent of concern	Not Applicable

E-6d(4) Control Chart Approach

REQUIREMENT [40 CFR 264.97(H)(4), (I)(3)]	DISPOSITION
Control limits for each constituent	Not Applicable
Specify type of control chart and associated parameter values	Not Applicable

E-6d(5) Alternative Approach

REQUIREMENT [40 CFR 264.97(H)(5), (I)]	DISPOSITION
An alternative approach can be proposed that complies with all performance standards set in 264.97(i)	Not Applicable

E-7 Detection Monitoring Program

REQUIREMENT [40 CFR 270.14(C)(6), 264.91(A)(4), 264.98]	DISPOSITION
Provide sufficient information, supporting data, and analysis documenting the absence of hazardous constituents in the ground water to support the implementation of a detection monitoring program at the present time	GWMP Sect 9.1 p.9-1

E-7a Indicator Parameters, Waste Constituents, Reaction Products to be Monitored

REQUIREMENT [40 CFR 270.14(C)(6)(I), 264.98(A)]	DISPOSITION
Supply a list of indicator parameters, waste constituents, or reaction products that can provide a reliable indication of the presence of hazardous constituents in the ground water. Provide the following information:	
Type, quantity, and concentrations of constituents expected in wastes managed at the regulated unit(s)	OB/OD Permit Table C-1, Title V Quantity Reports for OB/OD Operations at CRANE
Mobility, stability, persistence of waste constituents, or their reaction products, expected in the unsaturated zone	GWMP Sect 9.1 p.9-1
Detectability of indicator parameters, waste constituents, or their reaction products in the ground water (including the expected method detection limits (MDLs) or practical quantitation limits (PQLs))	GWMP Table 1-2

Concentrations or values and coefficients of variation of proposed parameters in the background ground water	GWMP Sect. 10.3.1.4 p.10-8

E-7b Ground Water Monitoring System

REQUIREMENT [40 CFR 270.14(C)(6)(II), 264.97(A)(2), (B), (C); 264.98(B)]	DISPOSITION
Describe the individual elements of the monitoring system to be used during detection monitoring. Identify the number, location, and depth of each well, and describe the well construction materials	FSP Table 3-1, Sect 3.2.2 p.3-2

E-7c Background Ground Water Concentration Values for Proposed Parameters

REQUIREMENT [40 CFR 270.14(C)(6)(III), 264.98(C), 264.97(G)(1), (2)]	DISPOSITION
Demonstrate that the following procedures will be used:	
Use of appropriate ground water monitoring system, to establish background specifying number and type of samples for each hazardous constituent appropriate for the statistical test employed	GWMP Sect 9.1 p.9-1
Sampling procedure shall be a sequence of at least four samples from each well in the entire system at an interval assuring an independent sample relative to the uppermost aquifer's effective porosity, hydraulic conductivity, hydraulic gradient and fate and transport characteristics of the potential contaminants but at least semi-annually	GWMP Sect. 9.1 p.9-1
Alternative sampling procedure to be approved by the Regional Administrator	Not applicable

E-7d Proposed Sampling and Analysis Procedures

REQUIREMENT [40 CFR 270.14(C)(6)(IV); 264.97(F); 264.98(D), (E), (F)]	DISPOSITION
Provide a description of the proposed sampling and analysis procedures, including the following information:	
Documentation of proper sampling and analysis procedures	QAPP Sect. 4 p.4-1, Sect. 7 p.7-1, SOP 5 & 6, Laboratory SOPs
Procedures for determining ground water elevation	FSP Sect. 4.2.2 p.4-3, SOP 2
Procedures for determining statistically significant increase for any monitored parameter	GWMP Sect. 10.1 p.10-1
At least four samples from each compliance and background well semi-annually	GWMP Sect. 9.1 p.9-2
Procedure for annual determination of uppermost aquifer flow rate and direction	GWMP Appendix 6-1

Provide a complete Quality Assurance Project Plan (QAPjP) for the ground water sampling and analysis plan of the detection monitoring program. Guidelines for developing the QAPjP are found in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846), Chapter One	QAPP provided

E-7e Statistically Significant Increase in Any Constituent or Parameter Identified at Any Compliance Point Monitoring Well

REQUIREMENT [40 CFR 264.98(G), 264, APPENDIX IX]	DISPOSITION
Document that the following procedures will be implemented if there is statistically significant evidence of contamination for any constituent or parameter is at any compliance point monitoring well:	
Notify Regional Administrator of this finding in writing within seven (7) days	GWMP Sect. 1.3.1.3 p.1-6, Sect. 9.1 p.9-3
Immediately sample all wells for Appendix IX list (Part 264) constituents, and if necessary, resample within one month and repeat analysis for the those compounds detected	GWMP Sect. 1.3.1.2 p.1-6, Sect 9.1 p.9-1
Submit a compliance monitoring plan meeting the requirements of §264.99 within 90 days	GWMP Sect. 1.3.1.2 p.1-6, Sect. 9.1 p.9-1
Submit engineering feasibility plan within 180 days for a corrective action program unless all constituents identified are listed in §264.94 Table 1 and their concentrations do not exceed respective values in that table or ACLs have been approved	GWMP Sect. 1.4 p.1-11, Sect. 9.1 p.-9-1
If appropriate, submit a demonstration that a source other than the regulated unit caused the contamination	GWMP Sect. 1.3.1.5 p.1-7

E-8 Compliance Monitoring Program

If the presence of hazardous constituents has been detected in the ground water at the point of compliance at the time of permit application, a compliance monitoring program must be established through submittal of the information in the following subsections. Citations for the locations of such information in the Ground Water Monitoring Plan are provided with each requirement.

E-8a Description of Monitoring Program

REQUIREMENT	DISPOSITION
Description of ground water monitoring program	GWMP Sect. 1.1.1 p.1-2, Sect. 1.1.2 p.1-3, Sect 7.1 p.7-1, Sect. 7.3 p.7-4, Sect. 8.1 p.8-1, Sect. 8.3 p.8-3, Table 7-1 & 8-1.

E-8a(1) Waste Description

REQUIREMENT [40 CFR 270.14(C)(7)(I)]	DISPOSITION
Provide description of the wastes previously handled at the facility. This description must include:	
• Historical records of volumes, types (including EPA ID number, if applicable), and chemical composite of wastes placed in units in the waste management area; • The results of any direct sampling of the waste (see "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods," SW-846); • A list of constituents that are reasonably expected to be in or derived from the waste; and • Identification of dominant constituents expected to be present, and their relative abundance.	OB/OD Permit Table C-1, Title V Quantity Reports for OB/OD Operations at Crane
If it is expected that some constituents may form a separate, immiscible fluid, the composition of this fluid and its viscosity and density must be included in the application	Not applicable

E-8a(2) Characterization of Contaminated Ground Water

REQUIREMENT [40 CFR 270.14(C)(7)(II)]	DISPOSITION
Provide a characterization of the contaminated ground water including the concentration of identified hazardous constituents. For each well at the point of compliance, and for each background well, provide the following information:	
Concentrations of each constituent in Appendix VIII of 40 CFR 261	GWMP Sect 1.5 p.1-11, Annual GW Report 2004
Concentrations of major anions and cations	GWMP Sect. 7.1 p.7-1, Annual GW Report 2004
Concentrations of the constituents listed in Table 1 of §264.94, if not already determined by the above	Annual GW Report 2004 Summary Tables

E-8a(3) Hazardous Constituents to be Monitored in Compliance Program

REQUIREMENT [40 CFR 270.14(C)(7)(III), 264.99(A)(1), 264.98(G)(3)]	DISPOSITION
Specify the hazardous constituents for which the owner/operator to monitor and present a rationale for selecting these constituents	GWMP Sect. 1.5 p.1-11, Sect. 7.2 p.7-4, Sect. 8.2 p.8-2
The owner/operator may resample within one month and repeat analysis for constituents detected. Constituents identified in both analyses will	Noted

form basis for compliance monitoring plan	

E-8a(4) Concentration Limits

REQUIREMENT [40 CFR 270.14(C)(7)(IV), 264.99(A)(2), (C)(3); 264.94; 264.97(G), (H)]	DISPOSITION
Specify proposed concentration limits for each hazardous constituent. (The proposed concentration limit must not exceed the value of that constituent, listed in Table 1 of §264.94, entitled Maximum Concentration of Constituents for Ground Water Protection or the present background level of that constituent in the ground water; whatever is greater. If petitioning the Regional Administrator to establish alternate concentration limits, the owner/operator must supply the information identified in comment E-8a(5).) Specify conditions warranting special sampling procedures.	GWMP Tables 1-2, 7-3, 8-3
Describe procedures for establishing background concentration values for constituents that are based on:	
Use of any appropriate ground water monitoring system	FSP Sect. 4.2 p.4-2, Sect. 4.2.1 p.4-2, Sect. 4.2.2 p.4-3, Sect. 4.2.5 p.4-3
Data that are available prior to permit issuance	SAIC Annual GW Report 2004, GWMP Sect. 7.3, 8.3
Data that accounts for measurement errors in sampling and analysis	QAPP Sect. 4 p.4-1
Data that accounts for seasonal ground water quality fluctuations	GWMP Sect. 7.1 p.7-1, Sect 8.1 p.8-1
Data from a minimum of four samples per well collected at least semi-annually during the compliance period	GWMP Sect. 7.3 p.7-5, Sect. 8.3 p.8-3

E-8a(5) Alternate Concentration Limits

REQUIREMENT [40 CFR 270.14(C)(7)(IV), 264.99(A)(2), 264.94(B)]	DISPOSITION
Provide a justification for establishing alternate concentration limits. This justification must address each of the following factors	GWMP Sect. 7.3 p.7-5, Sect. 8.3 p.8-3

E-8a(5)(i) Adverse Effects on Ground Water Quality

REQUIREMENT [40 CFR 264.94(B)(L)]	DISPOSITION
The potential adverse effects on ground water quality, considering:	
The physical and chemical characteristics of the waste in the regulated unit, including its potential for migration	Not applicable
The hydrogeological characteristics of the facility and surrounding land	Not applicable

The quantity of ground water and the direction of ground water flow	Not applicable
The current and future uses of ground water in the area	Not applicable
The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground water quality	Not applicable
The potential for health risks caused by human exposure or wastes constituents	Not applicable
The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents	Not applicable
The persistence and permanence of the potential adverse effects	Not applicable

E-8a(5)(ii) Potential Adverse Effects

REQUIREMENT [40 CFR 264.94(B)(2)]	DISPOSITION
The potential adverse effects on hydraulically-connected surface-water quality, considering:	
The volume and physical and chemical characteristics of the waste in the regulated unit	Not applicable
The hydrogeological characteristics of the facility and surrounding land	Not applicable
The quantity and quality of ground water, and the direction of ground water flow	Not applicable
The proximity of the regulated unit to surface waters	Not applicable
The current and future uses of surface waters in the area and any water quality standards established for those surface waters	Not applicable
The existing quality of surface water, including other sources of contamination and the cumulative impact on surface-water quality	Not applicable
The potential for health risks caused by human exposure to waste constituents	Not applicable
The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents	Not applicable
The persistence and permanence of the potential adverse effects	Not applicable

E-8a(6) Engineering Report Describing Ground Water Monitoring System

REQUIREMENT [40 CFR 270.14(C)(7)(V), 264.95, 264.97(A)(2) AND (C), AND 264.99(B)]	DISPOSITION
Provide detailed plans and an engineering report discussing the individual elements of the monitoring system to be used during compliance monitoring. The plans should identify the number, location, and depth of each well, and describe the casing and construction	GWMP Sect. 6.2.1p.6-2, Sect. 6.2.2 p.6-2,Sect 6.2.3 p.6-3, 6.2.4 p.6-3, Tables 3-1, 3-3, FSP Sect. 3.2.1 p.3-1,

materials of wells.	Sect 3.2.2 p.3-2
Provide details supporting the representative nature of the ground water quality at (1) background monitoring points and (2) the compliance monitoring point.	GWMP Sect. 3 Reference Section p.3-1, QAPP Sect 1.4.2.2 p.1-31, GWMP Sect. 5.0 p.5-1,GWMP Sect.7 Figures 7-3 through 7-6

E-8a(7) Proposed Sampling and Statistical Analysis Procedures for Ground Water Data

REQUIREMENT [40 CFR 270.14(C)(7)(VI), 264.97(D), (E), (F). 264.99(C), (D), (E), (F) , AND (G)]	DISPOSITION
Provide the following information regarding proposed sampling and statistical analysis procedures for ground water data:	GWMP Sect. 7.3 p.7-13, Sect. 8.2 p.8-1
Compliance period	GWMP Sect. 7.3 p.7-13. Sect. 8.2 p.8-1
Sample collection methods	FSP Sect. 4.2 p.4-3
Sample preservation/shipment	FSP Sect 4.2.11 p.4-5
Analytical procedures	GWMP Table 1-2, Laboratory SOPs
Chain-of-custody control	QAPP Sect. 5.1 p.5-1, Sect. 5.2 p.5-2, FSP Sect. 4.2.12 p.4-19
Documentation of proper sampling and analysis procedures	GWMP Sect. 1.2 p.1-4, Sect. 1.3.3 p.1-9, Sect. 1.3.4 p.1-10, Laboratory SOPs
Procedures for determining ground water elevation	FSP Sect. 4.2.2, SOP 2
Procedures for annual determination of uppermost aquifer flow rate and direction	GWMP Appendix 6-1
Annual testing procedures for Appendix IX constituents	Not applicable
Provide a description of procedures for determining a statistically significant increase for any monitored parameters or hazardous constituents, including the following:	
• Comparing compliance point using the procedures in §264.97(h) to the concentration limit developed in accordance with §264.94; and • Collecting at least four samples from each well (compliance and background) at least semi-annually.	GWMP Sect. 10.0 p.10-1, Sect. 10.1 p.10-1
Provide a complete Quality Assurance Project Plan (QAPjP) for the ground water sampling and analysis plan of the compliance monitoring program. Guidelines for developing the QAPjP are found in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846), Chapter One	QAPP provided

E-8a(8) Ground Water Protection Standard Exceeded at Compliance Point Monitoring Well

REQUIREMENT [40 CFR 264.99(H), (I)]	DISPOSITION
Indicate that one of the following procedures will be implemented if the ground water protection is exceeded at the compliance point monitoring well:	
Submit written notification to Regional Administrator	GWMP Sect. 1.3.2.1 p.1-8, Sect. 1.3.2.2 p.1-8
Submit an application for permit modification to establish a corrective action program meeting the requirements of 264.100 within 180 days, including details of the program to comply with the ground water protection standard and details of ground water monitoring to demonstrate effectiveness of the corrective action program	GWMP Sect. 1.3.2.3 p.1-8, Sect. 7.1 p.7-1, Sect 8.1 p.8-1
Submit demonstration that concentration limits were exceeded due to source other than regulated unit, or due to an error in sampling, analysis, statistical evaluation, or variation in the ground water	GWMP Sect. 1.3.2.4 p.1-9, Sect. 1.3.2.5 p.1-9, Sect. 1.3.2.6 p.1-9

E-9 Corrective Action Program

If hazardous constituents have been measured in the ground water that exceed the concentration limits established under §264.94 Table 1, or if ground water monitoring conducted at the time of permit application at the waste boundary indicates the presence of hazardous constituents from the facility in ground water over background concentrations, the owner or operator must submit sufficient information, supporting data, and analyses to establish a corrective action program that meets the requirements of §264.100 [40 CFR 270.14(c)(8), 264.100, 264.99(l)]. (However, an owner or operator is not required to submit information to establish a corrective action program if he demonstrates to the Regional Administrator that alternate concentration limits will protect human health and the environment after considering the criteria listed in §264.94(b).)

To address the requirement to submit the following information to establish a corrective action program, the various requirements are included in the GWMP at the cited sections:

E-9a Characterization of Contaminated Ground Water

REQUIREMENT [40 CFR 270.14(C)(8)(I)]	DISPOSITION
Provide a characterization of the contaminated ground water including the concentration of identified hazardous constituents. For each well at the point of compliance, and for each background well, provide the following information:	
Concentrations of each constituent in Appendix VIII of 40 CFR 261	GWMP Sect. 1.5 p.1-11, Annual GW Report Summary Tables 2004
Concentrations of major anions and cations	GWMP Sect. 7.1 p.7-1, Annual GW Report Summary

	Tables 2004
Concentrations of the constituents listed in Table 1 of §264.94, if not already determined by the above	Annual GW Report Summary Tables 2004

E-9b Concentration Limits

REQUIREMENT [40 CFR 270.14(C)(8)(II), 264.99(A)(2), 264.94(B)]	DISPOSITION
Specify proposed concentration limits for each hazardous constituent. (The proposed concentration limit must not exceed the present background level of that constituent in the ground water nor may it exceed the value of that constituent, if listed in Table 1 of §264.94, entitled Maximum Concentrations of Constituents for Ground Water Protection. If you wish to petition the Regional Administrator to establish alternate concentration limits than those specified above you must supply the information identified in comment E-9c.)	GWMP Table 1-2

E-9c Alternate Concentration Limits

REQUIREMENT [40 CFR 270.14(C)(8)(II), 264.99(A)(2), 264.94(B)]	DISPOSITION
Provide justification for establishing alternate concentration limits. This justification must address each of the following factors:	GWMP Sect. 7.4 p.7-8, Sect. 7.7 p.7-13, Sect. 8.4 p.8-4, Table 1-2

E-9c(1) Adverse Effects on Ground Water Quality

REQUIREMENT [40 CFR 264.94(B)(L)]	DISPOSITION
Potential adverse effects on ground water quality, considering all of the following:	
The physical and chemical characteristics of the waste in the regulated unit, including its potential for migration	GWMP Appendices D, E, F
The hydrogeological characteristics of the facility and surrounding land	GWMP Appendices D, E, F
The quantity of ground water and the direction of ground water flow	GWMP Appendices D, E, F
The proximity and withdrawal rates of ground water users	GWMP Appendices D, E, F
The current and future uses of ground water in the area	GWMP Appendices D, E, F
The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground water quality	GWMP Appendices D, E, F
The potential for health risks caused by human exposure or waste constituents	GWMP Appendices D, E, F
The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents	GWMP Appendices D, E, F

The persistence and permanence of the potential adverse effects	GWMP Appendices D, E, F

E-9c(2) Potential Adverse Effects

REQUIREMENT [40 CFR 264.94(B)(2)]	DISPOSITION
Potential adverse effects on hydraulically-connected surface-water quality; considering all of the following:	
The volume and physical and chemical characteristics of the waste in the regulated unit	GWMP Appendices D, E, F
The hydrogeological characteristics of the facility and surrounding land	GWMP Appendices D, E, F
The quantity and quality of ground water, and the direction of ground water flow	GWMP Appendices D, E, F
The patterns of rainfall in the region	GWMP Appendices D, E, F
The proximity of the regulated unit to surface waters	GWMP Appendices D, E, F
The current and future uses of surface waters in the area and any water quality standards established for those surface waters	GWMP Appendices D, E, F
The existing quality of surface water, including other sources of contamination and the cumulative impact on surface-water quality	GWMP Appendices D, E, F
The potential for health risks caused by human exposure to waste constituents	GWMP Appendices D, E, F
The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents	GWMP Appendices D, E, F
The persistence and permanence of the potential adverse effects	GWMP Appendices D, E, F

E-9d(1-9) Corrective Action Plan

A corrective action program must prevent hazardous constituents from exceeding their respective concentration limits at the compliance point, and between the compliance point and the downgradient facility property boundary.

REQUIREMENT [40 CFR 270.14(C)(8)(III), 264.100(B)]	DISPOSITION
Provide detailed plans and an engineering report on the corrective actions proposed for the facility. This information must include identification of the compliance point, a schedule for implementation for the corrective action measures, and the following:	GWMP Sect. 1.1.1 p.1-2, Sect. 1.3.1.3 p.1-6, Sect. 1.3.3 p.1-10, Sect. 7.4 p.7-8, Sect. 7.7 p.7-13, Sect. 8.4 p.8-4, CMP for ABG and ORR, 2006

SUBSECTION	REQUIREMENT
E-9d(1) Location	Maps showing the location of engineered barriers, caps, drains and wells, etc. (use the topographic map in

[40 CFR 270.14(c)(8)(iii), 264.100(b)]	Section B-2)
E-9d(2) Construction Detail [40 CFR 270.14(c)(8)(iii), 264.100(b)]	Description and engineering drawings of construction details and specifications for any proposed features to contain ground water or redirect its flow (e.g. engineering barriers, caps, drains, wells)
E-9d(3) Plans for Removing Wastes [40 CFR 270.14(c)(8)(iii), 264.100(b)]	If proposed, plans for removing and handling of any hazardous wastes
E-9d(4) Treatment Technologies [40 CFR 270.14(c)(8)(iii), 264.100(b)]	A description of the treatment technologies to be used for contaminated ground water that is pumped or drained from the zone of contamination
E-9d(5) Effectiveness of Correction Program [40 CFR 270.14(c)(8)(iv), 270.14(c)(8)(iii), 264.100(b)]	A prediction and sensitivity analysis on the effectiveness of corrective actions. (For example, anticipated drain flow rates, assuming a range of hydrogeological properties.)
E-9d(6) Rejection System [40 CFR 270.14(c)(8)(iii), 264.100(b)]	If treated ground or surface water is to be reinjected at the site, the concentration levels of all hazardous constituents to be reinjected
E-9d(7) Additional Hydrogeological Data [40 CFR 270.14(c)(8)(iii), 264.100(b)]	A description and summary of any additional hydrogeological data collected for use in designing the corrective action
E-9d(8) Operation and Maintenance [40 CFR 270.14(c)(8)(iii), 264.100(b)]	Operation and maintenance plans for the correction action measures
E-9d(9) Closure and Post-Closure Plans [40 CFR 270.14(c)(8)(iii), 264.100(b)]	If applicable, closure and post-closure care plans for the materials used to handle hazardous wastes as part of the corrective action

E-9e Ground Water Monitoring Program

REQUIREMENT [40 CFR 270.14(C)(8)(IV), 264.100(D)]	DISPOSITION
Provide a description of the ground water monitoring program that must be implemented to determine compliance with the concentration limits established under §264.94, and to determine the effectiveness of the corrective action program. Water quality monitoring must be conducted over the on-site extent of the contaminated ground water. Submit the information given in the following subsections:	

E-9e(1) Description of Monitoring System

REQUIREMENT [40 CFR 270.14(C)(7)(V), (8)]	DISPOSITION
Provide a description of all elements of the ground water monitoring system, including:	
Number of wells	GWMP Tables 7-1, 8-1

Locations	FSP Tables 3-1, 3-2, 3-4, Table 3-1
Depths and screened intervals	FSP Table 3-1
Casing descriptions	FSP Figures 3-5, 3-6
Other well construction details	FSP Sect. 3.2 p.3-1, Sect. 3.2.1 p.3-1Sect. 3.2.2 p.3-2
Description of how the ground water monitoring programs will demonstrate the adequacy of the corrective action	GWMP Sect. 7.4 p.7-8, Sect. 7.7 p.7-13, Sect. 8.4 p.8-4

E-9e(2) Description of Sampling and Analysis Procedures

REQUIREMENT [40 CFR 270.14(C)(7)(VI), (8)]	DISPOSITION
Provide a description of all sampling and analysis procedures, including:	
Sampling frequency	GWMP Tables 7-1, 8-1
Sampling collection	FSP Table 3-1, Figures 3-1, 3-2, 3-4
Sampling preservation and shipment	FSP Sect. 4.2.11 p.4-5, SOP 10
Analytical procedures	GWMP Table 1-2, Laboratory SOPs
Chain-of-custody control	FSP Sect. 4.2.12 p.4-5, QAPP Sect. 5.1, p.5-1, QAPP Sect. 5.2 p.5-2
Procedures for determining ground water elevations	FSP Sect. 4.2.2 p.4-3, SOP 2
Procedures for annual determination of ground water flow rate and direction	GWMP Appendix 6-1
Provide a complete Quality Assurance Project Plan (QAPjP) for the ground water sampling and analysis plan of the corrective action program. Guidelines for developing the QAPjP are found in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846), Chapter One	QAPP provided

E-9e(3) Monitoring Data and Statistical Analysis Procedures

REQUIREMENT [40 CFR 270.14(C)(7)(VI), (8)]	DISPOSITION
Provide a description of all monitoring data and statistical analysis procedures, including:	
Procedure for establishing background concentration levels	GWMP Sect. 10 p.10-1

Statistical procedures for comparing compliance point data to the concentration limits	GWMP Sect. 10 p.10-1
Statistical procedures for evaluating the effectiveness of the corrective action program between the compliance point and the property boundary	GWMP Sect. 10 p. 10-1

E-9e(4) Reporting Requirements

REQUIREMENT [40 CFR 264.100(G)]	DISPOSITION
Indicate that a semi-annual report will be submitted to the Regional Administrator evaluating the effectiveness of the corrective action program	GWMP Sect 7.4 p.7-8

F. PROCEDURES TO PREVENT HAZARDS

F-1 Security

F-1a Security Procedures and Equipment
F-1a(1) 24-Hour Surveillance System

CRANE is a DOD-controlled access installation. Physical security is maintained 24 (twenty-four) hours per day, 7 (seven) days per week. The size of the force is large enough to fulfill DOD requirements for an installation of this size and sensitive nature.

Being a closed installation means that CRANE is not open to the General Public, except when specifically allowed by the Commanding Officer, and then only in areas specifically designated by the Commanding Officer.

All areas described and discussed within this Permit Application have been officially designated as "Restricted Areas" by direction of the Commanding Officer. This is to ensure that no one will be allowed unaccompanied access to these areas.

CRANE Police/Guard division will check the facility entry points (gates) more than 2 (two) times during closed hours, from 1600 to 0600. On weekends and holidays, entry points and barriers will be checked 6 (six) to 8 (eight) times per 24 (twenty-four) hour period. Police/Guard patrols are armed and equipped with two-way radios and are in constant contact with police/fire communication centers.

As previously stated, the security patrol will check to ensure that gates and doors are locked, and will check the perimeter of the fence, to determine any possible forced entry. Patrols will not enter the facility unless any unusual situation should be observed, in which case, they will contact the Fire Shift Captain and/or Navy Command Duty Officer (CDO). The CDO and the Fire Chief/Captain have specialized training to respond, as necessary to such a situation.

If an incident occurs that involves explosive, reactive or shock sensitive material, CRANE has an Explosive Ordnance Disposal (EOD) Detachment housed on-station, and a team assigned daily as the Command Duty Officer (during off duty hours).

F-1a(2) Barrier and Means to Control Entry
F-1a(2)(a) Barriers

Entry to OB/OD operations is regulated by 2 (two) gates which swing across access roads and are locked when OB/OD operations are being utilized. These areas are also considered to be restricted access areas. This designation requires anyone wishing to gain access to the area during normal working hours to check

in at the office for that area. After hours, the Security Office controls access to these operations. No wastes are left open or unattended during non-operational hours.

F-1a(2)(b) : Means to Control Entry

As stated previously, entry to CRANE is controlled through the use of fencing, limited access points, and a security guard group. Entrance into the installation is through locked or manned gates, and is limited to authorized personnel only. All hazardous waste facilities are within the installation's fenced perimeter.

Photo-type badges are required of all CRANE employees. These badges must be worn at all times while employees are within installation boundaries. Visitors, leasers, and contractors are also issued badges, which must be displayed prominently at all times while the person is within installation boundaries.

Clear zones are maintained inside and outside the perimeter fence for the controlled area, and are patrolled by guards. A designated Key Control Officer is responsible for keeping and issuing master keys to various restricted access areas within the general installation. A logbook is kept to document key issuance and return.

Entry to OB/OD operations is regulated by a combination of primary and secondary gates that swing across access roads and are locked when OB/OD operations are being utilized. These gates are shown in **Exhibits V.B-2** and **V.B-7**. These areas are also considered to be restricted access areas. This designation requires anyone wishing to gain access to the area during normal working hours to check in at the office for that area. After hours the Security Office controls access to these operations. No wastes are left open or unattended during non-operational hours.

The DR/ORR has five primary gates that are closed during the time the DR is being detonated. This area also has four secondary gates that are used to control access to the area during normal operations (loading range or pans). The secondary gates at the ORR are closed when burning is being conducted in the area.

The ABG has two gates, one secondary and one primary. The primary is closed and locked during non-working hours. The secondary gate is used to control access to the ABG during normal working hours. This gate is closed when open burning is being conducted.

F-1a(3) : Warning Signs

Signs bearing the legend "Danger -- Unauthorized Personnel Keep Out" written in English and legible from 25 (twenty-five) feet are posted in sufficient numbers to be seen from any approach to the OB/OD operations.

Due to the size of the facilities and the number of signs involved, it is impractical to show the location of each individual sign on a drawing of each area. The following number of signs have been placed in these areas:

- Ammunition Burning Grounds (ABG) - 90 signs, 500 feet apart.
- Demolition Range (DR) - 66 signs, 500 feet apart.

Signs at OB/OD operations have been placed on the same posts as warning signs required by Army and Navy Safety Regulations. These Safety Regulations require warning signs be placed every 500 feet around areas where detonations or open burning activities are carried on.

The access opening for each of the underground storage tanks associated with the DU's (10- & 11-ABG) are marked with a hazardous waste sign indicating what the tank contains.

F-1b Waiver

CRANE is not requesting any waivers from security procedures and equipment requirements. Therefore, this section is not applicable.

F-2 Inspection Schedule

F-2a General Inspection Requirements

CRANE and CAAA personnel regularly inspect the hazardous waste TSD Facilities for equipment malfunctions, structural deterioration, operator errors and discharges that could cause or lead to the release of hazardous waste constituents and adversely affect the environment or threaten human health. The Inspection Schedule is kept by CRANE Environmental Protection in Building 3260 at CRANE in accordance with 40 CFR 264.15(b)(2). In accordance with 40 CFR 264.15, all inspection records will be retained by CRANE Environmental Protection for at least three years after the date of each inspection.

F-2a(1&2) Inspection Parameters and Frequency

The Inspection Logs for the OB/OD operations are included as **Exhibits V.D-1** and **V.D-2**. **Exhibit V.D-3** is the daily vehicle inspection log that is completed by the driver of that vehicle each day. These logs indicate what parameters are looked at during the inspection, and the frequency of inspection. (These three exhibits also contain descriptions of the types of problems for which the OB/OD areas are inspected.). There is no instrumentation which measures control parameters, temperature, and emission controls. Daily inspections are conducted of burn pans, incinerator cage and conveyor system and equipment (automatic leak detection) associated with the dewatering units.

At a minimum, the Inspection Log will record the date and time of inspection, the inspector's name, a notation of observations made, and the date and nature of any repairs or remedial action taken. CRANE personnel will remedy any deterioration or malfunction of equipment or structure that the inspections reveal. Any problem noted with safety or emergency equipment (such as telephones, radios or fire extinguishers) will be corrected immediately. The remedial actions will ensure that the problems do not lead to environmental or human health hazards. Immediate action will be taken if an imminent hazard exists. A work request will be submitted within 12 hours of notation of deficiency, with notation of violation and request for immediate correction.

F-2b Specific Process Inspection Requirements

F-2b(1) Container Inspection

This section does not apply to the OB/OD facilities.

F-2b(2) Tank System Inspections

F-2b(2)(a) Tank System External Corrosion and Release

This section does not apply to the OB/OD facilities.

F-2b(2)(b) Tank System Construction Materials and Surrounding Area

This section does not apply to the OB/OD facilities.

F-2b(2)(c) Tank System Overfilling Control Equipment

This section does not apply to the OB/OD facilities.

F-2b(2(d) Tank System Monitoring and Leak Detection Equipment

This section does not apply to the OB/OD facilities.

F-2b(3) Waste Pile Inspections

CRANE does not store or treat wastes in waste piles. Therefore, this section is not applicable.

F-2b(4) Surface Impoundment Inspections

CRANE does not store or treat wastes in surface impoundments. Therefore, this section is not applicable.

F-2b(5) Incinerator and Associated Equipment

CRANE does not dispose of wastes into landfills. Therefore, this section is not applicable.

F-2b(6) Landfill Inspections

CRANE does not dispose of wastes into landfills. Therefore, this section is not applicable.

F-2b(7) Land Treatment Facility Inspection

CRANE does not treat wastes in land treatment facilities. Therefore, this section is not applicable.

F-2b(8) Miscellaneous Unit Inspections

This section does not apply to the OB/OD facilities.

F-3 Waiver of Documentation of Preparedness and Prevention Requirements

CRANE has facility-wide documentation of on-site preparedness and prevention measures. The procedures for hazardous waste management facilities are addressed in the Contingency Plan and Emergency Procedures. The Contingency Plan is an evergreen document, always in use and continually updated. The Contingency Plan is retained at the EP office and CRANE Fire Protection/Prevention Branch, and copies are provided at other critical operations. The general content of the Contingency Plan is provided in the attached supplement.

The Contingency Plan sets forth the procedures that are used to minimize or prevent damage to human health and the environment from any sudden or non-sudden discharges of hazardous waste or hazardous waste constituents. Though the likelihood of a release of hazardous wastes or substances is minimized by implementation of operating and emergency procedures, the possibility of a release must always be recognized. Due to the nature of the substances used and managed at CRANE, a likely result of a sudden release, should one occur, is fire and explosion.

Because of the possibility for fire or explosion, CRANE operates and maintains its own fire department. Personnel of the CRANE Fire Protection/Prevention Branch are appropriately trained to manage the types of emergencies that are possible because of the potentially explosive nature of materials, products, and by-products. The fire department is on alert at all times to handle the types of fires that could occur during the management of hazardous wastes at the facility.

CRANE operates under explicit fire-fighting instructions formulated to protect the health and safety of the installation employees, and prevent the spread of fire into adjoining areas. The major provisions of these procedures are as follows:

(1) All fires are reported immediately to the Fire Protection/Prevention Branch. The decision to fight the fire or let it burn is made on a case-by-case basis, and is determined based on the hazard classification and characteristics of the materials involved in the fire. If it is adjudged too hazardous to fight the fire, Fire Protection/Prevention Branch personnel remain at the scene to contain the fire, prevent access to dangerous areas by non-authorized personnel, and to keep the fire from spreading to adjacent areas.

(2) All transportation vehicles, offices, and operating areas are provided with a water fire extinguisher or a hand-held fire extinguisher. The type of extinguisher provided corresponds to the nature of the materials handled or processed in that area. Operating personnel are instructed in the proper selection (by type) and use of the extinguisher(s).

(3) Operating personnel are also instructed to use the extinguishers only to fight minor fires, and only if there is no personal danger involved from doing so. In all cases, the Fire Protection/Prevention Branch is always notified immediately about any fire.

(4) Hazardous waste management facility internal communications are made by direct voice contact. Communications (internal and external), implementation of emergency or rescue procedures, and other related emergency response procedures are found in greater detail in the Contingency Plan.

F-3a Equipment Requirements

F-3a(1) Internal Communications

All personnel involved with hazardous waste handling will have immediate contact with other personnel through internal voice/signal communication. There should never be less than two operators engaged in any operation. At the ABG most of the burns are conducted or set up to be done during employees' breaks

and during lunch hour. Prior to any burning operations being conducted at the ABG, the Area Supervisor is responsible for ensuring that all personnel are out of the area. This procedure is described in greater detail in Section D-8Aa. If a burn is being conducted that does not require the entire ABG to be vacated the area supervisor is responsible for determining which employees should leave and informing the employees of that information. At the DR a siren is sounded prior to and after a detonation. One long blast on the siren/horn indicates to all personnel that Range is ready to be detonated and they need to be leaving the area and reporting to Building 3230 (Safe Area). Two short blasts on the siren/horn indicate that detonation is complete and area is safe to enter again. The DR area supervisor is responsible for ensuring that all employees are accounted for and have moved to Building 3230 before beginning to start the detonation process for the DR.

F-3a(2) External Communications

Hazardous waste handling personnel at OB/OD areas will have access to telephone(s) to summon emergency assistance. These phones are located:

- Demolition/Rifle Range - In Building 3230 (Office Area)
- Ammunition Burning Grounds - In Building 2908 (Office Area) and on a telephone pole located in the ABG proper.

In addition, personnel will have access to two-way walkie-talkie radios in vehicles used at the OB/OD areas. These radios and telephones would be used to summon assistance or help from the on-base emergency response team, fire, safety, industrial hygiene, medical and police department.

CRANE has other communication systems that consist of a plant-wide telephone network. These lines are used for both on-site and off-site calls and can be utilized to provide emergency instruction to facility personnel, emergency response teams, fire departments and police departments. A security radio network is also used at CRANE and consists of a base station and portable two-way radios. In addition to the above communication systems, CRANE has a plant wide alarm system to warn all personnel of impending emergencies including foreign military attacks, terrorists, tornado alerts, fire alarms and release of hazardous substances, etc.

F-3a(3) Emergency Equipment

CRANE provides fire control equipment consisting of portable fire extinguishers and other extinguishing equipment, such as dry chemical, spill control equipment, foam, and decontamination equipment. Additional spill equipment consists of:

1. ABG -
    - Small Bobcat loader
    - Sparking and non-sparking brass/steel hand tools (shovels, rakes, etc.)
    - Fork lift
    - Variety of different size containers
    - Pickup truck equipped with skid mount pump and 300 gallon tank
    - Absorbent pigs
2. DR/ORR -
    - Sparking and non-sparking brass/steel hand tools (shovels, rakes, etc.)
    - Fork lift
    - Bulldozers
    - Variety of different size containers
    - Pickup truck equipped with skid mount pump and 300 gallon tank

- Absorbent pigs

CRANE also has its own fire department with equipment as listed in **Exhibit G-8** (of the Contingency Plan). CRANE has three fire stations within the base boundaries. Fire Department response times (approximate) to individual areas are:

- ABG - 10 minutes
- DR/ORR - 7 minutes

Fire alarms at the OB/OD areas are connected to the fire department. Warning alarms, audible to workers during operations, are also located at the OB/OD areas.

F-3a(4) Water for Fire Control

Lake Greenwood is the primary source of water for CRANE. The central water treatment plant is rated at 2.16 million gallons per day. Approximately 600,000 (six hundred thousand) gallons of water is allocated for fire protection purposes.

The water is discharged into the fire main distribution system at a rate of constant pressure, maintained between 40 (forty) psi and 70 (seventy) psi. A fire hydrant is located at the DR. The water volume discharge rate for this hydrant is 100 gallons per minute. Water for the ORR would come from the fire hydrant at the DR. Water for fire protection at the ABG is supplied by a fire truck having an output of 100 gallons per minute. The truck can be refilled from a well (equipped with submersible pumps) at the ABG using a 3.4-inch hose.

F-3b Aisle Space Requirements

Standard Operating Procedures call for a 50-foot clear area to be maintained around open burning facilities (pans, cages, etc.) when preparing them for burning. For example, when unloading containers of bulk explosive vehicles carrying containers are allowed to pull up to within 10 feet of the pan and unload containers. Prior to opening the container and spreading PEP on the pan, the delivery vehicle is moved upwind and 50 feet away from the pan. This same 50-foot requirement would also apply to operations at the DR.

F-4 Preventive Procedures, Structures, and Equipment

F-4a Unloading Operations

The unloading operations at the dewatering unit area will consist of pumping the sludge from a tank truck into the steel pans. At least two feet of freeboard will be maintained at all times. After unloading the sludge, the tank truck drive will rinse the truck using clean water and will then pump rinse water into the DU. The driver will then remove the contaminated water from the tank associated with the DU and haul it back to the appropriate treatment operation.

The specific unloading procedures for open burning and open detonation operations are detailed in the SOP's pertaining to the operations. General Precautions or special requirements taken to prevent possible loading, transportation or unloading problems would be:

- No person other than the driver and one helper shall ride in or on a vehicle transporting energetic materials.
- The motor vehicle will be approved for explosive operations conforming to the requirements of OP 3681, AMC-R-385-100, and current applicable directives of OP 2239.
- The driver shall be qualified and licensed to transport hazardous cargo in accordance with OP 2239 and OP-5 (current version) or AMC Regulation 350-4. Motor vehicles

used to transport hazardous materials shall be inspected, and the Inspection Sheet will be completed daily.

- If practical, all containers shall be full. Containers that are partially filled, permitting shifting about within the container as determined by the markings on the container or other known evidence, shall be set aside and loaded on the vehicle last. These containers shall be removed first from the vehicle at the site. Care shall be taken to minimize the motion within the container so that static electricity generation will be minimized. Container will not be bumped, dragged or handled in a rough manner.
- Before unloading vehicles engine shall be shut off, brakes set and wheels chocked.
- Vehicle operator will assure that load is secured to prevent falling or movement during transporting of waste.

Exhibit V.D-4 provides information pertaining to Safety Precautions, hazard control briefing and special instructions pertaining to the OB/OD operations. This information was excerpted from the SOPs for the aforementioned operations.

F-4b Runoff Prevention

Contamination of precipitation run-off from the burning pans to other parts of the facility or environment is avoided by the design and construction of the units. Each unit (pan, cage) has an aluminum or fiberglass cover that completely encloses the steel burn pan. If the unit does not have a lid it is equipped with collection sump (example incinerator cage). Runoff from the DR is controlled by dry dams and sedimentation ponds. **Exhibit V.B-7** shows the locations of sedimentation ponds at the DR. Runoff from OD areas passes through NPDES monitoring points. When reviewing **Exhibit V.B-7**, it is easy to determine pathways for surface water runoff.

Additional information pertaining to this is provided in Sections D-8Ac.

F-4c Water Supplies

Contamination of ground water and surface water will be prevented during normal operations or any upset conditions by the nature and design of the units and by operating and emergency procedures. The nature, design and operational features at the OB/OD areas that minimize/prevent ground water contamination are discussed in Sections D-8Aa and D-8Cc.

F-4d Equipment Failure and Power Outages

Electricity is purchased from Duke Energy and distributed to both of the CRANE substations. This permits a radical distribution of power from 1 (one) substation, while the other is de-energized only a portion of the year. If there is a loss of feed power from Duke Energy, CRANE can switch over and draw power from Hoosier Energy.

In the event of an electrical power failure, CRANE has many gasoline and diesel-powered generators that can operate pumps and heating systems, if required. The ABG and DR would not be affected. Burning pans are inspected daily for equipment failure and removed from service if deteriorated.

F-4e Personnel Protection Equipment

An assessment of the appropriate level of protective clothing and equipment has been made for each unit to be permitted. Personnel at the ABG and DR/ORR will wear conductive safety toe shoes, flame retardant coveralls, safety glasses, and gloves during operations. Personnel protective equipment is also specified for each operation in the applicable SOP. **Exhibit V.D-4** provides information pertaining to Safety Precautions, hazard control briefing and special instructions pertaining to the OB/OD operations.

F-5 Prevention of Reaction of Ignitable, Reactive, and Incompatible Waste

F-5a Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Waste

Smoking at CRANE is allowed in authorized areas only. In addition to these restrictions, "No Smoking" signs are placed at all entryways of the OB/OD areas. Also, see Aisle Space Requirements in Section F-3.b.

F-5b General Precautions for Handling Ignitable or Reactive Waste and Mixing of Incompatible Waste

Specific precautions to prevent accidental ignition or reaction of waste are taken during all OB/OD operations, loading and unloading, and transportation. Procedures are clearly described in the Ammunition and Explosives Safety Ashore, NAVSEA OP 5 Volume 1 (current version); The Army Safety Manual, AMC-R 385-100; Army Regulation Authorizing, Accomplishing and Reporting Demilitarization of Class V Material, AMC-R 755-8; and OB/OD Standing Operating Procedures. In addition to the above regulations, CRANE will also follow IC-34-30-21, Military Bases: Immunity for Noise Pollution and Telecommunications Interference. The following are key precautions taken:

1. Adverse Weather Conditions - A weather forecast is obtained prior to beginning each day's operation. Operations will not be initiated during the following conditions:
    - Electrical storms within three miles
    - Sand, snow, or dust storms within three miles
    - Wind, velocity greater than 15 mph
    - No open detonation operations during periods of heavy, low overcast skies
    - No OB/OD operations during hours of darkness
2. Personnel Safety Precautions -
    - No flame-producing devices (e.g., matches, cigarette lighters) shall be allowed within hazardous waste treatment or storage areas. Signs indicating this are conspicuously placed in all areas where there is a hazard from ignitable or reactive wastes. Smoking is limited to designated areas at CRANE. No smoking is allowed at any of the areas to be permitted. Cutting, welding and spark producing tools will not be used at the facility except when properly permitted by the Fire Department, Fire Prevention Inspectors. When necessary, all ignitable hazards will be moved and a manned fire truck will be on hand as stand-by.
    - Non-sparking tools (e.g., aluminum, brass, beryllium or wood) shall be used to scoop explosive wastes; these wastes are then placed in approved containers. Containers of waste explosives are properly labeled and sealed.
    - Inert chemical and explosive wastes shall not be brought into contact with each other to assure that no heat-producing chemical reactions occur.
    - Reactive or ignitable wastes shall be shielded from direct sun.
    - All hazardous waste containers shall be inspected thoroughly. Any defects or foreign material must be reported to the operator for disposition.
    - Precautions shall be taken to control decomposition of explosives accumulated in supplies and cleaning equipment, such as mops, brooms, and similar items.
    - Cleaning equipment that has been contaminated shall be placed in clearly marked covered containers, and must be handled in an approved manner.

- All hazardous waste containers shall be labeled or stamped.
- Incompatible hazardous wastes shall not be stored in the same container or in the same area. Two or more wastes are said to be compatible when their characteristics are such that a quantity of two or more of the items stored together is no more hazardous than a comparable quantity of any one of the items stored alone. Table F-11 provides guidelines used in determining potentially incompatible waste materials or components.
- Periodic conductivity tests of safety shoes and calibration checks of the Conductive Shoe Tester shall be performed as specified by the area supervisor in the instructions posted at the site of the testing.

Exhibit V.D-4 provides information pertaining to Safety Precautions, hazard control briefing and special instructions pertaining to the OB/OD operations. This information was excerpted from the SOP's for the aforementioned operations. Additional information is provided in Sections D-8Aa and D-8Cc.

No ignitable or reactive wastes will be stored within 50 feet of the boundary of the ABG or DR.

Section B-2.b provides more information concerning location of OB/OD operations in relationship to public highways, streets and alleys.

OB/OD operations are conducted in strict accordance with the procedures set forth in the Ammunition and Explosives Safety Ashore, NAVSEA OP 5 Volume 1 (current version); the Army Safety Manual, AMC-R 385-100; Army Environmental Protection and Enhancement, AR 200-1; Army Regulation Authorizing, Accomplishing and Reporting Demilitarization of Class V Material, AMC-R 755-8. The primary purpose of these regulations is to insure protection of personnel and the environment. It is the opinion of both the Army and the Navy that the aforementioned procedures adequately address concerning dealing with handling ignitable or reactive waste.

F-5c Management of Ignitable or Reactive Wastes in Containers

Ignitable or reactive wastes will only be placed in compatible containers, as described by the Bureau of Explosive's specifications, BOE-6000F, for shipping containers.

No ignitable or reactive waste will be stored within 50 (fifty) feet of the boundary fence.

In addition to the general precautions for ignitable or reactive wastes discussed above, requirements specific to the management of ignitable or reactive wastes in containers are as follows:

1. All hazardous waste containers shall be inspected thoroughly. Any defects or foreign material shall be reported to the operating supervisor for disposition.
2. Non-compatible hazardous wastes shall not be stored in the same container or location.

F-5d Management of Incompatible Wastes in Containers

A good example for determining container storage for compatibility could be obtained by using the compatibility guide found in Exhibit F-8. It is equivalent to publication EPA-600/2-80-076, "A Method for Determining the Compatibility of Hazardous Wastes."

F-5e Management of Ignitable or Reactive Wastes in Tank Systems

Not Applicable - Currently, CRANE does not manage any ignitable or reactive waste(s) in tanks. Explosive contaminated sludges are discussed in Section C-1.c.

F-5f Management of Incompatible Wastes in Tank Systems

Not Applicable - Currently, CRANE does not manage any incompatible waste(s) in tanks. Explosive contaminated sludges are discussed in Section C-1.c.

F-5g Management of Ignitable or Reactive Wastes placed in Waste Piles

Not Applicable

F-5h Management of Incompatible Wastes placed in Waste Piles

Not Applicable

F-5i Management of Ignitable or Reactive Wastes placed in Surface Impoundments

Not Applicable

F-5j Management of Incompatible Wastes placed in Surface Impoundments

Not Applicable

F-5k Management of Ignitable or Reactive Wastes placed in Landfills

Not Applicable

F-5l Management of Incompatible Wastes placed in Landfills

Not Applicable

F-5m Management of Ignitable or Reactive Wastes Placed in Land Treatment Units

Not Applicable

F-5n Management of Incompatible Wastes placed in Land Treatment Units

Not Applicable

F-5o Management of Incompatible Wastes placed in Containment Buildings

Not Applicable

G. CONTINGENCY PLAN [G-1 Through G-7]

The primary copy of the Contingency Plan and Emergency Procedures (the Contingency Plan) is kept in the office of the Emergency Coordinator. Details of the Contingency Plan are provided in the attached supplement.

Wastes at the OB/OD facilities (that is, material) are handled only for the purpose of disposal operations (open burning or detonation). Munitions awaiting treatment could detonate prior to disposal, although highly unlikely. In all cases, the hazards would be limited to the OB/OD facilities through exposure to potential bodily injury or death. Off-site impacts would not occur as a result of explosion or fire.

CRANE does not anticipate that any incident connected with the OB/OD units would require extensive evacuation (since each unit is relatively remote and not situated in an area of high personnel concentration). If an unplanned fire, explosion, or fugitive emission occurs at any of the units, personnel would evacuate only the immediate area of the incident, if determined necessary.

- The internal communication and alarm system that is used to make facility operators aware of any situation requiring evacuation of facilities is dictated by the incident.
- When burning is conducted in the high explosive and propellant burn pans at the ABG, all personnel are required to move to a safe zone which, at the ABG is considered the office building, until the burn is complete and a determination is made by the Supervisor that it is safe to enter the area.
- When burning is conducted in the Yellow D flashing pans at the ORR, all personnel are required to move to a safe zone. At the ORR, this safe area is the DR. No personnel can enter the ORR until the burn is complete and a determination is made by the Supervisor that it is safe to enter the area.
- When detonating at the DR, all personnel are required to move to a safe zone. At the DR, this is the office building for the area. No personnel can enter the DR until the detonation is complete and a determination is made by the Supervisor that it is safe to enter the area.

The Standard Operation Procedure (SOP) for open burning and detonation prescribe the actions to be taken in case of emergencies and evacuation procedures.

H. PERSONNEL TRAINING

Personnel training is conducted for those personnel who are operators, supervisors or maintenance workers at the ABG, DR, or ORR. Training is provided to these individuals within six months of their assignment to one of the facilities or, as in the case of certain maintenance personnel, on a job-by-job basis. Review training is conducted annually. The training is conducted to provide facility personnel with information they need in order to make correct decisions and take correct actions to minimize environmental impacts of unplanned releases of hazardous wastes; and, to protect themselves from unnecessary exposures to the wastes.

H-1(a-e) Outline of the Training Program

The details of this outline are provided in the introduction to this permit. The various training programs are listed here as a summary of the breadth of training used at CRANE for its personnel involved in hazardous waste handling and treatment.

(1) Hazardous Waste; Spill Response - Operations Level Training (Initial); and Hazardous Waste; Spill Response - Operations Level Training (Annual Refresher)

(2) Hazardous Waste Training (Initial/Annual Refresher)

(3) Hazardous Waste Training (Initial), and Hazardous Waste Training (Annual Refresher)

(4) Hazardous Waste Handlers; Spill Response - Technician/Specialist Level; and Department of Transportation, 40 CFR 172-704.

(5) Spill Response – Operations Level Training (Initial); and Spill Response – Operations Level Training (Annual Refresher)

(6) HAZMAT/Spill Response – Technician/Specialist Level Initial); and HAZMAT/Spill Response –

(7) HAZMAT/Spill Response – On-scene Incident Commander Training (Initial); and HAZMAT/Spill Response – On-scene Incident Commander Training (Annual Refresher)

(8) Spill Response Simulated Incident Scenarios

(9) Lead Exposure Training (Initial/Annual Refresher)

(10) Miscellaneous

(a) Written Hazardous Waste Management and Minimization:

(b) Written Hazardous Waste Procedures:

(c) Written Standard Operating Procedures (SOP):

(d) Meetings:

In the Introduction, the description of the training program also includes descriptions of personnel, their job titles, and job functions.

Specific aspects of the training program pertaining to the OBOD operations at CRANE include the following:

I. General Training Requirement
- A. Required by 40 CFR 264.16
  - 1. Crane Hazardous Waste Treatment Facilities
    - a. ABG
    - b. Demo Range
    - c. Old Rifle Range
  - 2. Applicable Personnel
    - a. Facility Operators
    - b. Facility Supervisors
    - c. Facility Maintenance Personnel

- B. Purpose of Training
  - 1. Teaches hazardous waste management procedures
  - 2. Teaches effective response to emergency situations

II. Course Content
- A. Facility Operators
  - 1. 1. Initial training
    - a. 4 hours classroom
    - b. Part of HAZWOPER (29 CFR 1910.120) training
    - c. Topics
      - 1) Hazards associated with managed wastes
      - 2) Cradle-to-grave management concept
      - 3) Emergency communication system
      - 4) Emergency alarm system
      - 5) Emergency reporting system
      - 6) Operational controls to prevent releases
      - 7) Procedures to shut down operations
      - 8) Release detection/monitoring systems
  - 2. Annual review training
    - a. 2 hours classroom
    - b. Topics
      - 1) Review topics covered in initial training
      - 2) Review regulatory/procedure updates
      - 3) Review of releases in previous year

4) Tabletop mock incident exercise
5) Operational improvement suggestions

B. Facility Supervisors
1. Initial training
a. 5 hours classroom
b. Part of HAZWOPER (29 CFR 1910.120) training
c. Topics
1) Hazards associated with managed wastes
2) Cradle-to-grave management concept
3) Emergency communication system
4) Emergency alarm system
5) Emergency reporting system
6) Operational controls to prevent releases
7) Procedures to shut down operations
8) Release detection/monitoring systems
9) Waste management recordkeeping
10) Training records management
11) Release site management
12) Training transients
a) Government personnel
b) Contractor personnel
c) Visitors
2. Annual review training
a. 2 hours classroom
b. Topics
1) Review topics covered in initial training
2) Review regulatory/procedure updates
3) Review of releases in previous year
4) Tabletop mock incident exercise
5) Operational improvement suggestions
6) Review waste management records
7) Review training records
8) Discussion of any problem areas

C. Facility Maintenance Personnel
1. Initial training
a. Public Works heavy equipment operators
1) 2 hour classroom
2) Topics
a) Hazards in the area
b) Site safety procedures
c) Site communication procedures
d) Site alarm systems

e) Site evacuation procedures
f) Equipment decontamination

b. Other maintenance personnel
1) 15-minute on-site, job-by-job
2) Topics
a) Site safety procedures
b) On-site communication procedures
c) Alarm locations, meanings
d) Site evacuation procedure
e) Task specific issues

2. Annual review training
a. Public Works heavy equipment operators
1) 1 hour classroom
2) Topics
a) Review initial training topics
b) Review erosion control adequacy
c) Operational improvement suggestions

H-2 Implementation of Training Program

The details of implementation of the training program are provided in the Introduction of Attachment V.

I. CLOSURE PLANS, POST-CLOSURE PLANS, AND FINANCIAL REQUIREMENTS

The Resource Conservation and Recovery Act (RCRA), at 40 CFR 270.14(b)(13), requires a Part B permit applicant to submit closure and post-closure plans. The closure plans submitted with this permit application apply to open burning operations located at the ammunition burning ground (ABG) and old rifle range (ORR); and open detonation operations located at the demolition range (DR). The ABG Surface Impoundment and Ash Pile, formally undergoing closure activities, will be clean closed during closure activities for the entire ABG unit. The open burning/open detonation (OB/OD) facilities will be closed in a manner to ensure that the closure performance standard is met. Final closure of any of the various hazardous waste units at CRANE would negate the need for further maintenance because:

- The entire RCRA hazardous waste inventory intended to be managed in the various OB/OD units under the terms of this permit application would be exhausted.
- The various units would have been decontaminated and cleaned.
- The various units would be available for use under some other authority beyond the provisions of this Permit Application.

Final closure would eliminate post-closure escape of hazardous constituents because all wastes, etc., would be removed at the time of closure. No threat of release of hazardous wastes, hazardous waste constituents, leachate, etc., to the environment will exist because all such hazardous materials would have been removed for treatment, storage, or disposal elsewhere. Simply, closure and post-closure care of the OB/OD units will be accomplished in a manner to ensure that the environmental performance standards of 40 CFR 264.601 protecting human health and the environment are met.

I-1 Closure Plans

The closure plans for the ABG, DR and ORR address the elements required by 40 CFR 264.112(b). The plans are presented in the following Sections Ia-1 (ABG), Ib-1 (DR), and Ic-1 (ORR), using the general frame work for RCRA permits. This approach ensures all elements are covered and yet the separate plans are retained in a cohesive structure so that each area can be evaluated separately.

Written copies of the Closure Plans for the ABG, ORR, and DR are provided in Section Ia-1, Ib-1, and Ic-1, and are also available at the CRANE Environmental Protection (EP) office and each HW treatment facility.

Ia-1 Closure Plans: Ammunition Burning Grounds

Ia-1(a) Closure of Waste Management Units

At the ABG facility there are eleven waste management units (3-ABG - 13-ABG), the Surface Impoundments and the Ash Pile that will be closed. The closure performance standards will be achieved during the closure of these units by ensuring that each waste management unit is removed from the facility. This will eliminate any future treatment of wastes at the facility. Additionally, residual contaminants within the waste management area will be identified and a cleanup plan will be implemented to remove the contamination. It should be noted that, due to past treatment and disposal practices, the ABG is classified as a RCRA Solid Waste Management Unit (SWMU) and is undergoing various Corrective Action studies to determine the extent of contamination, impact on the environment and remediation techniques. If ground water or soil contamination remains, a post-closure program will be implemented.

Ia-1(b) Final Facility Closure

During the active life of the ABG facility, the maximum extent of operations that will be unclosed will include all eleven of the waste management units, the Surface Impoundments and the Ash Pile. When the use of a particular unit is no longer required by the DOD, the closure process will be set in motion. Closure of each unit will follow the specific closure plan that is outlined in the following sections.

Ia-1(c) Description of closure methods
Ia-1(c)(1) Maximum Inventory of Hazardous Wastes

The maximum inventory of hazardous wastes ever on-site over the active life of the facility is a function of the net explosive weight (NEW) that is allowed by the site safety plan to be in the area. The explosives safety site plan and site license for the ABG facility allows up to 50,000 pounds NEW of Class 1.3 explosives and 1,000 pounds NEW of Class 1.1 explosives within the area; there is no limit on the quantity of Class 1.4 explosives in storage.

PEP wastes staged at amounts under the NEW limits may be treated in any of the ABG units. Table V.B-1 provides a listing of the waste codes and treatment quantities that are able to be managed at this unit.

The primary RCRA characteristic associated with the waste military munitions/explosives treated in the OB/OD units is reactivity (D003) due to the presence of energetic materials. Some of these wastes may have a secondary characteristic of toxicity, due to the presence of metals (D004 through D011), 2,4-DNT (D030), and hexachlorobenzene (D032). In addition, ABG has the capability to treat explosive-contaminated solvents that carry a primary reactivity characteristic (D003) but also carry a F001 – F005 listed waste code.

Ia-1(c)(2) Partial Closure

Partial closure is not anticipated for the treatment activities conducted at the ABG. If future circumstances require CRANE to close a portion of the unit, a revision in the closure plan will be submitted to the appropriate regulatory agencies within the required time limit.

Ia1(c)(3) General Closure Routine

The waste management units at the ABG will be closed in accordance with the following procedures:

1. Notification to the Commissioner, Indiana Department of Environmental Management and the Regional Administrator of Region V, EPA in writing at least 45 days prior to date on which closure is expected to begin.
2. Removal of hazardous waste from the hazardous waste management units.
3. Evaluation of the need for decontamination of structure, site and equipment.
4. Decontamination as needed.
5. Evaluation of effectiveness of decontamination. Repeat decontamination and evaluation as necessary.
6. If residuals remain in the environment (soil, surface water, or ground water) a revised closure/post-closure plans shall be submitted within 180 days prior to closure.
7. Proper disposal of wastes generated during decontamination.
8. Submission of certification that closure was accomplished in accordance with the approved closure plan.

Ia-1(c)(4) Removal, Transportation, Treatment, Storage and Disposal of Wastes and Off-Site Waste Management Units Used

Once DOD has determined that the various units can be closed, any wastes destined to be treated at one of the ABG units will be processed through the unit. Upon completion of the processing of the last batch of waste, there will be no wastes remaining in the units. Therefore, there will be no need for removal, transportation, treatment, storage and disposal of wastes; nor will there be a need to utilize off-site hazardous waste management units.

The concrete burn pads (9-ABG) will be the last units closed because they will be used to decontaminate residues and system components from the other units.

Ia-1(d) Removal of Residues and Decontamination Procedures

Ia-1(d)(1) Pan Units 3a,3b,3c,4,5,6,7,8,-ABG

The pans, lids and their support structures will be moved to unit 9-ABG for flashing. The residues and clay linings of the pans will be dumped-out to facilitate thorough flashing. After flashing, the residues and pans will be inspected to ensure reactive materials have been removed. Ash and non-metal residues remaining after flashing will be containerized and disposed at an off-site disposal facility. The decontaminated metal components will be sent to a scrapyard for sale as scrap metal.

Soils surrounding the ABG treatment units will be sampled for metals and explosives in accordance with the methods outlined in **Tables I-1 and I-3** and in accordance with the provided QAPP (included by reference). Quality Control/Quality Assurance Information will be followed for any analytical data used for closure of the unit.

The soil sample results obtained during the ABG closure study will be compared to the background soil data for metals established in the *Base-Wide Soils Study, NSWC Crane* (TtNUS, August 2000). Any explosives detected in the soil are not naturally occurring and therefore do not have any background levels established. The closure study will utilize a non-detect background level for explosives.

If metals or explosive contamination is detected in the soil samples above background levels or the Remediation Closure Guide residential screening levels, additional samples will be collected to establish both the vertical and horizontal extent of the contamination. The soil results obtained will be compared to both the background levels and Remediation Closure Guide residential screening levels.

If the analyses of the additional soil samples show that concentrations of all constituents are equal to or less than background levels or Remediation Closure Guide residential screening levels, no further sampling will be conducted.

Any contaminated residue/soil at the ABG exceeding residential screening levels listed in the Remediation Closure Guide, dated March 22, 2012, or background levels will be treated on-site or will be removed using backhoes or other excavation equipment. Treatment technologies for contaminated soils cannot be determined at this time, and the likelihood of residual soil contamination is low.

The decision on whether treatment is appropriate will be determined in the future, depending on the contaminants present, the nature and extent of contamination, and the status of available technology. If treatment (on-site or off-site) is considered to be an appropriate alternative to off-site disposal, the Closure Plan will be revised and submitted to IDEM in accordance with Section I-10 (Closure Plan Amendment). The residue or soil will then be containerized, properly manifested, and transported to an approved waste management facility in accordance with 40 CFR 264.114.

The effectiveness of the decontamination procedures for the surrounding area of soil will be determined by taking soil samples, in the areas surrounding the units, to demonstrate that residential screening levels listed in the Remediation Closure Guide, dated March 22, 2012, or background concentrations are not exceeded.

During closure, if excavation is required, sampling will continue until all soil with contamination that exceeds residential screening levels listed in the Remediation Closure Guide, dated March 22, 2012, or background levels has been removed. The effectiveness of decontamination will be determined

on the basis of the results of tests on soil samples from the excavations. Decontamination will be considered effective when all soil samples concentrations are at or below residential screening levels listed in the Remediation Closure Guide, dated March 22, 2012, or background levels. The location and number of confirmation samples will be based on the results of sampling conducted to determine the extent of contamination.

Ground water sampling will most likely not be necessary as there will be a ground water sampling program in place as part of the Corrective Actions program associated with the ABG. However, if, at the time of closure, IDEM (or EPA) requests additional ground water sampling, a sampling plan will be developed based on EPA/IDEM guidance documents in effect at the time and submitted for approval. If the additional ground water sampling reveals a need to address contamination from the units a ground water cleanup plan will be developed and submitted for approval.

Throughout the closure process heavy equipment, tools, supplies, and personal protection equipment in need of decontamination will be decontaminated in accordance with a plan developed by CRANE and approved by IDEM (and EPA). There is a vehicle wash facility located within the ABG facility that may be used for larger items. Solutions and materials resulting from decontamination will be characterized and disposed in accordance with solid and hazardous waste management standards.

Ia-1(d)(2) Concrete Burn Pads Unit 9-ABG

After all other units have been closed, the two 9-ABG units will be closed. The metal fencing around the unit will be cut-off at ground level and flashed. After decontamination it will be sent to a scrapyard for sale as scrap metal. Remaining ash residues and clay lining material from the units will then be

characterized, removed and disposed in accordance with solid and hazardous waste management standards.

To confirm that the two concrete pads meet closure requirements, the pads will undergo a triple rinse process, whereby, each pad will be rinsed two times. The rinse water will be collected in the associated steel holding tanks. The captured rinse water will be pumped and taken to the explosive wastewater treatment facility for appropriate disposal. The pads will then be rinsed a third time. To confirm that the pads have met cleanup levels, two rinsate samples from each pad will be collected from the holding tanks and submitted for laboratory analysis in accordance with the laboratory QAPP. The analytical parameters will be based on wastes previously treated at these units and are shown on Table I-2. The analytical results will be compared to Maximum Contaminant Levels (MCLs) of the National Primary Drinking Water Regulations (40 CFR 141). For the organic parameters without MCLs, the cleanup levels of the rinsate will be based on the analytical method's estimated quantitation limits (EQLs), as defined in SW-846. If the data show that clean up levels have been achieved this will demonstrate that the pads, drain piping, and holding tanks are clean. The concrete pads will then be demolished and disposed in accordance with solid and hazardous waste management standards. The contents of the holding tanks will be pumped and transported to the explosive wastewater treatment facility, then the tanks will be removed and sent to a scrapyard for sale as scrap metal. In the event that the analytical data exceed clean up levels, the pads will undergo additional cleaning, rinsing, and confirmatory sampling and analysis as described above.

The analytical results used for this closure will be submitted to IDEM and will include, at a minimum, signed chain-of-custody sheets, sampling dates, analysis dates, analytical methods used, estimated quantitation limits (EQLs), and quality control (QC) results. The quality assurance/quality control (QA/QC) results will include, at a minimum, method of standard addition (ICP) or serial dilution analysis (ICP) (as applicable), tuning results (GC-MS), initial and continuing calibration results, method blank results, internal standard areas (GC-MS, ICP-MS), matrix duplicate results (as applicable), matrix spike/matrix spike duplicate (MS/MSD) results, laboratory control sample (LCS) results, and surrogate recoveries (GC-MS). The QA/QC information will also include that raw data consisting of chromatograms, recorder outputs, mass spectrum reports, computer printouts, charts, graphs, bench sheets, or any other hard copy data generated during sampling and analysis.

If required, investigation and management of soils and ground water will follow the same routine as that described in Section Ia-1(d)(1) above.

Ia-1(d)(3) Dewatering Units 10,11-ABG

All sludge in the units will be in-situ treated before closure of the units. Ash residue and sand in the units will be removed and flashed in unit 9-ABG prior to being containerized and disposed off-site. The dewatering units will be dismantled and flashed in unit 9-ABG. The decontaminated metal components will be sent to a scrapyard for sale as scrap metal. All other components (primarily concrete) will be disposed of in accordance with solid and hazardous waste management standards. Liquids in the associated tanks will be pumped and taken to a CRANE explosive wastewater treatment facility or treated off-site. The tanks will be closed in accordance with the requirements of 40 CFR 264.197. The inside of the tanks will be flashed prior to being sent to a scrapyard for sale as scrap metal.

Investigation and management of soils and ground water will follow the same routine as that described in Section Ia-1(d)(1) above.

Ia-1(d)(4) Primer Pits Unit 12-ABG

Ash residues from the unit and any visible contamination around the unit will be removed, flashed at unit 9-ABG and disposed of in accordance with solid and hazardous waste management standards. The metal pans will be flashed at unit 9-ABG and sent to a scrapyard for sale as scrap metal.

Investigation and management of soils and ground water will follow the same routine as that described in Section Ia-1(d)(1) above.

Ia-1(d)(5) Incendiary Cage Unit 13-ABG

Ash residues from the unit and any visible contamination around the unit will be removed, flashed at unit 9-ABG and disposed in accordance with solid and hazardous waste management standards. All metal components will be flashed at unit 9-ABG and sent to a scrapyard for sale as scrap metal. All other components (primarily concrete) will be disposed of in accordance with solid and hazardous waste management standards.

Investigation and management of soils and ground water will follow the same routine as that described in Section Ia-1(d)(1) above.

Ia-1(d)(6) Surface Impoundments and Ash Pile

The sites have undergone partial closure and the source contamination and Surface Impoundment structures, tanks, and associated piping have been removed. Investigation and management of soils and ground water will follow the same routine as described in Section Ia-1(d)(1) above.

Ia-1(e) Other Closure Activities

During closure of the various units careful attention will be given to control of runoff from the sites and carry-out of soil material. Final backfill and contouring of each area will be performed such that, as much as possible, surface water drainage is directed away from units not yet closed.

Ia-1(f) Schedule of Closure

Within 45 days of beginning closure of a unit, a notification of the expected date to begin closure will be submitted. Closure will begin within 30 days of the receipt of the known final volume of waste; or, within one year of the date of last receipt of waste if there is a reasonable possibility that additional wastes will be received at the unit. Once closure begins it will be completed within 180 days unless a longer period is approved.

A general schedule for closure of ABG units is as follows:

ACTION	TIMEFRAME
Remove and flash unit components	Week 1-4
Excavate and dispose contaminated soils	Week 5-9
Sample and analyze soil in excavated area	Week 10-13
Sample and analyze ground water (if required)	Week 14-17
Additional excavation and soil disposal	Week 18-21
Final backfilling, contouring, seeding	Week 22-26

All hazardous wastes will be treated, removed off-site, or disposed of on-site within 90 days from the receipt of the final volume of waste at the unit or facility; and all closure activities will be completed within 180 days from the receipt of the final volume of waste at the unit or facility.

An original copy of the closure plan for ABG will be kept on file at CRANE's Environmental Protection office until closure is completed and certified. If changes in operating plans or facility design effect the closure plan, the plan will be amended in accordance with the provisions of 40 CFR 264.112. Copies of the Closure Plans will be provided to IDEM and Region V, EPA.

CRANE will modify the closure plan for the ABG when revisions are necessary due to changes in the operations, facility design, and schedule.

CRANE will follow the requirements/guidelines set forth in 40 CFR 264.112(c) for amending/updating the closure plan.

Ib-1 Closure Plans: Demolition Range

Ib-1(a) Closure of Waste Management Units

At the DR facility there is one waste management unit (3-DR) that will be closed. Due to the nature of the operations at the DR (burial of shots) and the large spatial extent of the site, extensive sampling and analysis will need to be accomplished to determine the area of contamination. Once the extent and severity of contamination is known, a detailed closure plan will be prepared and submitted within 180 days prior to closure. Upon implementation of the plan, further maintenance of the DR will be minimized and the release of additional pollutants to the environment will be controlled, minimized or eliminated to the extent necessary to protect human health and the environment.

Immediately upon completion of treatment activities at the DR (while the detailed closure plan is being developed) the waste management area will be thoroughly inspected and any easily, and reasonably, retrievable munition fragments will be removed. Additionally, cleaning and maintenance of the sediment traps within the facility will be accomplished to ensure that they will remain effective at trapping sediment in stormwater runoff. These actions represent the minimum level of effort that will be undertaken and may be supplemented with other management practices that are deemed necessary to control contaminant runoff from the site.

It should be noted that, due to past treatment and disposal practices, the DR is classified as a RCRA Solid Waste Management Unit (SWMU) and is undergoing various Corrective Action studies to determine the extent of contamination, impact on the environment and remediation techniques. By the time the DR is taken out of service, there may be enough data available to prepare a detailed closure plan prior to discontinuing the operations.

Ib-1(b) Final Facility Closure

During the active life of the DR facility the maximum extent of operations that will be unclosed will include the entire 3-DR waste management unit area. When the use of the DR is no longer required by the DOD the closure process will be set in motion. Closure of the DR will follow the steps outlined in the following sections.

Ib-1(c) Description of Closure Methods

Ib-1(c)(1) Maximum Inventory of Hazardous Wastes

The maximum inventory of hazardous wastes ever on-site over the active life of the facility is a function of the net explosive weight (NEW) that is allowed by the site safety plan to be in the area. The explosives safety site plan for the DR facility allows up to 150,000 pounds net explosive weight (1.1 explosives) within the area.

Table V.B-1 provides a listing of the waste codes and treatment quantities that are able to be managed at this unit.

The primary RCRA characteristic associated with the waste military munitions/explosives treated in the OB/OD units is reactivity (D003) due to the presence of energetic materials. Some of these wastes may have a secondary characteristic of toxicity, due to the presence of metals (D004 through D011), 2,4-DNT (D030), and hexachlorobenzene (D032). In addition, ABG has the capability to treat explosive-contaminated solvents that carry a primary reactivity characteristic (D003) but also carry a F001 – F005 listed waste code.

Ib-1(c)(2) Partial Closure

Partial closure is not anticipated for the treatment activities conducted at the DR. If future circumstances require CRANE to close a portion of the unit, a revision in the closure plan will be submitted to the appropriate regulatory agencies within the required time limit.

Ib-1(c)(3) - General Closure Routine

The waste management units at the DR will be closed in accordance with the following procedures:

1. Notification to the Commissioner, Indiana Department of Environmental Management and the Regional Administrator of Region V, EPA in writing at least 45 days prior to date on which closure is expected to begin.
2. Investigation by sampling and analysis to determine extent of contamination. Concurrently, perform basic cleanup of area by removing residual fragmentation. Also, perform sediment trap maintenance.
3. Develop detailed closure plan based on investigation findings.
4. Implement additional maintenance/control practices to prevent offsite migration of contaminants.
5. If residuals in the environment (soil, sediment ponds, and ground water) can not be removed, a closure/post-closure plan revision will be submitted to the Regional Administrator.
6. Implement detailed closure plan.
7. Proper disposal of wastes generated by closure activities.
8. Final contouring of site.
9. Establish permanent erosion control structures/vegetation.
10. Submission of certification that closure was accomplished in accordance with the approved closure plan.

Ib-1(c)(4) - Removal, Transportation, Treatment, Storage and Disposal of Wastes and Off-Site Waste Management Units Used

Once DOD has determined that the DR facility can be closed, any wastes destined to be treated at the facility will be processed. Upon completion of the processing of the last batch of waste there will be no wastes remaining at the DR. Therefore, there will be no need for removal, transportation, treatment, storage and disposal of wastes; nor will there be a need to utilize off-site hazardous waste management units.

Ib-1(d) - Removal of Residues and Decontamination Procedures

Residues remaining at the DR facility will be in the form of metal fragments from the casings of the munitions that are detonated at the facility. It is standard operating procedure at the DR to retrieve large pieces from the range on a weekly to monthly basis. There will most likely be many small pieces of metal scattered across the range. These pieces will be collected to the greatest extent that is technically and economically feasible utilizing the technology available at the time of closure. If it is determined that the pieces can be disposed of without additional treatment to remove PEP contaminants it will be handled as scrap metal. If inspection and/or sampling indicate the pieces must be decontaminated, the ABG or ORR facilities, if operating, will be used to flash the pieces. After flashing, the pieces would be managed as scrap metal. If the ABG or ORR units are not available the collected pieces will be sent to an offsite reclamation or disposal facility.

Soils surrounding the DR will be sampled for metals and explosives in accordance with the methods outlined in **Tables I-1 and I-3** and in accordance with the provided QAPP (included by reference). Quality Control/Quality Assurance Information will be followed for any analytical data used for closure of the unit.

The soil sample results obtained during the DR closure study will be compared to the background soil data for metals established in the *Base-Wide Soils Study, NSWC Crane* (TtNUS, August 2000). Any explosives detected in the soil are not naturally occurring and therefore do not have any background levels established. The closure study will utilize a non-detect background level for explosives.

If metals or explosive contamination is detected in the soil samples above background levels or the Remediation Closure Guide residential screening levels, additional samples will be collected to establish both the vertical and horizontal extent of the contamination. The soil results obtained will be compared to both the background levels and Remediation Closure Guide residential screening levels.

If the analyses of the additional soil samples show that concentrations of all constituents are equal to or less than background levels or Remediation Closure Guide residential screening levels, no further sampling will be conducted.

Any contaminated residue/soil at the DR exceeding residential screening levels listed in the Remediation Closure Guide, dated March 22, 2012, or background levels will be treated on-site or will be removed using backhoes or other excavation equipment. Treatment technologies for contaminated soils cannot be determined at this time, and the likelihood of residual soil contamination is low.

The decision on whether treatment is appropriate will be determined in the future, depending on the contaminants present, the nature and extent of contamination, and the status of available technology. If treatment (on-site or off-site) is considered to be an appropriate alternative to off-site disposal, the Closure Plan will be revised and submitted to IDEM in accordance with Section I-10 (Closure Plan Amendment). The residue or soil will then be containerized, properly manifested, and transported to an approved waste management facility in accordance with 40 CFR 264.114.

The effectiveness of the decontamination procedures for the surrounding area of soil will be determined by taking soil samples, in the areas surrounding the units, to demonstrate that residential screening levels listed in the Remediation Closure Guide, dated March 22, 2012, or background concentrations are not exceeded.

During closure, if excavation is required, sampling will continue until all soil with contamination that exceeds residential screening levels listed in the Remediation Closure Guide, dated March 22, 2012, or background levels has been removed. The effectiveness of decontamination will be determined

on the basis of the results of tests on soil samples from the excavations. Decontamination will be considered effective when all soil samples concentrations are at or below residential screening levels listed in the Remediation Closure Guide, dated March 22, 2012, or background levels. The location and number of confirmation samples will be based on the results of sampling conducted to determine the extent of contamination.

Ground water sampling will most likely not be necessary as there will be a ground water sampling program in place as part of the Corrective Actions program associated with the DR. However, if, at the time of closure, IDEM (or EPA) requests additional ground water sampling, a sampling plan will be developed based on EPA/IDEM guidance documents in effect at the time and submitted for approval. If the additional ground water sampling reveals a need to address contamination from the units, a ground water cleanup plan will be developed and submitted for approval.

Throughout the closure process heavy equipment, tools, supplies, and personal protection equipment in need of decontamination will be decontaminated in accordance with a plan developed by CRANE and approved by IDEM (and EPA). There is a heavy equipment wash rack located at the DR facility that may be used for larger items. Solutions and materials resulting from decontamination will be characterized and disposed in accordance with solid and hazardous waste management standards.

Ib-1(e) Other Closure Activities

During closure of the various units careful attention will be given to control of runoff from the area and carry-out of soil material. Sediment traps within the DR management area on top of the hill as well as the

sedimentation ponds surrounding the DR at the base of the hill will be maintained in such a way as to maximize their sediment trapping effectiveness. Final grading and contouring will be performed in such a way as to minimize erosion potential. Some type of vegetation suitable to the growing conditions of the site will be established as quickly as possible to decrease erosion.

1b-1(f) Schedule of Closure

Within 45 days of beginning closure of the DR, a notification of the expected date to begin closure will be submitted. Closure will begin within 30 days of the receipt of the known final volume of waste; or, within one year of the date of last receipt of waste if there is a reasonable possibility that additional wastes will be received at the unit. Once closure begins it will be completed within 180 days unless a longer period is approved. It is almost certain that the closure of the DR site will require several years.

A general schedule for closure of the DR units is as follows:

ACTION	TIMEFRAME
Collect, flash, dispose small metal fragments	Week 1-4
Clean/maintain sediment traps	Week 1-4
Sample and analyze soil in excavated area	Week 1-4
Sample and analyze ground water (if required)	Week 1-6
Additional excavation and soil disposal	Week 6-24
Final backfilling, contouring, seeding	Week 24-26

All hazardous wastes will be treated, removed off-site, or disposed of on-site within 90 days from the receipt of the final volume of waste at the unit or facility; and all closure activities will be completed within 180 days from the receipt of the final volume of waste at the unit or facility.

An original copy of the closure plan for DR will be kept on file at CRANE's Environmental Protection office until closure is completed and certified. If changes in operating plans or facility design effect the closure plan, the plan will be amended in accordance with the provisions of 40 CFR 264.112. Copies of the Closure Plans will be provided to IDEM and Region V, EPA.

CRANE will modify the closure plan for the DR when revisions are necessary due to changes in the operations, facility design, and schedule.

CRANE will follow the requirements/guidelines set forth in 40 CFR 264.112(c) for amending/updating the closure plan.

1c-1 Closure Plans: Old Rifle Range

1c-1(a) Closure of Waste Management Units

At the ORR facility there are two waste management units (3a-ORR, 3b-ORR) that will be closed. The closure performance standards will be achieved during the closure of these units by ensuring that each waste management unit is removed from the facility. This will eliminate any future treatment of wastes at the facility. Additionally, residual contaminants within the waste management area will be identified and a cleanup plan will be implemented to remove the contamination. It should be noted that, due to past treatment and disposal practices, the ORR is classified as a RCRA Solid Waste Management Unit (SWMU) and is undergoing various Corrective Action studies to determine the extent of contamination, impact on the environment and remediation techniques. If clean closure can not be met, a revised closure/post-closure plan will be submitted to the Regional Administrator.

Ic-1(b) Final Facility Closure

During the active life of the ORR facility the maximum extent of operations that will be unclosed will include both of the waste management units. When the use of the units is no longer required by the DOD the closure process will be set in motion. Closure of the units will follow the specific closure plan that is outlined in the following sections.

Ic-1(c) Description of Closure Methods

Ic-1(c)(1) Maximum Inventory of Hazardous Wastes

The maximum inventory of hazardous wastes ever on-site over the active life of the facility is a function of the net explosive weight (NEW) that is allowed by the site safety plan to be in the area. The site safety plan for the ORR facility allows up to 5,000 pounds net explosive weight within the area.

Ic-1(c)(2) Partial Closure

Partial closure is not anticipated for the treatment activities conducted at the ORR. If future circumstances require CRANE to close a portion of the unit, a revision in the closure plan will be submitted to the appropriate regulatory agencies within the required time limit.

Ic-1(c)(3) General Closure Routine

The waste management units at the ORR will be closed in accordance with the following procedures:

1. Notification to the Commissioner, Indiana Department of Environmental Management and the Regional Administrator of Region V, EPA in writing at least 45 days prior to date on which closure is expected to begin.
2. Removal of hazardous waste from the hazardous waste management units.
3. Evaluation of the need for decontamination of structure, site and equipment.
4. Decontamination as needed.
5. Evaluation of effectiveness of decontamination. Repeat decontamination and evaluation as necessary.
6. If residuals remain in the environment (soil, surface water, or ground water) a revised closure/post-closure plans shall be submitted to the Regional Administrator.
7. Proper disposal of wastes generated during decontamination.
8. Submission of certification that closure was accomplished in accordance with the approved closure plan.

Ic-1(c)(4) Removal, Transportation, Treatment, Storage and Disposal of Wastes and Off-Site Waste Management Units Used

Once DOD has determined that the ORR units can be closed, any wastes destined to be treated at the ORR units will be processed. Upon completion of the processing of the last batch of waste there will be no wastes remaining in the units. Therefore, there will be no need for removal, transportation, treatment, storage and disposal of wastes; nor will there be a need to utilize off-site hazardous waste management units.

Ic-1(d) Removal of Residues and Decontamination Procedures

Ic-1(d)(1) Removal of Residues and Decontamination Procedures: Pan Units 3a-ORR

The pans, lids and their support structures can be flashed in the 3b-ORR units. Otherwise, an alternative means of removing any residual PEP contaminants from the pans will be employed. This may consist of

methods such as manually wiping with rags or high-pressure hot water cleaning. The residues and clay linings of the pans will be removed and either flashed in the 3b-ORR units or disposed at an off-site facility. If the units are flashed, any ash and non-metal residues remaining after flashing will be containerized and disposed at an off-site disposal facility. The decontaminated metal components will be managed as scrap metal.

Soils surrounding the ORR will be sampled for metals and explosives in accordance with the methods outlined in **Tables I-1 and I-3** and in accordance with the provided QAPP (included by reference). Quality Control/Quality Assurance Information will be followed for any analytical data used for closure of the unit.

The soil sample results obtained during the ORR closure study will be compared to the background soil data for metals established in the *Base-Wide Soils Study, NSWC Crane* (TtNUS, August 2000). Any explosives detected in the soil are not naturally occurring and therefore do not have any background levels established. The closure study will utilize a non-detect background level for explosives.

If metals or explosive contamination is detected in the soil samples above background levels or the Remediation Closure Guide residential screening levels, additional samples will be collected to establish both the vertical and horizontal extent of the contamination. The soil results obtained will be compared to both the background levels and Remediation Closure Guide residential screening levels.

If the analyses of the additional soil samples show that concentrations of all constituents are equal to or less than background levels or Remediation Closure Guide residential screening levels, no further sampling will be conducted.

Any contaminated residue/soil at the ORR exceeding residential screening levels listed in the Remediation Closure Guide, dated March 22, 2012, or background levels will be treated on-site or will be removed using backhoes or other excavation equipment. Treatment technologies for contaminated soils cannot be determined at this time, and the likelihood of residual soil contamination is low.

The decision on whether treatment is appropriate will be determined in the future, depending on the contaminants present, the nature and extent of contamination, and the status of available technology. If treatment (on-site or off-site) is considered to be an appropriate alternative to off-site disposal, the Closure Plan will be revised and submitted to IDEM in accordance with **Section I-10** (Closure Plan Amendment). The residue or soil will then be containerized, properly manifested, and transported to an approved waste management facility in accordance with 40 CFR 264.114.

The effectiveness of the decontamination procedures for the surrounding area of soil will be determined by taking soil samples, in the areas surrounding the units, to demonstrate that residential screening levels listed in the Remediation Closure Guide, dated March 22, 2012, or background concentrations are not exceeded.

During closure, if excavation is required, sampling will continue until all soil with contamination that exceeds residential screening levels listed in the Remediation Closure Guide, dated March 22, 2012, or background levels has been removed. The effectiveness of decontamination will be determined

on the basis of the results of tests on soil samples from the excavations. Decontamination will be considered effective when all soil samples concentrations are at or below residential screening levels listed in the Remediation Closure Guide, dated March 22, 2012, or background levels. The location and number of confirmation samples will be based on the results of sampling conducted to determine the extent of contamination.

Ground water sampling will most likely not be necessary as there will be a ground water sampling program in place as part of the Corrective Actions program associated with the ORR. However, if, at the time of closure, IDEM (or EPA) requests additional ground water sampling, a sampling plan will be developed based on EPA/IDEM guidance documents in effect at the time and submitted for approval. If the additional ground water sampling reveals a need to address contamination from the units a ground water cleanup plan will be developed and submitted for approval.

Throughout the closure process heavy equipment, tools, supplies, and personal protection equipment in need of decontamination will be decontaminated in accordance with a plan developed by CRANE and approved by IDEM (and EPA). Solutions and materials resulting from decontamination will be characterized and disposed in accordance with solid and hazardous waste management standards.

Ic-1(d)(2) Removal of Residues and Decontamination Procedures: Concrete Burn Pads 3b-ORR

After the 3a-ORR units have been closed, closure of the 3b-ORR units can begin. The metal fencing around the unit will be cut-off at ground level and flashed in the 3b-ORR unit. After decontamination it will be managed as scrap metal. Remaining ash residues and clay lining material from the units will then be characterized, removed and disposed in accordance with solid and hazardous waste management standards.

To confirm that the two concrete pads meet closure requirements, the pads will undergo a triple rinse process, whereby, each pad will be rinsed two times. The rinse water will be collected in the associated steel holding tanks. The captured rinse water will be pumped and taken to the explosive wastewater treatment facility for appropriate disposal. The pads will then be rinsed a third time. To confirm that the pads have met cleanup levels, two rinsate samples from each pad will be collected and submitted for laboratory analysis in accordance with the laboratory QAPP. The analytical parameters will be based on wastes previously treated at these units and shown on Table I-2. The analytical results will be compared to Maximum Contaminant Levels (MCLs) of the National Primary Drinking Water Regulations (40 CFR 141). For the organic parameters without MCLs, the cleanup levels of the rinsate will be based on the analytical method's estimated quantitation limits (EQLs), as defined in SW-846. If the data show that clean up levels have been achieved this will demonstrate that the pads, drain piping, and holding tanks are clean. The concrete pads will then be demolished and disposed in accordance with solid and hazardous waste management standards. The contents of the holding tanks will be pumped and transported to the explosive wastewater treatment facility or off-site, then the tanks will be removed and sent to a scrapyard for sale as scrap metal. In the event that the analytical data exceed clean up levels, the pads will undergo additional cleaning, rinsing, and confirmatory sampling and analysis as described above.

The analytical results used for this closure will be submitted to IDEM and will include, at a minimum, signed chain-of-custody sheets, sampling dates, analysis dates, analytical methods used, estimated quantitation limits (EQLs), and quality control (QC) results. The quality assurance/quality control (QA/QC) results will include, at a minimum, method of standard addition (ICP) or serial dilution analysis (ICP) (as applicable), tuning results (GC-MS), initial and continuing calibration results, method blank results, internal standard areas (GC-MS, ICP-MS), matrix duplicate results (as applicable), matrix spike/matrix spike duplicate (MS/MSD) results, laboratory control sample (LCS) results, and surrogate recoveries (GS-MS). The QA/QC information will also include that raw data consisting of chromatograms, recorder outputs, mass spectrum reports, computer printouts, charts, graphs, bench sheets, or any other hard copy data generated during sampling and analysis.

Below the concrete pads there will be rock and soil on top of a PVC liner that remains from the clay lined pits that were previously used. The rock, soil and liner will be removed and disposed in accordance with solid and hazardous waste management standards.

Soil in the waste management unit area (including underlying soil from older units) will be sampled to determine if it needs to be removed. A sampling plan incorporating methodology, quality assurance requirements, and cleanup level requirements will be developed based on EPA/IDEM guidance documents in effect at the time and submitted for approval. If sampling determines that soils need to be removed, a decontamination plan will be developed and submitted for approval.

Ground water sampling will most likely not be necessary as there will be a ground water sampling program in place as part of the Corrective Actions program associated with the ORR. However, if, at the time of closure, IDEM (or EPA) requests additional ground water sampling, a sampling plan will be developed based on EPA/IDEM guidance documents in effect at the time and submitted for approval. If

the additional ground water sampling reveals a need to address contamination from the units a ground water cleanup plan will be developed and submitted for approval.

Throughout the closure process heavy equipment, tools, supplies, and personal protection equipment in need of decontamination will be decontaminated in accordance with a plan developed by CRANE and approved by IDEM (and EPA). Solutions and materials resulting from decontamination will be characterized and disposed of in accordance with solid and hazardous waste management standards.

1c-1(e) Other Closure Activities

During closure of the ORR units careful attention will be given to control of runoff from the area and carry-off of soil material. Final grading and contouring will be performed in such a way as to minimize erosion potential. Some type of vegetation suitable to the growing conditions of the site will be established as quickly as possible to decrease erosion.

1c-1(f) Schedule of Closure

Within 45 days of beginning closure of the ORR, a notification of the expected date to begin closure will be submitted. Closure will begin within 30 days of the receipt of the known final volume of waste; or, within one year of the date of last receipt of waste if there is a reasonable possibility that additional wastes will be received at the unit. Once closure begins it will be completed within 180 days unless a longer period is approved.

A general schedule for closure of the ORR units is as follows:

ACTION	TIMEFRAME
Remove and flash components	Week 1-4
Excavate and dispose contaminated soils	Week 5-9
Sample and analyze soil in excavated area	Week 10-13
Sample and analyze ground water (if required)	Week 14-17
Additional excavation and soil disposal	Week 18-21
Final backfilling, contouring, seeding	Week 22-26

All hazardous wastes will be treated, removed off-site, or disposed of on-site within 90 days from the receipt of the final volume of waste at the unit or facility; and all closure activities will be completed within 180 days from the receipt of the final volume of waste at the unit or facility.

An original copy of the closure plan for ORR will be kept on file at CRANE's Environmental Protection office until closure is completed and certified. If changes in operating plans or facility design effect the closure plan, the plan will be amended in accordance with the provisions of 40 CFR 264.112. Copies of the Closure Plans will be provided to IDEM and Region V, EPA.

CRANE will modify the closure plan for the ORR when revisions are necessary due to changes in the operations, facility design, and schedule.

CRANE will follow the requirements/guidelines set forth in 40 CFR 264.112(c) for amending/updating the closure plan.

I-2 Post-Closure Plan/Contingent Post-Closure

CRANE intends to clean close the OB/OD facilities with no wastes remaining in place. In the event that a clean closure is not accomplished for any facility, CRANE will submit a Post Closure Plan/Contingent Post Closure in accordance with 40 CFR 264.118.

I-2a Inspection Plan

Not Applicable

I-2b Post-Closure Monitoring Plan

Not Applicable

I-2c Post-Closure Maintenance Plan

Not Applicable

I-2c(1) Identification and Location of Person Responsible for Storage and for Updating CRANE Copy of Post-Closure Plan During Post-Closure Period

Not Applicable

I-3 Notices Required for Disposal Facilities

CRANE does not dispose of hazardous waste on-site (e.g., CRANE is not a disposal facility); therefore, this section is not applicable.

I-4 Closure Cost Estimate

The hazardous waste management units at CRANE are an entity of the Federal Government and are therefore granted specific exemption from the requirements of 40 CFR §264.140.

I-5 Financial Assurance Mechanism for Closure

The hazardous waste management units at CRANE are an entity of the Federal Government and are therefore granted specific exemption from the requirements of 40 CFR §264.140.

I-6 Post-Closure Cost Estimate

In accordance with 40 CFR §264.140(c), a post-closure financial assurance mechanism is not required for Federal facilities.

I-7 Financial Assurance Mechanism for Post-Closure Care

The hazardous waste management units at CRANE are an entity of the Federal Government and are therefore granted specific exemption from the financial requirements of Subpart H (40 CFR 264.140).

I-8 Liability Requirements

The hazardous waste management units at CRANE are an entity of the Federal Government and are therefore granted specific exemption from the requirements of 40 CFR §264.140.

I-9 Use of State-Required Mechanisms

The hazardous waste management units at CRANE are an entity of the Federal Government and are therefore granted specific exemption from the requirements of 40 CFR §264.140.

I-10 Closure Plan Amendment

CRANE will maintain the Closure Plan to ensure that it is current and accounts for anticipated closure activities. The Closure Plan will be amended when the following events or contingencies occur:

- The expected reasons that warrant closure of the OB/OD facilities change.
- Changes in operating plans or unit design affect this Closure Plan. This will include, but not be limited to, the need to modify the OB/OD facilities, to expand OB/OD capacity, or to treat different types of explosives or ordnance, etc.
- New information is obtained that significantly changes the underlying assumptions or procedures outlined in this Closure Plan.
- Unexpected events occur during closure that requires significant modification of the Closure Plan.

Certain events and/or contingencies are anticipated in the Closure Plan and do not warrant formal amendment of this plan. For example, the need to extend the anticipated schedule of some closure activities by a few days (provided the overall time scheduled for closure is not exceeded). Such events and contingencies will be brought to the attention of IDEM (and the U.S. EPA); however, formal amendment of the Closure Plan will not be requested.

Whenever events or contingencies requiring formal amendment of this Closure Plan occur, a written request for permit modification will be submitted to IDEM (and the U.S. EPA). Such requests will be signed by the engineer responsible for CRANE oversight and sent by certified mail. Any requests for amendment will describe in detail the necessary Closure Plan changes.

J. CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS

J-1 Solid Waste Management Units

There is no **additional** information provided here germane to the OB/OD facilities, not already covered in the sections above.

J-2 Releases

There is no **additional** information provided here germane to the OB/OD facilities, not already covered in the sections above.

K. OTHER FEDERAL LAWS

There is no additional information provided here germane to the OB/OD facilities.

L. PART B CERTIFICATION

This is contained in the introductory section for the entire Part B permit. A separate certification is not provided for each unit.