4.0 PROCESS INFORMATION

ATK has two distinct hazardous waste management systems for the Bacchus Facility, one for reactive wastes and one for chemical wastes. All hazardous waste management operations at the Bacchus Facility are conducted or are under the management of ATK. The collection and processing of information required by these two systems are addressed separately in the following text.

4.1 WASTE CHARACTERIZATION

Wastes will be characterized to identify hazardous properties to ensure they are properly managed. Attachment 3 identifies the WAP that will be used to characterize and classify both reactive and chemical wastes.

4.1.1 Reactive Waste

The primary products produced at the Bacchus Facility are solid rocket motors cast with either nitrate ester or composite propellants. Nitrate ester propellant is classified as a DOT Class 1.1 explosive material. A nitrate ester propellant usually contains a liquid explosive, such as nitroglycerin (NG), that is mixed with solid ingredients such as nitrocellulose, HMX, RDX, aluminum and ammonium perchlorate. Composite propellants manufactured at the Bacchus Facility are classified as a DOT Class 1.3 explosive material. A composite propellant usually contains of a non-explosive liquid binder mixed with aluminum and ammonium perchlorate.

Reactive wastes are produced from the manufacturing process including, but are not limited to the following: cured and uncured propellants; rocket motors; small initiating devices; propellant scrap; and explosive ingredients (HMX, aluminum, ammonium perchlorate, etc.). Liquid explosive wastes, such as NG, are diluted and adsorbed in wood pulp. Reactive wastes also include materials such as rags, gloves, other personal protective equipment, plastics, rubber and paper that were contaminated with explosive materials during the manufacturing process.

Waste Class 1.1 and Class 1.3 explosive materials are characteristic hazardous wastes for reactivity (D003). Nearly all of the reactive wastes generated at the Bacchus Facility are reactive due to the presence of propellants and explosives. Some reactive wastes, such as those from laboratory operations, may contain solvents which would also be a listed waste defined by R315-261 of the Utah Admin. Code. Wastewater treatment sludge generated from the processing of explosives is a K044 listed hazardous waste.

Class 1.1 explosive materials include powdered or granulated ingredients (nitrocellulose, HMX, RDX, aluminum, ammonium perchlorate and base grain); liquid explosives (NG, binder premix, and NG remover); nitrate ester propellants; and ordnance items. Class 1.3 reactive wastes specifically contain composite propellant. Other categories of reactive waste, such as waste developmental propellant, K044 waste and laboratory waste, can be a Class 1.1 or Class 1.3 explosive material depending on the chemical composition of the product at the point of generation.

NG remover is a chemical mixture added to nitroglycerin to chemically break it down and make it less hazardous to handle if it has been spilled. Wastes containing NG remover are considered Class 1.1 reactive wastes for the potential presence of NG.

4.1.2 Chemical Waste

ATK defines chemical waste as non-explosive characteristic and listed hazardous wastes that are generated by operations at the Bacchus Facility. Chemical wastes also include used oil, universal wastes, and non-RCRA wastes. All wastes generated at the Bacchus Facility are evaluated for hazardous waste properties. This evaluation includes generator knowledge, information obtained from the manufacturer's safety data sheets (SDSs) and laboratory analysis. The Waste Analysis Plan (Attachment 3) provides the procedures, techniques and protocols that will be used to evaluate wastes generated at the Bacchus Facility.

4.2 HAZARDOUS WASTE GENERATION AND COLLECTION

Wastes generated at the Bacchus Facility are from batch or continuous operations. These wastes are accumulated in accordance with R315-262 of the Utah Admin. Code. Waste accumulation stations are operated under either the less than 90-day rules or the satellite accumulation rules. Operators that produce wastes are instructed in the proper requirements for the collection, storage and disposal of these wastes.

4.2.1 Reactive Waste Generation and Collection

ATK uses a variety of containers to store reactive wastes at the Bacchus Facility. The standard containers used at the Bacchus Facility are described in this section. However, due to the nature of our business, new types of containers will be required in the future, and cannot be described in this application. In lieu of describing all containers, the basic criteria for selecting and using containers are provided. Containers will be selected using the DOD Contractor's Safety Manual for Ammunition and Explosives (DOD 4145.26-M). All containers for reactive waste that are currently used, or will be used in the future will meet the DOD 4145.26-M requirements.

Operating buildings generating reactive wastes use a variety of collection containers as described below:

Slum bags – Slum bags are antistatic plastic bags used to containerize reactive waste and line containers that accumulate reactive wastes. Slum bags are used to line slum pots and fiberboard drums.

SLIDs - Excess pure propellant is collected in cardboard/wood containers known as SLIDs, or "slum-in-a-drum", which typically can hold up to 500 pounds of waste propellant. A SLID allows a significant amount of excess propellant to be collected in one container, reducing handling requirements for large amounts of propellant waste. SLIDs are constructed from cardboard "Sona" tubes (used as forms for cement pillars) that are glued and sealed onto a pallet. A groove is routered into the pallet's surface to accept the form as shown in Figure 4-2.1. Excess pure propellant is placed in a SLID at the end of the manufacturing process; the open tops of the SLIDs are then covered with antistatic plastic and sealed with tape. SLIDs are also used at storage buildings to hold slum bags, and to contain certain wastes during burning.

Slum pots - Contaminated materials generated during the manufacturing process (rags, gloves, personal protective wear, plastics, etc.) and smaller amounts of waste propellant are collected in aluminum containers that are commonly referred to as "slum pots". Slum pots are specifically designed for the collection, transportation, and temporary storage of reactive waste within the operational boundaries of the Bacchus Facility.

Slum pots are constructed of seamless cold rolled aluminum that is 18 3/4 inches high by 18 3/4 inches in diameter and is ¼ inch thick or equivalent (see Figure 4-2.2). Each pot has two lifting handles and has a hard rubber lid and hard rubber bottom that cushion and resist any abrasion during transportation. Both the lid and bottom are non-sparking. Slum pots are lined with antistatic plastic bags (known as "slum bags") that contain the waste. When full the waste is sealed inside the slum bag with a plastic tie.

Fiberboard drums – Contaminated wastes that are too large for slum pots or are generated in large volumes are collected directly into commercially available 30-gallon fiberboard drums. These drums have a removable lid that can be sealed in place with a locking chime after the drum is filled. Fiberboard drums selected for this application are approved by DOT for highway transportation of hazardous materials and can be used to ship these wastes off-site for treatment and disposal.

Pizza boxes – Dry ingredients that can detonate during treatment will be placed in large flat cardboard boxes, similar to a pizza box that allow the material to treated by open burning while minimizing the potential to detonate during treatment.

Tanks - Explosive contaminated wastewater, which is not classified as hazardous waste, is collected in wastewater tanks at the points of generation. When appropriate, propellant "chips" and other suspended solids are filtered out before the wastewater reaches the tank, and when the wastewater is pumped out of the tanks. The wastewater is pumped into tanker trucks where it is either: 1) delivered to a wastewater treatment plant where it is treated, if necessary, before being discharged to a local POTW; or 2) transported off-site for treatment and disposal. Filters containing "chips and other suspended solids are accumulated in slum bags and treated and disposed of in accordance with the applicable hazardous waste management rules.

Other Containers – Large blocks of cured propellant are containerized by wrapping the waste in plastic and placing it on wood pallets. Ammunition cans are used to hold initiating and ordnance items. Waste rocket motors are generally large enough to be their own container.

Operating personnel accumulate reactive waste in these containers as it is generated. Liquid reactive wastes, typically containing nitroglycerin, are diluted and absorbed in wood pulp to reduce their sensitivity. The absorbed liquid reactive wastes are then accumulated in slum pots.

When a reactive waste container is full or at the end of an operating shift, it is closed or sealed as applicable for the container. The hazardous waste explosive tag shown in Figure 4-2.3 is filled out and attached to the container. Operators at the buildings that generated the waste enter pertinent information from the hazardous waste explosive tag into the electronic waste tracking system described in Section 4.3.1.

Most operating buildings that generate reactive waste have an explosive waste collection shed located approximately 50 feet from the operating building. Except as described below, waste containers are placed in these collection sheds to facilitate removal of waste propellant, explosive and reactive wastes from the operating buildings. The collection sheds are constructed of wood or corrugated metal and are secured to a six-inch concrete floor. The sheds are closed on three sides with the open

front facing north (see Figure 4-2.4). The north aspect of the open front ensures that the wastes are not exposed to direct sun while it is in this temporary storage shed.

When managing reactive wastes, ATK building operators use the temporary collection sheds as satellite accumulation stations. Reactive wastes are placed in these sheds either as they are generated or at the end of each operating shift. Waste containers that are not full at the end of a shift are sealed, a hazardous waste explosive tag is attached to the container and they are moved to the temporary collection shed. There are three exceptions when ATK does not use these temporary collection sheds as described above: 1) Cold weather restrictions where certain Class 1.1 materials must remain inside operating buildings because of safety concerns with freezing; 2) Large objects such as SLIDs where use of a dock at the operating building allows for more efficient and safe handling of the waste; and 3) Buildings which infrequently generate reactive wastes.

Containerized explosive wastes are picked up from the collection sheds using a vehicle approved for the transport of explosive wastes in accordance with the satellite accumulation requirement of R315-262-15 of the Utah Admin. Code). Extreme care is used when handling all explosive wastes. The wastes are transported to either a less than 90 day explosive storage building or a permitted explosive storage unit while the treatment preparations are being made. Explosive wastes will always be segregated by explosive classification. Containers that hold wastes in accumulation sheds or at the point of generation of different explosive classification will be stored in separate bays of the storage location and separated by a partition. While in storage, slum bags containing similar types of explosive waste are often combined together in larger containers, such as empty SLIDs, to allow storage that is more efficient. Note that liquid explosive wastes always remain in slum pots during storage. The main areas used for explosive waste storage other than satellite accumulation areas are:

- Building 32E – This less than 90-day hazardous waste storage building is the primary building where Class 1.3 wastes are stored prior to treatment. Class 1.1 materials cannot be stored in this building. This building is a precast concrete structure with a loading dock. The building is clearly marked with the appropriate fire symbols on the exterior of the building. This building can store up to 59,000 pounds of Class 1.3 explosives.

- Building 31 – This less than 90-day hazardous waste storage building can be used to store Class 1.1 and/or Class 1.3 materials prior to treatment. The building is constructed of wood with an elevated floor at truck bed height. The building is protected by a sprinkler system and marked with the appropriate fire symbols. The floor is completely covered with lead sheeting for continuous grounding. Building 31 is equipped with a fan ventilation system because reactive laboratory wastes containing solvents are stored in the building. Other waste generated in small quantities, such as waste ordnance, are also stored in this building. Building 31 has a maximum storage limit of 3,000 pounds.

- Building 45A – This less than 90-day hazardous waste storage building that is used to store Class 1.1 and/or Class 1.3 materials prior to treatment. Building 45A is an earth covered bunker style building. The building is protected by a sprinkler system, and has the appropriate fire symbols on the building exterior.

The building is cited for 16,000 pounds of Class 1.1 or 50,000 pounds of Class 1.3 explosives. The building defaults to the Class 1.1 storage limits any time both Class 1.1 and Class 1.3 materials are stored in the building.

- NG Remover Storage Shed – This less than 90-day hazardous waste storage building is used to store wastes exposed to NG remover. NG remover reacts with NG at low concentrations allowing these wastes to be handled safely. No other type of reactive waste is stored in this building when NG remover is present. The facility is a wooden shed with Class 1.1 fire symbols prominently marked on the building's exterior. The building can store no more than 5 pounds of Class 1.1 explosives.

- Building 2347, Explosive Storage 2 (ES-2) – ES-2 is a long-term explosive waste storage facility, which is further described in Section 4.4.

- Building CD6A, Explosive Storage 3 (ES-3) – ES-3 is a long-term explosive waste storage facility, which is further described in Section 4.4.

Propellant and explosive operating buildings at the Bacchus Facility, including but not limited to explosive waste storage areas, are designed and constructed in accordance with strict federal standards. These standards identify the criteria that must be used to construct buildings where reactive material will be used and/or stored. These standards also require that explosive buildings to be separated by sufficient distance, or a quantity-distance relationship, to prevent an explosive event in one building from propagating to another building. Quantity-distance rules also control the location of propellant and explosive operating buildings with regard to public property (highways, parks, etc,) and private property. All buildings used for temporary storage of waste explosives, including the temporary storage sheds, are correctly sited with respect to the applicable quantity-distance rules. Section 2.3 provides a narrative on the quantity-distance rules. Refer to Figure 2-3.12 for safe distances for prominent 90-day storage and permitted facilities.

4.2.2 Chemical Wastes

The operations at NIROP generate a wide variety of chemical wastes incidental to the manufacturing processes. These wastes include both listed and characteristic hazardous wastes in solid and liquid forms. Special classification wastes streams, such as used oil, universal wastes and non-RCRA wastes are also generated and collected. Chemical wastes are accumulated and stored in a variety of containers, all of which are compatible with the waste and can be opened and closed. All containers shipped off-site for disposal meet applicable DOT container requirements. There are three different types of chemical wastes which are generated at NIROP: (1) routinely generated waste, (2) non-routinely generated waste, and (3) small container waste.

Routinely generated chemical wastes include but are not limited to paints, coatings, solvents, and contaminated solids. These wastes are generated in a quantity, which fills its container in less than 90-days. Non-routinely generated wastes are generated infrequently and at low volumes. Routinely and non-routinely generated wastes are collected in a variety of containers. The waste containers will always compatible with the waste.

Small container wastes include but are not limited to a wide variety of off-specification commercial chemical products. The sources for these wastes include shelf-life expired commercial chemical products, unused commercial chemical products, aerosol cans, laboratory chemicals, and/or unique chemicals that are not routinely received. A waste that does not leave its original container can easily be characterized using generator knowledge.

Routinely generated chemical wastes and small container wastes generated at the NIROP Facility are transferred to HS-1 (refer to Part B Permit for ATK Launch Systems LLC, Bacchus Facility – Plant 1, UTD001705029, for full description and capabilities of HS-1) for storage prior to being shipped off-site to an approved TSDF for treatment and/or disposal.

4.2.3 Other Hazardous and Non-Hazardous Waste Streams

Special classification waste streams, such as used oil, universal wastes and non-RCRA waste are also generated at the NIROP facility. These waste steams are collected, characterized and transferred to the HS-1 for management prior to being shipped off-site for disposal. However, ATK does generate scrap metal at the NIROP Burning Grounds that is accumulated in a gondola on the Ash Storage Pad. All of these waste streams are managed in accordance with applicable regulatory requirements.

4.3 WASTE TRACKING

ATK maintains an electronic waste tracking record for the Bacchus Facility to collect and manage information about reactive wastes generated at both the Plant 1 and NIROP operations. This tracking system uses a combination of paper records and an electronic database.

4.3.1 Reactive Wastes

Wastes being accumulated in containers at any operating area within the Bacchus Facility are labeled and managed in accordance with R315-262 of the Utah Admin. Code for either a satellite accumulation or less than 90-day hazardous waste storage area. The electronic tracking system maintains the following information to monitor cradle to grave waste handling practices:

- Tag # - a unique number used to track the waste (see Figure 4-2.3);
- Date - identifies the generation date;
- Building # - identifies where the waste was generated;
- Explosive category for each type of explosive waste generated on plant;
- Explosive and total weight of the container;
- Identify who prepared and approved the waste at the site of generation;
- Pick-up Date - date picked up from the waste generation site;
- Identify all storage locations and transfer dates prior to treatment;
- Identify the date the waste transferred to the Burning Grounds for treatment; and
- Identify pan # and burn station where treatment occurred.

The electronic tracking system maintains information on all containers of reactive waste in storage including the time in storage, and has the capability to track the total amount of wastes in storage at each storage location. It also tracks the total weight of waste placed on each burn pan and the total weight of waste burned on any given day.

For reactive wastes that are shipped off site for treatment and disposal, the system maintains the following information: the manifest number, transporters, manifest ship date, and manifest return date. In the event a number of slum bags are consolidated before shipping into a large reusable container, the waste tracking system will identify wastes by tag numbers that are aggregated into the larger shipping containers.

In the event the electronic tracking system is not operable, the information will be tracked using paper copies until the electronic system is operable. In the event this occurs, ATK will transfer all information to the electronic system within 72 hours of the system becoming operational again.

4.3.2 Chemical Waste Tracking For Routine and Non-Routine Generated Waste

ATK maintains an electronic waste tracking record for the Bacchus Facility that is used to collect and manage information about routinely and non-routinely generated waste that is generated at both the Plant 1 and NIROP operations. This tracking system uses a combination of paper records and an electronic database.

Wastes being accumulated in containers at any operating area within the Bacchus Facility are labeled and managed in accordance with R315-262 of the Utah Admin. Code for either a satellite accumulation or less than 90-day storage area. The chemical waste tracking system maintains the following information to monitor cradle to grave waste handling practices:

- Drum # -- A unique number assigned by ATK to each waste container;
- Waste Stream – ATK's unique internal waste stream profile which includes all RCRA waste codes for the waste;
- Building # -- Building in which waste was generated;
- Manifest # -- Manifest number in which the waste was shipped under;
- Accumulation Date -- Date the container was given a number and delivered to a specific building;
- Pickup Date -- Date the container was received at HS-1;
- Quantity -- Weight of container ready for shipping;
- Status -- A code given to each container indicating whether it is in process or shipped to disposal facility;
- Storage -- Identifies storage locations;
- TSDF -- The facility where the material was delivered;
- Transporter -- The transporter used to transport the shipment;
- Ship Date -- Date the shipment left the facility;
- Return Date -- Date that the fully signed manifest is received by ATK;
- Notes -- A description of the shipments contents.

4.3.3 Chemical Waste Tracking for Small Containers

Small containers of waste (i.e. waste that is eventually consolidated into a lab pack) are entered into the small container database and stored in the appropriate cabinet based on the DOT classification for the material. This tracking system uses a combination of paper records and an electronic database. Small containers are accumulated until an adequate quantity has been amassed to fill a lab pack container. All lab pack containers are entered into the electronic tracking system as a non-routine generated waste. The following information is collected for each small container of waste:

- Name - chemical or commercial name of the waste and the applicable RCRA waste codes;
- Container # - database tracking number;
- Size - size of the container;
- Type - type of container (e.g. plastic, glass, metal, etc);
- State - physical state of the waste;
- Date - date received; and
- DOT - Department of Transportation classification.

Any small container held in storage for longer that one year will be managed in accordance with Section 4.9.

4.4 HAZARDOUS WASTE STORAGE

ATK may store hazardous wastes at the Bacchus Facility prior to disposal. Reactive and chemical wastes are stored in designated facilities described in this section and segregated according to compatibility requirements.

4.4.1 HS-1

Chemical wastes generated at NIROP are managed by ATK at the HS-1 storage area, which is part of the Plant 1 Permit.

4.4.2 ES-2

ES-2 (Figure 4-4.5) can be used to store any of the explosive wastes listed in Section 4.1.1. Figure 4-4.6 shows a floor plan and a typical storage configuration of the building. A minimum 30-inch aisle space will be maintained between rows of containers. Rows will not be more than two containers deep. All containers of waste in storage will be closed except when waste is being added to or removed from the container. Each container of waste will be labeled with a Hazardous Waste Explosive tag. Each tag includes the unique identification number (bar code) which will be used the track the waste in the reactive waste electronic database system described in Section 4.3

Storage compatibility will be maintained by requiring a 30-inch minimum space between 1.3 and 1.1 propellants and/or propellant ingredients. NG remover will not be stored in this building.

This building has an automatic fire protection system, so that a fire can be fought remotely. Employees are not permitted to fight fires inside an explosive storage building.

ES-2 is a totally enclosed building, so there are no precipitation run-on or run-off concerns. Free liquids are not stored in the building.

4.4.3 Ash Storage Pad

The Ash Storage Pad (see Figure 4-4.7) is used to accumulate and store treatment residue and clean-up materials generated during open burning activities at the NIROP Burning Grounds. The treatment residue is typically stored in a 20 cubic yard, lined, storage container. A minimum 30-inch aisle space will be maintained between all containers stored on the pad.

The containers of waste stored on this storage pad will be identified using the unique drum number issued by the electronic waste tracking system or with the label used while the container was being generated.

Incompatible wastes will not be stored on this pad.

This storage pad is exposed to precipitation. Precipitation run-on or run-off controls are addressed using the following constraints:

1. All hazardous waste storage containers will be covered except when wastes are being added or removed,
2. All waste spilled while being transferred to a storage container will be immediately cleaned up, and
3. No free liquids will be stored on the pad.

A trash (including scrap metal) collection container may also be located on the pad. This container may remain open. ATK will not exceed the 50 cubic yard storage capacity for this unit and all solid waste stored on this pad will count against the storage capacity.

4.4.4 ES-3

ES-3 (Figure 4-4.8) can be used to store any of the explosive wastes listed in Section 4.1.1. Figure 4-4.9 shows a floor plan and a typical storage configuration of the building. A minimum 30-inch aisle space will be maintained between rows of containers. Rows will not be more than two containers deep. All containers of waste in storage will be closed except when waste is being added to or removed from the container. Each container of waste will be labeled with a Hazardous Waste Explosive tag. Each tag includes the unique identification number (bar code) which will be used the track the waste in the reactive waste electronic database system described in Section 4.3

Storage compatibility will be maintained by requiring a 30-inch minimum space between 1.3 and 1.1 propellants and/or propellant ingredients. NG remover will not be stored in this building.

This building has an automatic fire protection system, so that a fire can be fought remotely. Employees are not permitted to fight fires inside an explosive storage building.

ES-3 is a totally enclosed building, so there are no precipitation run-on or run-off concerns. Free liquids are not stored in the building.

4.5 TREATMENT OF REACTIVE WASTE

The treatment of reactive wastes will vary due to treatment options and methods. The treatment options include, but are not limited to, open burning on-site at the NIROP Burning Grounds, open burning or detonation at the ATK facility near Promontory, Utah (ATK-Promontory), open burning or detonation at the Utah Test and Training Range (UTTR) located at Oasis, Utah or offsite treatment and disposal at another authorized TSDF. The following sections provide more details on the collection, management and disposal of reactive wastes at the Bacchus Facility.

4.5.1 Off-site Treatment of Reactive Waste

In addition to the RCRA manifest rules that govern the transportation of hazardous waste, the Department of Transportation (DOT) has additional regulations regarding the transportation of explosive materials and wastes on public highways. The shipping containers and transportation handling techniques for all explosive materials and wastes must be examined as per DOT 49 CFR 173.51or an authorized military agency prior to shipment. Testing is often necessary to determine the hazardous nature of each explosive material or waste and to verify the integrity of the packaging method selected for each material or waste. Reactive wastes that are amenable to transportation on the public highways can be shipped off-site to an approved hazardous waste treatment facility. ATK follows all applicable State and Federal requirements whenever explosive wastes are shipped from the Bacchus Facility to insure that they are shipped safely.

The primary off-site treatment facility for the Bacchus Facility is the ATK's Promontory Facility located approximately 100 miles north of the Bacchus Facility. The Promontory Facility is located in a more remote area than the Bacchus Facility and is an approved hazardous waste treatment facility, where reactive wastes can be open burned or detonated. ATK ships the majority of the Bacchus Facility's routinely generated reactive waste streams to the Promontory Facility. All reactive wastes shipped to the Promontory Facility will have DOT approved shipping methods. Reactive wastes that remain at the Bacchus Facility for open burning are difficult to ship because they are odd sized, generated in small quantities, have explosive safety hazards, or are a "forbidden explosive" as defined in R315-261-23 (8) of the Utah Admin. Code.

Some of the reactive wastes generated at the Bacchus Facility that are routinely shipped to the Promontory Facility include:

- SLIDs containing pure Class 1.1 or Class 1.3 propellant are shipped with a plywood cover placed over the top of each SLID and banded in place.

- Class 1.3 contaminated wastes: Slum bags containing contaminated wastes (rags, gloves, wipes, etc. contaminated with reactive material) are placed in lined, reusable plastic bins for shipment. Up to 350 pounds of waste can be aggregated in each bin. Each bin is closed and secured with plastic banding prior to shipment. Contaminated Class 1.3 wastes too large to fit in slum bags are shipped in individual, sealed 30-gallon fiberboard drums.

- Class 1.1 contaminated wastes: Slum bags containing contaminated wastes that that do not contain significant amount of solvents are placed in lined reusable plastic bins for shipment. Up to 350 pounds of waste can be aggregated in each bin. Each bin is closed and secured with plastic banding prior to shipment.

- Explosive contaminated packaging: Contaminated packaging, such as, the cloth and plastic bags that HMX and RDX products arrive in from the vendor. After being emptied, these contaminated bags are shipped to Promontory in sealed 30-gallon fiberboard drums for treatment.

- Waste HMX and RDX: HMX and\or RDX is wetted, with a minimum, of 15% by weight water and accumulated in plastic lined 30-gallon fiberboard drums. Additional packaging requirements for HMX or RDX are described later in this section.

Reactive wastes are also sent to UTTR, located approximately 70 miles west of the Bacchus Facility. UTTR is an approved hazardous waste treatment facility, permitted to open burn and open detonate reactive wastes that are the property of the Federal government. Whenever possible, waste rocket motors or segments that meet the federal property requirement are sent to UTTR for treatment. UTTR typically conducts operations in the spring, summer, and early fall. If necessary, wastes or materials are stored at an applicable storage unit by ATK at the Bacchus Facility until UTTR is available for disposal.

The Bacchus Facility is used as a staging point for surplus and obsolete rocket motors that are awaiting treatment at UTTR. These rocket motors are received at the Bacchus Facility by ATK as both products or hazardous wastes. Surplus rocket motors can be recalled by the owner prior to being treated and used for their intended purposes. Obsolete rocket motors are always shipped to UTTR as a hazardous waste using a hazardous waste manifest. ATK follows all applicable State and Federal requirements whenever these wastes are shipped from the Bacchus Facility to insure that they are shipped safely.

Large quantities of HMX or RDX are sent off-site for treatment and disposal. HMX and RDX may be sent to the UTTR since these explosives are supplied to ATK by the Federal government and are government property. Waste HMX and RDX can also be treated at the Promontory Facility or at another approved TSDF.

Before HMX and RDX can be transported over public highways, it must be wetted with a minimum of 15% by weight water. This is assured at the Bacchus Facility by adding 12 ounces of water for every 5 pounds of HMX or RDX. Waste HMX and RDX are accumulated for off-site treatment and disposal in plastic lined 30-gallon fiberboard drums, which hold up to 300 pounds of wetted HMX or RDX per drum. The plastic liners for these drums are secured with plastic bag ties to assure retention of water. The fiberboard drums and plastic liners are always maintained in a closed condition unless ATK is adding waste to the container or verifying the water content inside the bag. Packing will conform to 49 CFR 172.101 Hazardous Material Table requirements for HMX.

Waste HMX and RDX is accumulated until quantities permit efficient shipment. ATK usually stores waste HMX and RDX at ES-3, but this waste can also be stored at 45A and ES-2. ATK follows all applicable State and Federal requirements for the storage of these wastes while they are being stored on-site, and whenever these wastes are shipped from the Bacchus Facility to ensure that they are shipped safely.

Certain HMX or RDX wastes are not amenable for off-site treatment and disposal including mixtures of HMX or RDX with other ingredients or very wet HMX or RDX. Mixtures of HMX or RDX with other ingredients are burned in small increments of 10 pounds or less in pizza boxes. Very wet HMX or RDX is prepared for burning by adding 10 gallons or less of the wet mixture to wood pulp in an empty SLID or cardboard box. The wood pulp absorbs the excess water to form a paste like material

that also absorbs diesel fuel added to the mixture as extra fuel just prior to burning. When generated, these HMX or RDX wastes are stored at one of the permitted explosive storage units or in one of the less than 90-day explosive waste storage areas at the Bacchus Facility.

4.6 NIROP BURNING GROUNDS

Whenever operators are working inside the NIROP Burning Grounds, the following safety procedures are put into practice:

1. Egress paths are always maintained as shown in Figure 6.7-2;
2. The main gate into the NIROP Burning Grounds remains open;
3. All gates or doors into a burn pan or cage remains open while operators are inside;
4. Operators always prepare outer burn pans for ignition first and work towards the center;
5. The NIROP Burning Grounds firing system has two separate interlocks that are disconnected while operators are inside the NIROP Burning Grounds; and
6. Weather conditions are monitored to assure operators are not exposed to risks from lightning strikes.

The NIROP Burning Grounds (Figure 4-6.10 and Figure 4-6.11) is a hazardous waste thermal treatment unit designed to treat explosive wastes via open burning. This unit is not permitted to open detonate wastes. When conducting an open burn ATK follows the steps identified below:

1. Pre-burn inspection;
2. Placement of waste on burn pans;
3. Squibbing and ignition and
4. Post-burn inspection and clean up.

These steps are described in the following sections.

4.6.1 Pre-burn Inspection

Prior to bringing any reactive waste into the NIROP Burning Grounds, ATK conducts a pre-burn inspection (Figure 4-6.12). This inspection confirms that all previous cleaning activities are complete, and verifies the location of all untreated waste or unburned residue. The following operational items are checked during this inspection:

1. Previously used burn pans or cages are checked for untreated waste and unburned residue;
2. Previously used burn pans or cages are checked for ejected material;
3. Previously used burn pans or cages are checked to make sure that they were cleaned properly;
4. Burn pans or cages are checked for leachate leakage; and
5. A resistance check is conducted on the firing circuit for each burn pan and cage. This verifies that the previous burn did not damage or short circuit the firing system. Any resistance reading indicates that the firing circuit has been damaged or short-circuited.

Any burn pan or cage that fails one or more of the pre-burn inspection criteria will be removed from service until the problem is corrected. The pre-burn inspection also

checks the operational status of the communication systems (radios & telephone), the warning siren and flashing light, and the availability and status of the fire extinguishers, containment measures (e.g. firebreaks), fire blankets, diesel storage and interlocks.

The following actions will be taken to address deficiencies found during the pre-burn inspection.

- A burn pan or cage will be taken out of service if the area immediately surrounding the burn pan or cage has not been cleaned including ejected material, there is leachate leakage from a burn pan or it has a short circuit in the firing system. The burn pan or cage cannot be returned to service until the deficiency has been corrected.

- The NIROP Burning Grounds must always have at least one operational form of communication (radio or telephone). The NIROP Burning Grounds will be shut down if no radio or telephone is available.

- An inoperable fire extinguisher or the loss of any of the fire blankets (see Table 6.4) will shut down the facility until the deficiency can be corrected.

- All leaks or spills of diesel fuel must be addressed before the NIROP Burning Grounds can be operated. Large leaks associated with the diesel storage system may require that the storage system be shutdown and drained. If this situation occurs, ATK will use an alternate source of diesel fuel until the diesel fuel storage system can be repaired.

- The siren and flashing light will be tested prior to any burn. The loss of siren and/or flashing light will require that ATK shut down the NIROP Burning Grounds until the problem is corrected. If ATK must use the NIROP Burning Grounds they will have the Bacchus Facility Fire Department or area supervision enter and inspect the area around the NIROP Burning Grounds to assure that personnel not directly involved with the hazardous waste treatment operations are not in the area. At a minimum, the area to be inspected will be the quantity distance area depicted around the Burning Grounds in Figure 2-3.12. If any unauthorized employees are found during the inspection, they will be escorted from this area. Open burning operations can commence once the fire department or area supervisor have cleared the area.

The pre-burn inspection is required on days when an open burn is conducted. A pre-burn inspection will be conducted once every calendar month if no pre-burn inspection has been conducted during that calendar month.

4.6.2 Placement of Waste on Burn Pans

Following the completion of an acceptable pre-burn inspection, containers of reactive wastes are delivered to the NIROP Burning Grounds in a transportation vehicle approved by the Bacchus Facility Safety Department. The transport vehicle is backed up to a burn pan and the reactive wastes are transferred onto the burn pan. For large items, such as SLIDs, a forklift is used to unload the vehicle and transfer the reactive wastes onto the burn pan. At least two, but no more than six operators are involved in the waste unloading operation. Only one vehicle is unloaded at a time.

With limited exceptions (e.g., propellant necks), a maximum of 500 pounds of waste can be placed on each burn pan or inside a burn cage, including Cage 12 and Cage 19. The NIROP Burning Grounds has a treatment limit of 4,500 pounds per day.

Certain reactive wastes such as dry ingredients, liquid explosive slums and Class 1.1 propellant slums have significant explosive safety hazards. Therefore, these wastes are handled in accordance with the details provided in Figure 4-6.13. Operators at the NIROP Burning Grounds are trained in accordance with the procedures described in ATK procedure document 21000GV0001 "Burning Propellant at NIROP Burning Grounds", an internal confidential document. Revisions to this document are managed by the Bacchus Facility Production Control group in accordance with internal procedure OP-43 "Bacchus Manufacturing Documentation Control" and require written authorization from the Environmental, Operations and Safety departments. Operators are trained to new revisions of this procedure within 30 days of issuance using the training system described in Section 7.

Cardboard is placed underneath all liquid explosive slums to contain any free liquid that may not be fully absorbed in wood pulp. Likewise, wood pallets are placed under explosive wastes that are collected wet or need additional combustible material to assure a complete burn.

Burn pan 16 (Figure 4-6.14) is surrounded by a cage and is used to burn small ordnance items or other items that may move somewhat during burning. This cage is not intended for intact rocket motors or larger items known to be propulsive. Propulsive items must be rendered non-propulsive before they can be burned at the NIROP Burning Grounds. For example, this may involve cutting or splitting a rocket motor in half or securing to a burn pan before treatment. Ordnance items often burn with no visual indication that the reactive waste material has been completely treated. For this reason, ordnance items are always burned twice.

Cages 12 and 19 (Figure 4-6.15) are used for wastes which are contaminated with small amounts of Class 1.1, Class 1.3, or dry ingredients. These wastes are lightly contaminated materials (e.g., lightly contaminated slum bags, packaging, contaminated containers, etc.) and are stacked inside the cage to promote a complete burn.

Immediately after placing waste on a pan, the empty container is inspected for any contamination. SLIDs and slum pots are reused if no contamination is found. If contamination is found it is carefully cleaned at the NIROP Burning Grounds with a rag and solvent, which is then placed on the burn pan or cage for treatment. Soap and water is the solvent used for cleaning slum pots contaminated with wastes that do not contain HMX. Butyrolactone (BLO) is the solvent used for wastes that do contain HMX and that are not easily cleaned with soap and water. If the container is a slum pot that could not be decontaminated simply by wiping down the container, it is taken to the Waste Water Treatment Plant where it can be steam cleaned prior to reuse. If a SLID cannot be decontaminated, it will be burned. Note that these cleaning steps are used for SLIDs and slum pots located throughout the Bacchus Facility.

Each burn pan is divided into 16 burn stations that are identified on the side of each burn pan. After placing the explosive waste in a burn pan the treatment date, burn pan number and burn station are recorded as described in Section 4.3.1. Larger items such

as SLIDs are placed in a burn pan and assigned the closest burn station, this information is entered onto the explosive waste tag and into electronic reactive waste database as described in Section 4.3.1. Cage 12 and Cage 19 do not have burn stations, so only the cage number and station No. 1 is recorded in the electronic reactive waste database as described in Section 4.3.1. After all of the explosive waste tags have been gathered they are used to complete the Burning Grounds Log Sheet shown in Figure 4-6.16.

4.6.3 Squibbing and Ignition

After all of the burn pans and cages have been loaded the transport vehicles have been removed and all non-essential personnel leave the NIROP Burning Grounds, ATK begins the final preparations for the burn. The final step in preparing a burn known as "squibbing", which is defined as cutting the container open, adding diesel, if necessary, and attaching the igniter. The squibbing operation is completed by a minimum of two operators. A separate employee, who can provide emergency assistance or summon help in the event of an emergency, observes their activities. This typically occurs using the camera system at the NIROP Burning Grounds. In the event that the camera is not working, the observer must remain a minimum of 400 feet from the NIROP Burning Grounds and maintain constant visual surveillance. This person will always have immediate access to an emergency communication device.

With the exception of pure propellant in SLIDs and other forms of pure propellant, all waste is sprinkled with diesel fuel to assure ignition and complete burning. Slum bags are carefully split open with a linoleum knife to expose the waste and sprinkled with diesel fuel. HMX and RDX arrive at the NIROP Burning grounds in cardboard boxes, which are sprinkled with diesel fuel immediately after the lid of the cardboard boxes is removed to expose the HMX and RDX. Other containers such as 1) vent socks in shallow cardboard boxes and 2) diapers in fiberboard drums have diesel applied to the container contents. Wastes containing significant amounts of AP or AP\aluminum mixtures are heavily soaked with diesel fuel to assure an even burn. An MSDS for the diesel fuel is included in Appendix 4-A.

For safety reasons, burn pans with liquid explosive slums are squibbed first. Liquid explosive slums are not treated in any of the burn cages. The contents of these slum bags are carefully spread out on the cardboard as described in Figure 4-6.13 prior to being wetted with diesel fuel.

An ignition train consisting of a Class 1.1 or Class 1.3 granular explosive is then poured in an approximate one-half inch high by four inch wide train down the length of the burn pan. This ignition train connects all of the waste to the ignition source and is used for all types of reactive waste placed on a burn pan. Near the firing circuit location (metal pylon at front of the burn pan), approximately one cup of ignition powder is placed at the point where the igniter will be inserted. An MSDS for the granular ignition powder is included in Appendix 4-B.

Igniters are constructed by ATK at the Bacchus Facility and consist of two approximate 6-foot long lengths of wire connected together at the center to a short 2-inch length of nichrome wire. The nichrome section of the igniter is inserted into ignition train and the other ends of the wire are twisted onto the firing circuit at the pylon.

After all of the prepared burn pans and cages are readied for firing, the operators retire to the control room. The interlocks are placed into the firing control console and the firing control computer is activated. A flashing red light and 30-second siren are activated once the firing system is operational to alert personnel inside the QD for the NIROP Burning Grounds that a burning operation is about to be started.

The firing system then performs a resistance check to assure that the igniters have been installed correctly into the hard-wired portion of the firing system. Each firing circuit must have a resistance of 50 ohms or less. In the event that one or more burn pans or cages have a bad resistance reading, operators remove the interlocks and deactivate the firing system, then reenter the NIROP Burning Grounds to correct the problem. If the resistance problem cannot be immediately corrected, a separate igniter wire is run from the pylon at an adjacent burn pan or cage. If a spare firing circuit is not available (all adjacent burn pans are loaded), an attempt to fire the burn pan or cage using the questionable pylon may still be made during burning operations.

Each burn pan or cage is then ignited in the order selected by the operators. Burn order is generally selected to allow the waste to burn against the wind direction. The burn is observed with a video camera in the control room to verify proper ignition.

In the event of a misfire on one or more burn pans or cages, operators must wait a minimum period before reentering the NIROP Burning Grounds to correct the problem. If none of the burn pans or cages ignite, this minimum wait period is 30 minutes. If at least one burn pan or cage ignites, then the wait period before reentering is a minimum of four hours and only when burning is mostly complete. Correction of the misfire may require running a separate igniter wire from the pylon at an adjacent burn pan.

The daily NIROP Burning Grounds Log is reviewed and maintained by area supervision. The sheet is reviewed to assure all items have been recorded and to note any items that may require corrective action. Note that this record also identifies the quantities of combustibles (cardboard, wood pallets), diesel fuel, and ignition train explosive used during each burn. All items will be documented and the information will be entered into the operating record database. The completed forms are maintained in accordance with the requirements of R315-264-73 of the Utah Admin. Code.

4.6.4 Post-Burn Inspection and Cleanup Barring an unusual situation such as a misfire, there is a 16-hour lapse before any operators can return to the NIROP Burning Grounds to inspect and cleanup after a burn. Each post-burn inspection and cleanup is documented using the checklist shown in Figure 4-6.17. Operators check for hot spots or smoldering residue prior to cleaning. Any burn pan found to contain a hot spot is isolated until the treatment is complete before proceeding with cleaning activities. Cleaning generally occurs the day after a burn depending on certain weather conditions. If it has snowed since the last burn, it may not be possible to clean unburned residue from a pan or cage, or to clean the asphalt around the pans or cages.

All residues remaining on the burn pans are visually inspected to determine if there is any unburned explosive residue. Unburned explosive residues are carefully gathered in one spot on the burn pan or cage and reburned or containerized as described below. All residues that have been completely treated are collected and containerized for proper off-site disposal. The NIROP Burning Grounds ash is a derived from hazardous waste

due to laboratory solvents. This ash is sent off-site for disposal in accordance with all applicable state and federal regulations. The treated residue may contain trace amounts of propellant constituents, but waste characterization has determined that it is no longer a D003 reactive hazardous waste. ATK characterizes the burn ground residues annually in accordance with Section 3.5.1 of this permit.

After the burn pans are cleaned, a mechanical sweeper is used to collect all treated residue from the asphalt around the burn pans or cages, if the asphalt does not have any accumulations of snow or ice. This collected material is containerized with the other treatment residue from the burn pans or cages for off-site disposal.

Leachate that collects inside the burn pans from wetting or precipitation is periodically removed from the burn pans with vacuum truck. The leachate is transported to an approved TSDF for disposal or discharged to a POTW.

Untreated residue and unburned waste will be managed in the following manner:

- Small amounts of untreated residue will be considered as newly generated waste and will be tracked as such in the explosive waste tracking system. This small amount is defined as 5% of the total volume placed on the pan or cage. The primary option for managing this waste is to burn it by 6pm of the following calendar day. If the untreated residue cannot be treated by 6pm of the following calendar day then it will be managed in accordance with R315-262 of the Utah Admin. Code.

- Unburned waste that results from a misfire or an interrupted ignition can remain on a burn pan. An interrupted ignition occurs when anything greater than 5% of the waste on the pan fails to ignite. In this situation, the waste is considered unreacted waste instead of newly generated residue. ATK will attempt to reburn the waste by 6pm of the following calendar day. If unforeseen circumstances prevent the burn from occurring by 6pm of the following day, the waste will be covered and the burn pan will be labeled and managed as a 90-day storage area in accordance with the requirements of R315-262 of the Utah Admin. Code. A plastic burn pan cover has been developed that can cover an entire burn pan. This cover will hold unburned waste on the burn pan until it can be treated under appropriate conditions. The cumulative storage time for the waste both in storage prior to burning and on the burn pan would be 90-days. If it is necessary to storage this waste for greater than 90-days, an emergency permit would be requested.

- Certain waste may already be older than 90-days when placed on a burn pan. If any such waste remains unburned after a burn attempt, the unreacted waste will be reburned by 6 pm of the following calendar day. If it is not possible to reburn this waste by 6 pm of the following calendar day, an emergency storage permit would be requested for this waste.

- Certain unburned wastes cannot be safely handled if temperatures fall below certain levels (54 degrees F for nitroglycerine wastes and 10 degrees for Class 1.1 propellant). These wastes must be left uncovered until the temperatures rises high enough to allow preparations for burning or handling (covering) for 90-day

storage. ATK will request an emergency permit if such waste cannot be burned or covered by 6 pm on the calendar day after the waste was set out.

- Ordnance wastes must be burned twice to assure that the treatment is complete. Since the second burn is part of the prescribed treatment methodology for this waste stream, ordnance waste will not be considered as newly generated waste after the first burn. If ordnance waste can not be reburned by 6 PM the following calendar day from the first burn then it will be managed in accordance with R315-262 of the Utah Admin. Code. This waste must be inspected weekly until the material is treated the second time. This inspection is documented on the weekly inspection log (Figure 5-2.3).

4.6.5 Run-on Run-off Controls

Run-on from precipitation is mitigated at the NIROP Burning Grounds by the use of earthen berms and asphalt curbing around the operating area. All precipitation falling outside of the NIROP Burning Grounds is channeled around the operating area, diverted to drainage structures and then forwarded to the drainage basin north of the operating area.

Run-off from precipitation that falls within the operating area of the NIROP Burning Grounds is managed using asphalt curbing, berms, and ground slope to direct all storm water to two collection areas, which then convey the collected storm water to a treatment plant (see Figure 8-4). The treatment plant is designed to handle storm water generated within the operating area of the NIROP Burning Grounds for a 25-year, 24-hour storm event.

4.7 OFF-SITE DISPOSAL

Prior to the shipment of any hazardous waste to an off-site TSDF, containers are marked and labeled and shipping papers are prepared in accordance with 49 CFR 172, and R315-262 and R315-264-1103Appendix I. Only permitted treatment storage and disposal facilities are used.

4.8 RECEIVING HAZARDOUS WASTE FROM OFF-SITE

ATK periodically receives chemical and reactive hazardous waste at the Bacchus Facility from off-site sources. This is usually limited to chemical and reactive hazardous waste generated at other ATK owned facilities. However, ATK does receive reactive hazardous waste, including but not limited to rocket motor segments that are not ATK generated hazardous waste for storage. All hazardous waste received from an off-site source will be managed at one of the permitted storage units. All off-site generated hazardous waste will be reviewed and approved prior to being accepted using the following criteria.

- EPA hazardous waste number(s);
- Physical description;
- Chemical description;
- Source of the waste;
- Sampling frequency;
- Parameter for Analysis;
- Handling code;
- Tracking system number;

- DOT shipping description; and
- Safe handling instructions

Upon receipt, all off-site generated hazardous waste will be visually inspected to ensure that it meets the acceptance criteria, the manifest is correct, and the containers are labeled, closed, in good condition and compatible with the waste. All discrepancies will be resolved with the generator before the waste is received. After the waste has been accepted, it will be managed using the tracking systems described in Sections 4.3.

Purge water generated by ATK at the Bacchus Facility's off-site groundwater monitoring wells is exempt from the prior approval requirements in this section, but it will be managed in accordance with R315-262 of the Utah Admin. Code, and tracked as described Section 4.3.

4.9 STORING WASTES FOR LONGER THAN ONE YEAR

Under the conditions described below the following materials may be stored for longer than one year:

- Wastes designated for disposal at UTTR where disposal arrangements and/or approvals cannot be completed within one year.
- Rocket motors or motor sections that lack adequate approvals to ship off-site and/or lack sensitivity data to develop a disposal plan in less than one year.

A report will be submitted annually no later than January 31st identifying any waste in storage longer than one year. This report will detail the steps taken to get the waste off-site, explain why ATK was unsuccessful in its attempt to ship this waste off-site and identify when ATK projects that they will be able to ship the waste off-site.

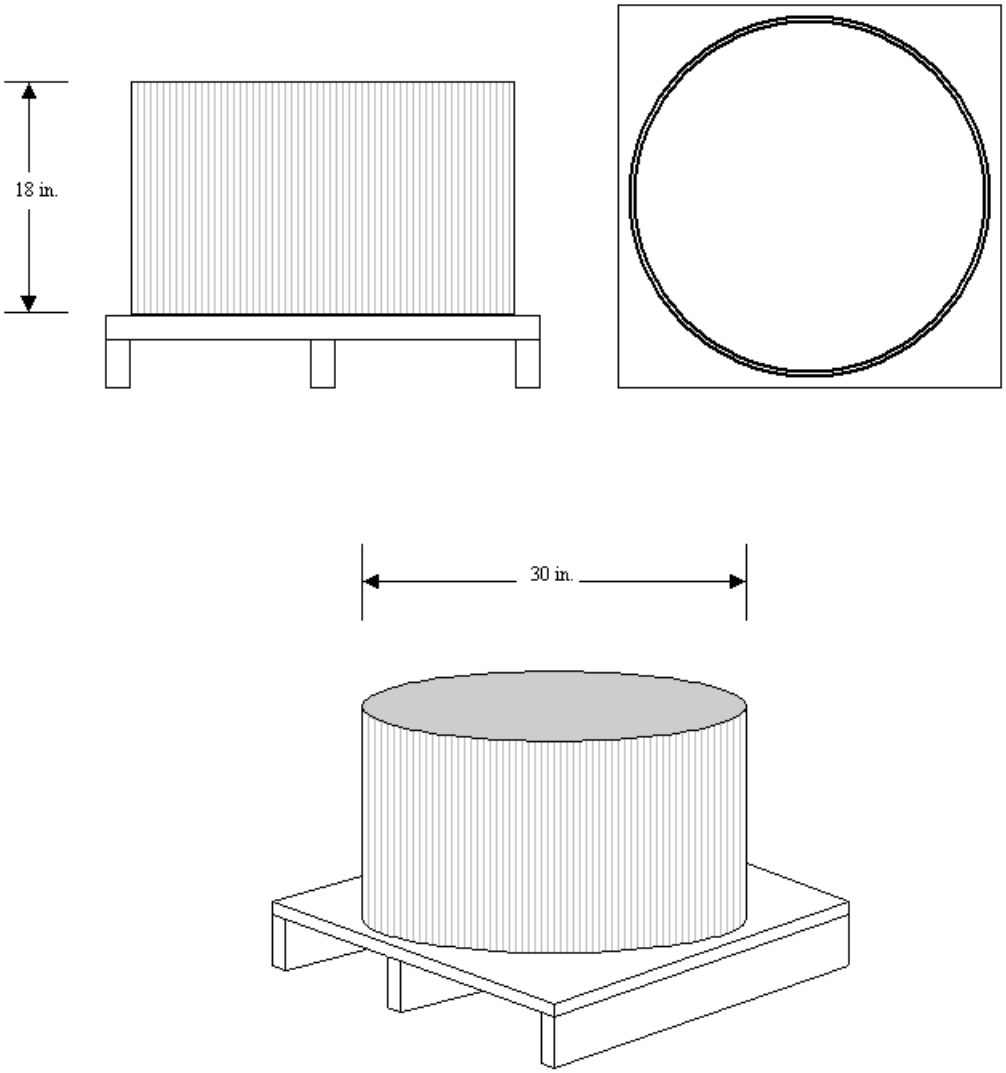
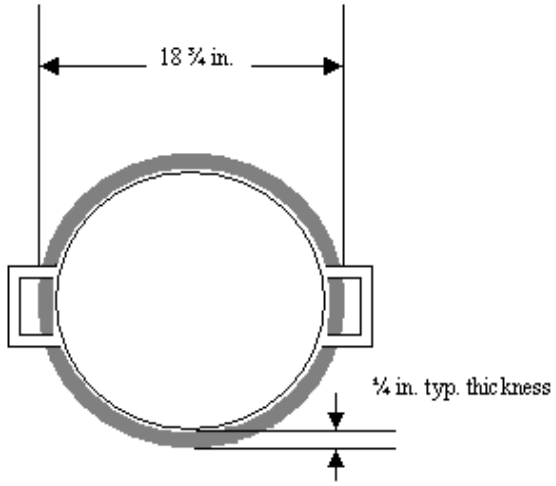
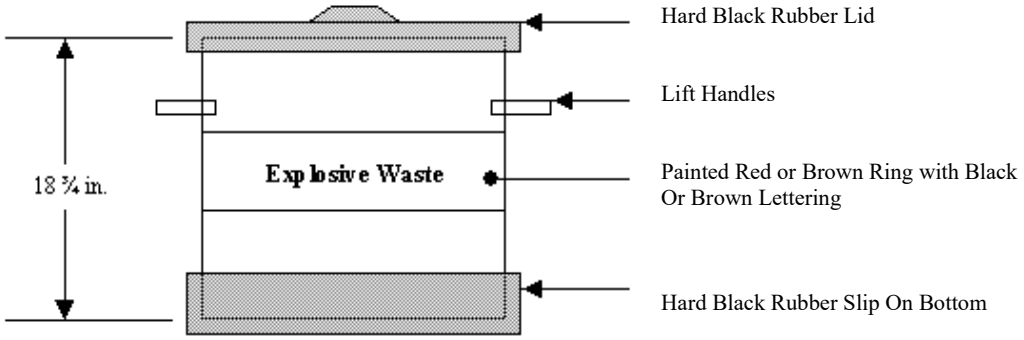


Figure 4-2.1
SLID (Not To Scale)



Top View (Lid Removed)



Front View

Construction
- Seamless Cold- Rolled Aluminum
- Welded Aluminum Handles
- Hard Rubber Lid and Bottom
- Painted Explosive Warning Band
  - Explosive Waste
  - HTPB Waste

Figure 4-2.2
SLUM POT (Not To Scale)

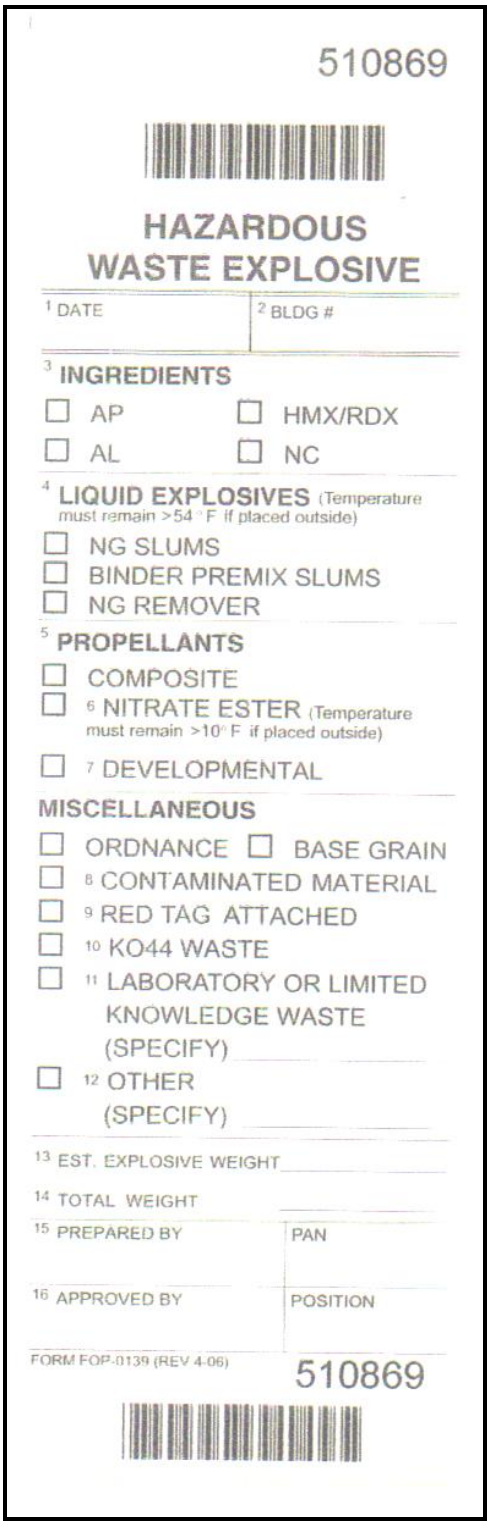


Figure 4-2.3
Hazardous Waste Explosive Tag

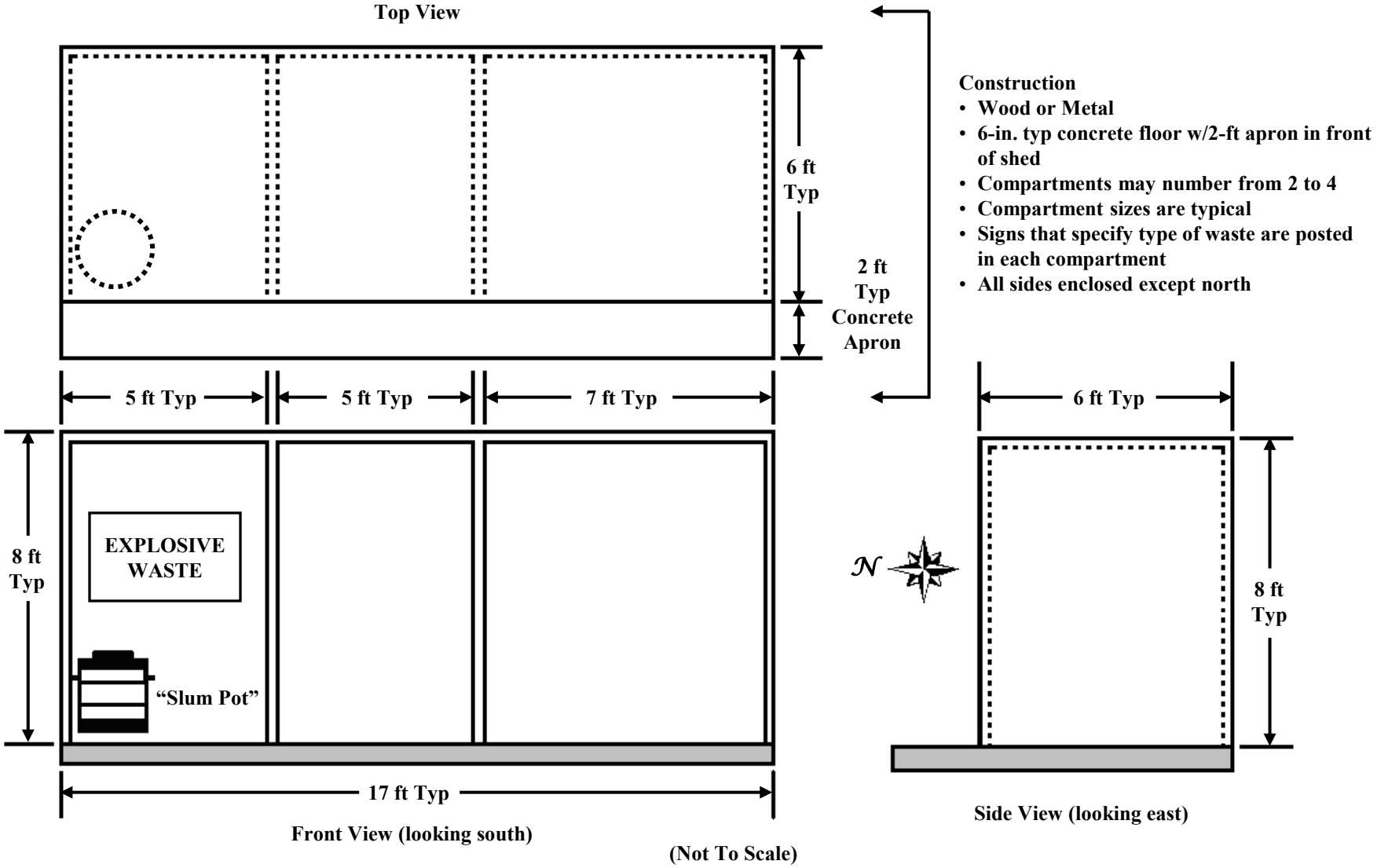


Figure 4-2.4
Typical Explosive Waste Temporary Collection Shed

Figure 4-4.5
ES-2 Explosive Storage Building

ES-2 is cited for 40,000 pounds of Explosive waste

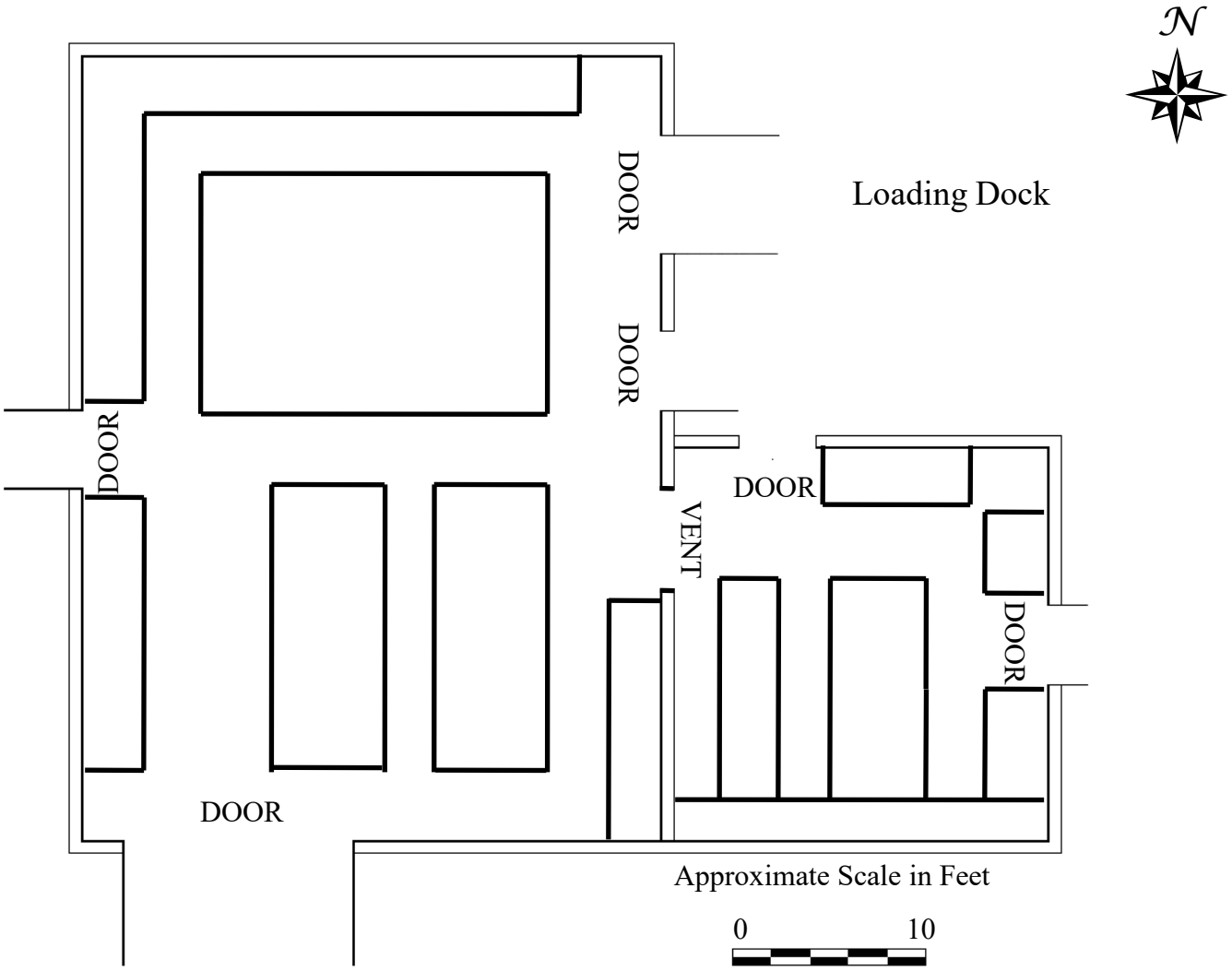


Figure 4-4.6
ES-2 Floor Plan and Typical Storage Configuration

Figure 4-4.7
Ash Storage Pad
Pad/Gondola

Figure 4-4.8
ES-3 Explosive Storage Building

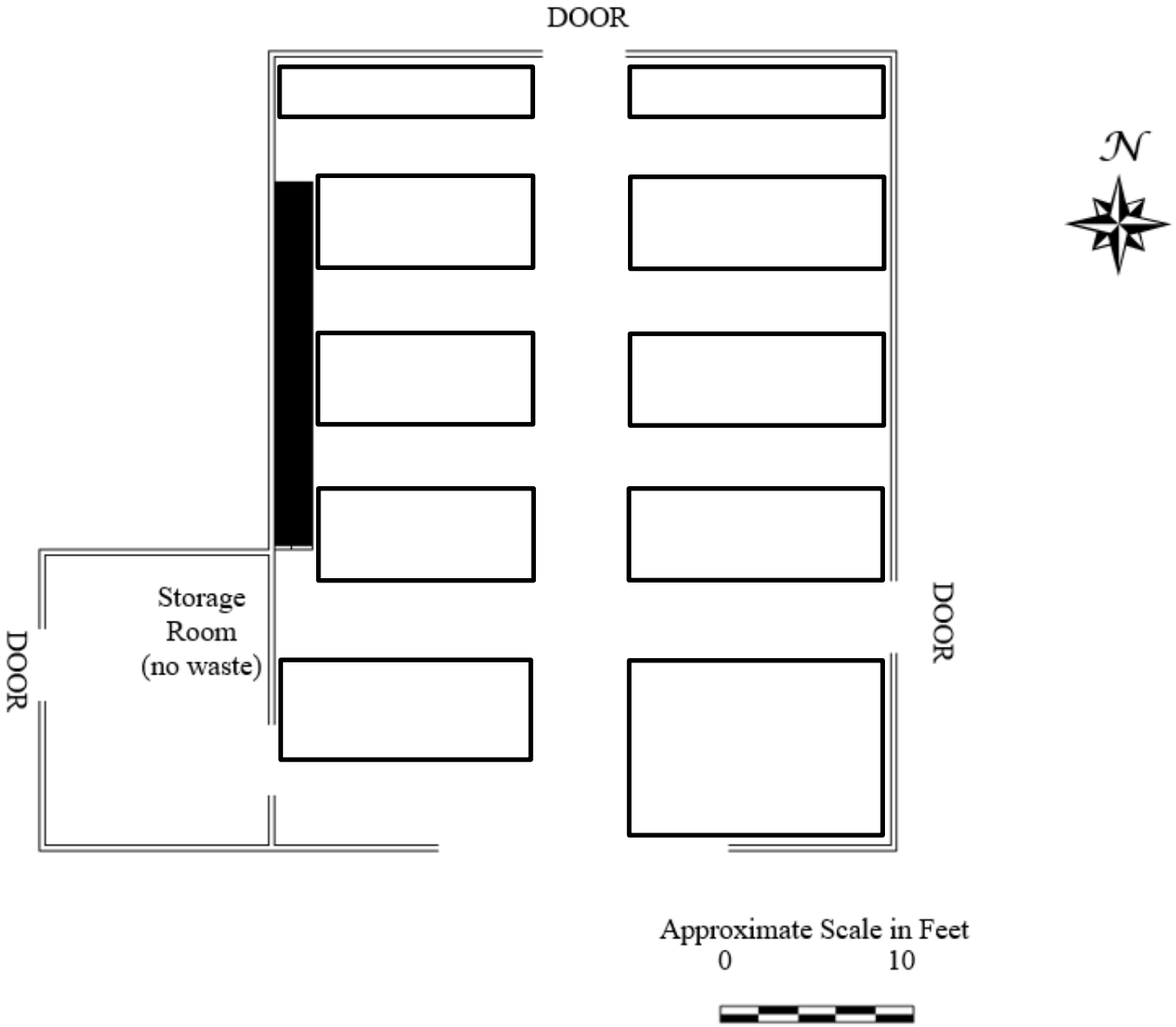


Figure 4-4.9
ES-3 Floor Plan and Typical Storage Configuration

Figure 4-6.10
NIROP BURNING GROUNDS

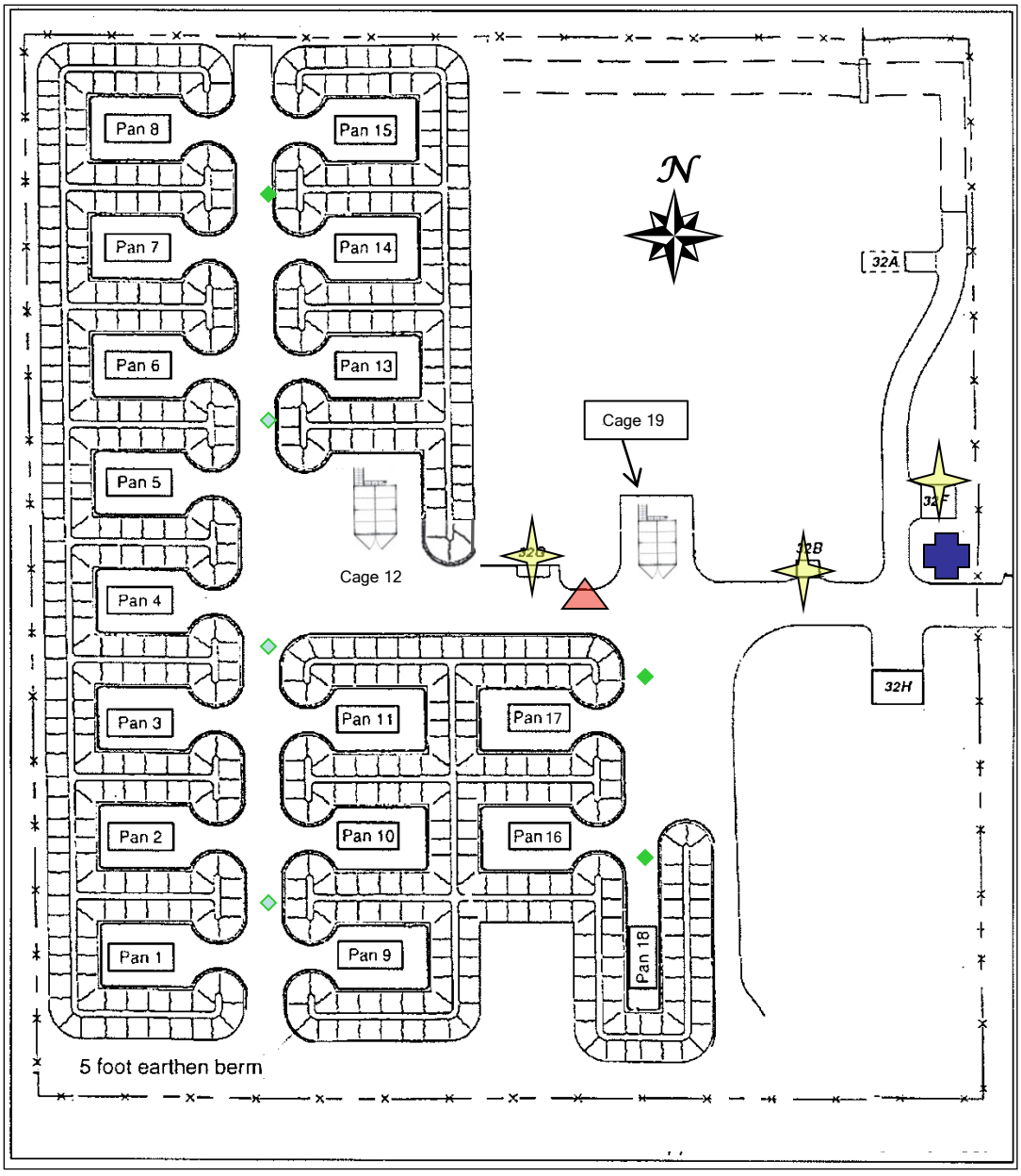


Figure 4-6.11
NIROP Burning Grounds

Telephone, Sirens, Flashing Lights

Fire Blankets

Fire Hydrant

Hose Bibs, Hose, and Racks

FIGURE 4-6.12

BURNING GROUNDS PRE BURN INSPECTION

RECORDED BY:_____ DATE:_____

SUPERVISOR:_____ TIME:_____

✓- ACCEPTABLE X – UNACCEPTABLE (Describe in Comments below)

PAN OR CAGE NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
RESISTANCE CHECK FOR SHORT CIRCUITS	CHECK COMPLETE ☐ LIST PANS/CAGE THAT FAIL & ARE OUT OF SERVICE DUE TO RESISTANCE ISSUES _____																		
CHECK PREVIOUS POST BURN INSPECTION FOR LOCATION OF RESIDUE AND UNBURNED SLUMS, IDENTIFY WITH A ✓ NOTE LOCATION OF RESIDUE IN A BOX IN COMMENTS BELOW																			
SAFETY ITEMS AT CONTROL BUNKER	SIREN AND FLASHING LIGHT OPERATIONAL ☐ RADIO OPERATIONAL ☐ VERIFY BURNING GROUNDS SIGN IS INTACT AND IN GOOD REPAIR ☐ **FIRING SYSTEM KEY AND PLUG (RED) REMOVED FROM FIRING SYSTEM AND IN POSSESSION OF OPERATORS BEFORE ENTERING BURNING GROUNDS** ☐																		
INSPECT AND VERIFY ALL PANS OR CAGES ARE READY FOR FRESH WASTE (CLEANED, NO EJECTED MATERIAL, GATHERED RESIDUE, NO UNBURNED SLUMS)																			
PANS AND CAGES CHECKED FOR LEACHATE LEAKAGE																			
SAFETY ITEMS AT BURNING GROUNDS	TELEPHONE OPERATIONAL ☐ FIRE EXTINGUISHER OPERATIONAL ☐ FIRE BLANKETS (3) AVAILABLE ☐ DIESEL STORAGE ACCEPTABLE (NO LEAKS) ☐																		

COMMENTS: Describe any unacceptable conditions identified above. Describe unusual operational problems and corrective actions taken. Use back if necessary.

CORRECTIVE ACTION:

Figure 4-6.13
Restrictions on Placement of Explosive Waste at the NIROP Burning Grounds

Waste Type	Burn Pan Restriction/Requirement
Liquid Explosives	1. No other waste type may be placed on a pan with liquid explosives with the exception of waste base grain used for ignition purposes. 2. Liquid explosives wastes may not be placed in a cage. 3. A single bag or an aggregate of bags not to exceed 35 pounds total weight may be placed at a station; stations with liquid explosive waste must be separated by **four** feet. 4. Cardboard must be placed under each bag of liquid explosive waste.
Nitroglycerine remover	1. No other waste may be placed on a pan that contains nitroglycerine remover waste.
Class 1.1 waste	1. Bags containing primarily Class 1.1 propellant may only be placed in a single row down the middle of the burn pan. 2. Class 1.1 wastes must be separated from Class 1.3 wastes by a minimum of **three** feet. 3. D-5 casting necks may weigh up to 650 pounds. 4. Waste may not be placed on a pan parallel or opposite to a pan containing a D-5 casting neck. 5. Only **three** Class 1.1 diapers may be burned on pan. Each diaper must be contained within an empty SLID.
HMX and RDX (Dry Ingredient Wastestream)	1. Dry HMX or RDX or dry ingredient mixtures are burned in shallow 30" x 30" cardboard boxes. Only **four** boxes may be burned per pan. 2. Cardboard boxes of HMX or RDX or dry ingredient mixtures must be separated from each other by a minimum of **three** feet. 3. Very wet HMX or RDX waste must be burned in empty SLIDs or cardboard boxes and desensitized with wood pulp. No more than 10 gallons of very wet HMX or RDX may be placed in each container.
Vent Socks (Dry Ingredient Wastestream)	1. Lightly contaminated vent socks may be unrolled and placed in Cage 12 or Cage 19. 2. Heavily contaminated vent socks are burned in shallow cardboard boxes. Only **three** boxes may be placed on a burn pan. 3. No other waste type may be placed on a pan with heavily contaminated vent socks. 4. Heavily contaminated vent socks may only be placed in a single layer in the cardboard box.
AP and aluminum (Dry Ingredient Wastestream)	1. AP or aluminum waste must be separated by **three** feet from other wastes when burned on a pan (does not apply to Cage 12 or Cage 19). 2. AP or aluminum waste must be heavily dieseled to assure a uniform burn.
Laboratory or Propellant Development waste	1. Laboratory or propellant development waste must be separated by **three** feet from all other explosive wastes.
Ordnance or potentially propulsive items (Class 1.1 wastestream)	1. Ordnance or potentially propulsive items must be burned in Burn Pan 16, Cage 12, or Cage 19. 2. Ordnance or potentially propulsive items must be burned **three** feet from any other waste placed in Burn Pan 16, Cage 12 or Cage 19. 3. Ordnance items must be burned twice.
Class 1.3 waste	1. Class 1.3 wastes must be separated from Class 1.1 wastes by a minimum of **three** feet. 2. A maximum of **five** Class 1.3 diapers may be burned on a burn pan. Each diaper may remain in its fiberboard drum.
Note: With the exception of propellant casting necks, the weight limit for burn pans is 500 pounds including the weight of combustibles, ignition powder and diesel fuel unless limited by the above restrictions.	

Figure 4-6.14
Burning Grounds Cage 16

Figure 4-6.15
Burning Grounds Cage 19
(Picture is looking North)

FIGURE 4-6.16

BURNING GROUNDS LOG

Recorded By: _____ Date: _____

Checked By: _____ Time: _____

Supervisor : _____ Wind Direction - From: _____

Pan Burn Order: _____

✓ - Acceptable X - Unacceptable

PAN NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Slums Per Pan Total Slums All Pans																			
Explosive Wt./Pan Explosive Wt. All Pans																			
Total Wt./Pan Total Wt. All Pans																			
Liquid Explosive Slums Separated By 4 Feet Or More From Others																			

Description Of Slum		Slum Number	Explosive Weight	Total Weight
Liquid Explosive Slums	D003			
1.1 Explosive Slums	D003			
Catch Tank Slums	K044			
Lab Slums	D003			
Dry Ingredient Slums	D003			
1.3 Explosive Slums	D003			
NG Remover Slums	D003			
Unusual R&D Slums	D003			
Total Number and Weight of Slums				

Diesel -
Base Grain -
Combustibles -

Comments: Describe any unusual slums or operational problems and the corrective action taken. Use back if necessary.

Corrective Action:

FIGURE 4-6.17

BURNING GROUNDS POST BURN INSPECTION

RECORDED BY:_____ FOR BURN OCCURING ON:_____

SUPERVISOR:_____

✓- ACCEPTABLE X – UNACCEPTABLE (Describe in Comments Below)

PAN or CAGE NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Pan or Cage checked for open flame or hot spots, if found check box below																			
Pans or Cages cleaned including: 1. Surface cleaned 2. Unburned residue collected on pans, cages or in separate container 3. Ejected items picked up and put on pan or cage 4. Surface around pans and cages swept to collect ash, weather permitting 5. BG ash placed in proper container 6. Cover residue or unburned waste if not burned by 5 PM, temperatures permitting																			
Date pan or cage cleaned (Operators Initial)																			

Identify Pans, Cages or Container with unburned residue _____

IDENTIFY SITUATIONS AFFECTING CLEANING THE DAY AFTER A BURN

☐ Unburned waste (Misfires, failure to ignite) PANS or CAGES _____

☐ Ordnance & bleed tubes (clean after second burn) CAGE 12, 16 or 19 (Circle)

☐ Bulk propellant burn on Friday PANS _____

☐ Snow covers pans between burn and cleaning PANS or CAGES _____

☐ Hot spots still observed on pans (Isolate pans) PANS or CAGES _____

☐ Open flame still observed on pans (Isolate Burning Grounds)
PANS or CAGES _____

☐ Cleaning of Cage 12 or Cage 19 (minimum 36 hours after ignition)

☐ Asphalt not swept because of snow, ice, precipitation, or winds over 35 mph

SAFETY ITEMS	STATUS
Radio is Operational	
Telephone is Operational	
Fire extinguishers are available for use	
Fire blankets (3) are available for use	
Diesel Storage Acceptable (no leaks)	
BG firing system key and plug remain with operators	

COMMENTS:

GASC0210 Revised 12-JAN-1994 Printed 10-JAN-1996

No. 1 Diesel Fuel, No. 1 Fuel Oil

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Tradenames and Synonyms

Fuel Oil, No. 1
Diesel Fuel, No. 1
Diesel Fuel, No. 1, Low Sulfur
Kerosene, Low Sulfur
3501, 3511, 3554, 4195 - Conoco Product Codes

Company Identification

MANUFACTURER/DISTRIBUTOR
CONOCO INC.
P.O. BOX 2197
HOUSTON, TX 77252

PHONE NUMBERS

Product Information	1-713-293-5550
Transport Emergency	CHEMTREC 1-800-424-9300
Medical Emergency	1-800-441-3637

COMPOSITION/INFORMATION ON INGREDIENTS

 # Components

Material	CAS Number	%
Straight Run Kerosene	8008-20-6	
and/or		
Hydrodesulfurized Kerosene	64742-81-0	

Petroleum distillate exposure limit applies.

(Continued)

HAZARDS IDENTIFICATION

Potential Health Effects

Substance Information
Primary Routes of Entry: Skin, inhalation

The product may cause irritation to the eyes, nose, throat, lungs, and skin after prolonged or repeated exposure. Extreme overexposure or aspiration into the lungs may cause lung damage or death. Overexposure may cause weakness, headache, nausea, confusion, blurred vision, drowsiness, and other nervous system effects; greater overexposure may cause dizziness, slurred speech, flushed face, aortic plaques, heart beat irregularities, unconsciousness, and convulsions.

Pulmonary fibrosis has been reported in cable plant workers exposed to mist and vapors of mineral oils and kerosene for 5-35 years. Because of mixed exposures to mineral oils as well as kerosene, it is difficult to attribute these effects to kerosene alone.

Individuals with pre-existing diseases of the lungs, liver, or kidneys may have increased susceptibility to the toxicity of excessive exposures.

Combustion Product:
Carbon monoxide is a gas that can result from incomplete combustion of hydrocarbons, from detoxification of some chemicals like methylene chloride, tobacco smoke, and even from natural body processes. Carbon monoxide binds tightly to hemoglobin and interferes with oxygen transport to body tissues. Overexposure can cause headache, nausea, nervous system depression, coma, and death.

Carcinogenicity Information
None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

FIRST AID MEASURES

First Aid
INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

Wash skin thoroughly with soap and water. If irritation develops and persists, consult a physician.

(Continued)

FIRST AID MEASURES(Continued)

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

If swallowed, do not induce vomiting. Immediately give 2 glasses of water. Never give anything by mouth to an unconscious person. Call a physician.

Notes to Physicians

Activated charcoal mixture may be administered. To prepare activated charcoal mixture, suspend 50 grams activated charcoal in 400 mL water and mix thoroughly. Administer 5 mL/kg, or 350 mL for an average adult.

Because of the danger of aspiration, emesis or gastric lavage should not be employed unless the risk is justified by the presence of additional toxic substances. Activated charcoal may induce vomiting, but may be given after emesis or lavage to absorb toxic additives. Steroid therapy in mild to moderate cases does not improve outcome. Bacterial pneumonia often occurs after exposure, but prophylactic antibiotics are not indicated and should be reserved for documented bacterial pneumonia.

FIRE FIGHTING MEASURES

Flammable Properties

Flash Point	115 F (46 C)
Method	TCC
Flammable limits in Air, % by Volume	
LEL	0.5
UEL	6
Autoignition	410 F (210 C)

NFPA Classification Class II Combustible Liquid.

Vapor forms explosive mixture with air. Vapors or gases may travel considerable distances to ignition source and flash back.

Extinguishing Media

Water Spray, Foam, Dry Chemical, CO2.

Fire Fighting Instructions

Use water to keep fire-exposed containers cool. If a leak or spill has not ignited, use water spray to disperse the vapors and to provide protection for personnel attempting to stop a leak. Water spray may be used to flush spills away from sources of potential ignition.

Products of combustion may contain carbon monoxide, carbon dioxide, and other toxic materials. Do not enter enclosed or confined space without proper protective equipment including respiratory protection.

(Continued)

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)
Remove source of heat, sparks, flame, impact, friction, and electricity including internal combustion engines and power tools. If equipment is used for spill cleanup, it must be explosion-proof and suitable for flammable liquid and vapors.

NOTE: Vapors released from the spill may create an explosive atmosphere.

Initial Containment
Dike spill. Prevent material from entering sewers, waterways, or low areas.

Spill Clean Up
Soak up with sawdust, sand, oil dry or other absorbent material.

HANDLING AND STORAGE

Handling (Personnel)
Avoid breathing vapors or mist. Wash thoroughly after handling. Wash clothing after use.

 # Handling (Physical Aspects)
Ground container when pouring. Keep away from heat, sparks and flames. Close container after each use. Do not pressurize, cut, weld, braze, solder, grind, or drill on or near full or empty container. Empty container retains residue (liquid and/or vapor) and may explode in heat of a fire.

Storage
Store in accordance with National Fire Protection Association recommendations. Keep container tightly closed. Store in a well ventilated place. Store away from oxidizers, heat, sparks and flames.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls
Use only with adequate ventilation. Keep container tightly closed.

Personal Protective Equipment
RESPIRATORY PROTECTION
None normally required except in emergencies or when conditions cause excessive airborne levels of mists or vapors. Select appropriate NIOSH-approved respiratory protective equipment when exposed to sprays or mists. Proper respirator selection should be determined by adequately trained personnel and based on the contaminant(s), the degree of potential exposure, and published respirator protection factors.

PROTECTIVE GLOVES
Should be worn when the potential exists for prolonged or repeated

(Continued)

EXPOSURE CONTROLS/PERSONAL PROTECTION(Continued)

skin contact. NBR or neoprene recommended.

EYE/FACE PROTECTION
Wear safety glasses. Wear coverall chemical splash goggles and face shield when the possibility exists for eye and face contact due to splashing or spraying of material.

OTHER PROTECTIVE EQUIPMENT
Coveralls with long sleeves if splashing is probable. Launder contaminated clothing before reuse. Extremely contaminated leather shoes should be discarded.

Exposure Guidelines

Applicable Exposure Limits

Petroleum distillate exposure limit applies.

PEL	(OSHA)	500 ppm, 2000 mg/m3, 8 Hr. TWA
TLV	(ACGIH)	None Established
AEL *	(Du Pont)	None Established

* AEL is Du Pont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Boiling Point	330-572 F (166-300 C)
Vapor Pressure	2 mm Hg @ 68 F (20 C)
Vapor Density	>1 (Air = 1)
% Volatiles	(by volume) Nil
Solubility in Water	Insoluble
Odor	Paraffinic
Form	Liquid
Specific Gravity	0.81

Color : Undyed (clear or straw-colored)
Low sulfur diesel may be dyed red.

STABILITY AND REACTIVITY

Chemical Stability
Stable at normal temperatures and storage conditions.

Conditions to Avoid
Avoid heat, sparks, and flame.

Incompatibility with Other Materials
Incompatible with oxidizing materials.

Decomposition
Incomplete combustion may produce carbon monoxide.

Polymerization
Polymerization will not occur.

(Continued)

TOXICOLOGICAL INFORMATION

Animal Data

Animal studies have shown that prolonged or repeated inhalation exposures to high concentrations of some petroleum distillates have caused liver tumors in mice and kidney damage and tumors in male rats. However, kidney effects were not seen in similar studies involving female rats, guinea pigs, dogs, or monkeys. Present studies indicate the kidney effects will only occur in male rats. Also, human studies do not indicate this peculiar sensitivity for kidney damage and studies reported in 1992 showed that this particular type of rat kidney damage is not useful in predicting a human health hazard. The significance of liver tumors in mice exposed to high doses of chemicals is highly speculative and probably not a good indicator for predicting a potential human carcinogenic hazard.

Mouse skin painting studies have shown that petroleum middle distillates (boiling range 100-700 F; naphtha, jet fuel, diesel fuel, kerosene, etc.) can cause skin cancer when repeatedly applied and never washed from the animal's skin. The relative significance of this to human health is uncertain since the petroleum distillates were not washed from the skin and resulting skin effects (irritation, cell damage, etc.) may play a role in the tumorigenic response. A few studies have shown that washing the animal's skin with soap and water between treatments greatly reduces the carcinogenic effect of some petroleum oils. Other laboratory studies indicate that middle distillates caused the skin tumors by promoting, rather than initiating, the formation of tumors, so the effect is probably dose-related and low level exposure should not be carcinogenic.

Studies in mice and rats have shown that chronic exposure (8 hours/day, 7 days/week, 24 months) to unfiltered diesel exhaust produced tumors of the lungs and also lymphomas. On the basis of these studies, NIOSH recommends that whole diesel exhaust be regarded as a potential carcinogen.

DIESEL FUEL -
Skin : Extremely irritating; no mortality at 5 ml/kg, rabbit
Oral : LD50: 9 ml/kg, rat

DISPOSAL CONSIDERATIONS

Waste Disposal

Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations. Do not flush to surface water or sanitary sewer system.

By itself, the liquid is expected to be a RCRA ignitable hazardous waste, when disposed.

(Continued)

TRANSPORTATION INFORMATION

Shipping Information
INTERNATIONAL HM-181

Proper Shipping Name	Gas Oil
Hazard Class	3
UN/NA Number	UN 1202
Packing Group	III
Label	Flammable liquid
Placard	Flammable

DOMESTIC HM-181

Proper Shipping Name	Fuel oil (or) Diesel fuel
Hazard Class	Combustible liquid
UN/NA Number	NA 1993
Packing Group	III
Label	None
Placard	Combustible

Special Information:
Material must be shipped as a flammable liquid in accordance with the international description if shipped by vessel or air.

REGULATORY INFORMATION

U.S. Federal Regulations
OSHA HAZARD DETERMINATION
This material is hazardous as defined by OSHA's Hazard Communication Standard, 29 CFR 1910.1200.

CERCLA/SUPERFUND
Not applicable; this material is covered by the CERCLA petroleum exclusion. Releases are not reportable.

SARA, TITLE III, 302/304
This material is not known to contain extremely hazardous substances.

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute	: Yes
Chronic	: Yes
Fire	: Yes
Reactivity	: No
Pressure	: No

SARA, TITLE III, 313
This material is not known to contain any chemical(s) at a level of 1.0% or greater (0.1% for carcinogens) on the list of Toxic Chemicals and subject to release reporting requirements.

TSCA

(Continued)

REGULATORY INFORMATION(Continued)

Material and/or components are listed in the TSCA Inventory of Chemical Substances (40 CFR 710).

RCRA
This material, when discarded or disposed of, is not specifically listed as a hazardous waste in Federal regulations; however, it could be considered hazardous if it meets criteria for being toxic, corrosive, ignitable, or reactive according to U.S. definitions (40 CFR 261). This material could also become a hazardous waste if it is mixed with or comes in contact with a listed hazardous waste. If it is a hazardous waste, regulations 40 CFR 262-266 and 268 may apply.

CLEAN WATER ACT
The material contains the following ingredient(s) which is considered hazardous if spilled into navigable waters and therefore reportable to the National Response Center (1-800-424-8802).

Ingredient(s)	Petroleum Hydrocarbons
Reportable Quantity	Film or sheen upon, or discoloration of, any water surface

State Regulations (U.S.)

CALIFORNIA "PROP 65"
This material is not known to contain any ingredient(s) subject to the Act.

PENNSYLVANIA WORKER & COMMUNITY RIGHT TO KNOW ACT
This material may contain the following ingredient(s) subject to the Pennsylvania and Community Right to Know Hazardous Substances List.

Ingredient	Kerosene (Petroleum)
Category	Hazardous Substance

Canadian Regulations

CLASS B Division 3 - Combustible Liquid.

CLASS D Division 2 Subdivision B - Toxic Material. Chronic Toxic Effects.

Transport/Medical Emergency Phone Number: 1-613-348-3616

OTHER INFORMATION

NFPA, NPCA-HMIS

NFPA Rating

Health	0
Flammability	2
Reactivity	0

NPCA-HMIS Rating

(Continued)

OTHER INFORMATION (Continued)

Health	1
Flammability	2
Reactivity	0

Personal Protection rating to be supplied by user depending on use conditions.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsibility for MSDS	MSDS Administrator
Address	Conoco Inc. PO Box 2197 Houston, TX 77252
Telephone	713/293-5550

# Indicates updated section.

End of MSDS

Alliant Ammunition and Powder Co.
Regular Telephone No.: (540) 639-8143
Emergency Telephone No.: (540) 639-7323
CHEMTREC Emergency No.: (800) 424-9300
DATE: October 21, 1999 Revised July 20, 2005

SECTION 1: PRODUCT IDENTIFICATION

PRODUCT NAME: Smokeless Powder HES 8666.1

APPEARANCE: solid

COLOR: Gray to Black in color

ODOR: odorless

CASRN: proprietary mixture

HMIS RATINGS

HEALTH HAZARD: 2 moderate

FLAMMABILITY HAZARD: 4 severe

REACTIVITY HAZARD: 4 severe

CHEMICAL DESCRIPTION: Double base smokeless propellant

SECTION 2: HAZARDOUS COMPONENT INFORMATION

HAZARDOUS INGREDIENTS	PEL/TLV
nitrocellulose	not established
nitroglycerin	0.2 ppm C (Skin*) 0.05 ppm TLV (Skin*)
2-Nitrodiphenylamine (2-NDPA)	not established
Oxamide	not established
Cyclotetramethylene-tetranitramine (HMX)	1.5 mg/m^3
graphite	2 mg/m^3

Note: Air level for Alliant Techsystems recommends HMX by analogy with cyclonite

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: DANGER!

Extremely flammable
Accidental firing or explosion is likely to cause severe injury or death.
Electrostatic charges generated by emptying package in or near flammable vapor may cause flash fire. May form flammable dust-air mixtures.
May cause skin irritation.
Ingestion may cause headache, insomnia, fatigue, nausea, vomiting, seizure, convulsions, and loss of consciousness.

SECTION 4: FIRST AID PROCEDURES

EYE: Remove contact lenses. Hold eyelids apart. Immediately flush eyes with plenty of low pressure water for at least 15 minutes. Get immediate medical attention.

SKIN: Wash thoroughly with soap and water. Remove contaminated clothing. Thoroughly wash clothing before reuse. Render unusable and discard contaminated shoes and leather articles.

INHALATION: Remove to fresh air. Give artificial respiration. If breathing is difficult, give oxygen. Get immediate medical attention.

INGESTION: If conscious, drink large quantities of water. Induce vomiting. Call a physician or poison control center immediately. NEVER give anything by mouth to an unconscious person. NEVER induce vomiting in an unconscious person.

SECTION 5: FIRE HAZARD:

FIRE FIGHTING PROCEDURES: EVACUATE AREA IMMEDIATELY. DO NOT fight fire.

EXTINGUISHING MEDIA: Deluge with large quantities of water as quickly as possible by automatic sprinklers or fire hose from a protected location. Product is self-oxidizing.

CONDITIONS TO AVOID: Avoid impact, friction, heat, sparks, or flame.
Avoid conditions that generate dust. This product may form flammable dust-air mixtures.
Avoid emptying package in or near flammable vapors. Static charges may cause flash fire.

HAZARDOUS COMBUSTION PRODUCTS:

Combustion products include: carbon dioxide, nitrogen oxides, aldehydes, carboxylic acids, methane and hydrogen cyanide.

SECTION 6: ACCIDENTAL RELEASE MEASURES:

Clean up spills immediately using soft natural bristle brush and conductive rubber or conductive plastic shovel. Use caution; material is sensitive to initiation from sources such as heat, flame, shock, friction or sparks.
In case of accidental spill or release, refer to Section 8, Personal Protective Equipment and General Hygiene Practices.

SECTION 7: HANDLING AND STORAGE:

GENERAL MEASURES:

Electrically ground all equipment.
Blanket vessel with inert gas when emptying bags where flammable vapors may be present.
Electrically ground operator and pour material slowly into conductive, grounded chute.
DO NOT PRESSURIZE OR EXPOSE CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION
Follow appropriate D.O.D., N.F.P.A. and B.A.T.F. explosive safety measures. Local ordinances may apply.
For handling and storage requirement see 29 CFR 1910.109.
Store in cool, dry place: approximately 68°F (20°C)
Store only in Department of Transportation approved containers.
Check old product for deterioration regularly.
Keep container closed when not in use.

MATERIALS OR CONDITIONS TO AVOID:

Avoid storing product near incompatible materials. See MSDS Section 10
Do not store near flammable materials.
Do not keep deteriorated or salvaged product.
Keep away from heat, flame sparks and other ignition sources.
Do not store in direct sunlight or expose to UV radiation.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL HYGIENIC PRACTICES:

Avoid contact with eyes, skin and clothing.
Avoid breathing dust, vapor, or mist.
Handle in areas with adequate ventilation.
Wash thoroughly after handling, and before eating, drinking, or smoking
Avoid contamination of food, beverages, or smoking materials.
Remove contaminated clothing promptly and clean thoroughly before reuse.

PERSONAL PROTECTIVE EQUIPMENT:

Safety glasses
Impervious gloves
Appropriate respiratory protection is required to reduce airborne contaminants that may exceed acceptable limits. Respirators should be selected and used in accordance with OSHA, Subpart I (29 CFR 1910.134) and manufacturer's recommendations.

Flame-retardant clothing.
Static-free clothing.
Wear conductive safety shoes.

WORK PRACTICES AND ENGINEERING CONTROLS:

Material is shock sensitive. Use care in handling.
Friction can cause ignition. Keep away from ignition sources.
Prevent build-up of static electric charges.
Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Discharge from the ventilation system should comply with applicable air pollution control regulations.
DO NOT smoke in areas where powder is stored or used.
Eyewash fountains and safety showers should be easily accessible.

PROTECTIVE MEASURES DURING REPAIR AND MAINTENANCE:

Completely remove product from area, and thoroughly clean all equipment, piping, or vessel before beginning maintenance or repairs.
Eliminate ignition sources and prevent build-up of static electrical charges.
Use spark-proof tools and explosion-proof equipment.
A work permit system is recommended for any preparation and clean up.
Wetting work area with water will greatly reduce hazards.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES:

Volatile (Wt.)%:	N/A
Solubility in Water:	Negligible
Specific Gravity:	(H_20 = 1) 1.71
Vapor Pressure:	Negligible
Evaporation Rate:	(Butyl Acetate = 1) N/A
PH:	N/A

SECTION 10: STABILITY AND REACTIVITY:

GENERAL STABILITY CONSIDERATIONS:

Stable under recommended handling and storage conditions.
Material is sensitive to friction, shock, impact, and electrostatic discharge.

INCOMPATIBLE MATERIALS:

Incompatible with: acids, oxidizing agents, alkalies and amines, and strong sunlight or ultraviolet light.

HAZARDOUS DECOMPOSITION PRODUCTS:

None anticipated under normal or recommended handling and storage conditions.

HAZARDOUS POLYMERIZATION:

Not anticipated under normal or recommended handling and storage conditions

SECTION 11: TOXICOLOGICAL INFORMATION

REPORTED HUMAN EFFECTS: CARCINOGENICITY/TERATOGENICITY INFORMATION:

Cyclotetramethylenetetranitramine (HMX) None known, but may also aggravate severe untreated anemia.

Oxamide None known. Ingestion probably would aggravate any pre-existing kidney or urinary bladder irritation.

REPORTED HUMAN EFFECTS: CARCINOGENICITY/TERATOGENICITY INFORMATION:

Nitroglycerin: WARNING! Inhalation may cause severe headache. Ingestion may cause severe headache and blood pressure lowering. Absorption through skin may cause severe headache. Repeated skin contact may cause allergic skin reaction (skin sensitization).

Signs and Symptoms of Overexposure in the Workplace:

Skin - Severe headache, nausea, vomiting, fatigue
Inhalation - Severe headache, nausea, vomiting, fatigue
Ingestion - Severe headache, nausea, vomiting, fatigue

Medical conditions generally recognized as being aggravated by exposure:

Severe untreated anemia and glaucoma may be aggravated by extreme overexposure to nitroglycerin in the workplace. Aggravation of these conditions has never been reported as a consequence of workplace exposure but has been reported following protracted medicinal over dosage of nitroglycerin. Alcohol has been reported to intensify any adverse reaction to nitroglycerin.

Not listed as a carcinogen by National Toxicity Program (NTP); not regulated as a carcinogen by Occupational Safety and Health Administration (OSHA); not evaluated by International Agency for Research on Cancer (IRAC). Rats dosed for a lifetime showed a decrease in the number of mammary and pituitary tumors that usually occur.

Reported Human Effects: The effects reported above are only ones that have been reported following workplace exposure. The following additional effects have been reported following medicinal usage or overusage: faintness, skin flush, palpitation, rapid heart beat, dizziness, abdominal pain, retrosternal discomfort, muscle twitches, Heinz bodies (black spheres in red blood cells), methemoglobinemia, depression, confusion, skin irritation, and allergic skin reaction (sensitization).

Reported Animal Effects: Nitroglycerin not teratogenic in rats or rabbits. Inactive in dominant lethal mutagenicity test. No effect on fertility in reproduction test. At many times the dose that would be received following exposure at the TLV, methemoglobinemia and fibrous tissue formation in the bile ducts were seen. Testicular effects were seen in rats dosed for 3 months at over 20,000 times the dose a worker would receive working in the TLV. In lethal dose determination in rats, rapid breathing, poor muscle tone, raised hair and excessive activity were seen.

Other: Mutagenic in the Ames test.
96 hr. LD_{50} - Rainbow trout: 1mg/1
- Fathead minnow: 4.2mg/1
8 day LD_{50} (Dietary) - Bobwhite quail: >>5,600 ppm

Reported Animal Effects: HMX only poorly absorbed through skin of rabbits and dogs from solutions in transdermal solvents such as DMSO and acetone. No effects were seen which maximum concentrations were applied to the skin of dogs daily for four days. Maximum concentrations applied to the backs of rabbits caused a small percentage of deaths preceded by convulsions. Intravenous administration to dogs at sublethal doses caused hyperactivity, tremors, hyperflexia, convulsions, and lowering of blood pressure. The onset of these effects occurred 1 to 2 hours after dosing. No methemoglobinemia was seen. Similar effects would be expected from overexposure by inhalation; however, no inhalation studies have been reported. Not skin sensitizer or irritant.

Reported Animal Effects: 2-NDPA No conventional toxicological tests have been published for this chemical. Health hazard information in this MSDS is based on the known structure/biochemistry/toxicology relationships for this class of compounds.

SECTION 12: ECOLOGICAL INFORMATION:

ECOLOGICAL INFORMATION: NA

SECTION 13: DISPOSAL CONSIDERATIONS:

Disposal (if explosive) should be carried out under the direct supervision of a qualified person. Call Alliant Techsystems for assistance if needed.

For industrial disposal, federal hazardous waste regulations allow open burning of explosive wastes in permitted facilities. Burn in the open in an isolated location in small, shallow piles not over one inch deep.

Quantity burned at any one time should not exceed one pound. Use an ignition train of slow-burning combustible material to permit retreat to a safe distance.

SECTION 14: TRANSPORTATION INFORMATION

U.S. DOT:

For information regarding transportation of this product, please contact Alliant Techsystems at 540-639-8743

U.S. DOT Proper Shipping Name:	Powder Smokeless Class B Propellant
UN ID No.:	UN0161
Class & Division:	1.3C
Packing Group.:	Packing Group II

SECTION 15: REGULATORY INFORMATION:

The following environmental and regulatory data are provided to assist users of this product in defining their regulatory environmental compliance.

SARA SEC. 313 Chemicals

	Sec. 302 (EHS) TPQ	Section 304 EHS RQ	CERCLA RQ	Sec. 313	RCRA Code
Product or Components					
nitroglycerin			10	313	P081

Section 313:

This product does contain a chemical subject to reporting under Section 313 of Title III of the Superfund Amendments and Reauthorization Act and 40CFR375.

CERCLA

This product does contain a chemical subject to reporting as a CERCLA Hazardous Substances under 40CFR302.4.

RCRA

This product exhibits the following characteristics listed in 40CFR261, Subpart C: ignitability and reactivity (D003).

SECTION 16: OTHER INFORMATION

LIST OF ACRONYMS:

ACHIH:	American Conference of Governmental Industrial Hygienist
AICS:	Australian Inventory of Chemical Substances
AIHA WEEL:	American Industrial Hygienists Association - Workplace Environmental Exposure Level
ANSI:	American National Safety Institute
C:	Ceiling
CASRN:	Chemical Abstracts Service Registry Number
CERCLA:	Comprehensive Emergency Response, Compensation and Liability Act
DSL:	Domestic Substances List (Canadian)
EIECCS:	European Inventory of Existing Commercial Chemical Substances
HMIS:	Hazardous Materials Identification System
IARC:	International Agency for Research on Cancer
MITI:	Ministry of International Trade and Industry (Japanese)
N/A:	Not Applicable
NDSL:	Non-domestic Substances List (Canadian)
NFPA:	National Fire Prevention Association
NOR:	Not Otherwise Regulated
NTP:	National Toxicology Program
OSHA:	Occupational Safety and Health Administration
PEL:	Permissible Exposure Limit
RCRA:	Resource Conservation and Recovery Act

RQ:	Reportable Quantity
SARA:	Superfund Amendment Reauthorization Act
STEL:	Short Term Exposure Limit
TLV:	Threshold Limit Value (ACGIH)
TPQ:	Threshold Planning Quantity
TSCA:	Toxic Substances Control Act
TWA:	Time Weighted Average

The information and recommendations contained in this Material Safety Data Sheet have been compiled form sources believed to be reliable and to represent the most reasonable current opinion on the subject when the MSDS was prepared. No warranty, guaranty or representation is made as to the correctness or sufficiency of the information. The user of this product must decide what safety measures are necessary to safely use this product, either alone or in combination with other products, and determine its environmental regulatory compliance obligations under any applicable federal or state laws.

MSDS REVIEW

Health	4
Flammability	3
Reactivity	1
Specific Hazard	9

Reference Number (part or stock number)	WS18450
	WS27815-001

Respirator

✓ Half mask air purifying respirator with a
__ Full face air purifying respirator with a
- __ black organic vapor cartridge
- __ purple HEPA filtered cartridge
- __ yellow organic vapor/acid gas cartridge
- __ green ammonia cartridge
- ✓ black organic vapor-purple HEPA filtered cartridge
- __ yellow organic vapor/acid gas-purple HEPA filtered cartridge
- __ green ammonia-purple HEPA filtered cartridge
- __ Defender drab green multi purpose cartridge
- __ Defender drab green multi purpose cartridge with HEPA filter

__ Half mask airline respirator
__ Full face airline respirator
__ Abrasive blast helmet
__ Self Contained Breathing Apparatus (SCBA)
__ Not normally required

Hand

✓ Foil laminate	__ Polyethylene	__ NBR	__ Abrasion Resistant
__ PVA	__ PVC	✓ Nitrile	__ Cotton
__ Latex	__ Polyurethane	__ Thermal	__ Non-Porous
__ Natural rubber	__ Viton	__ Cryogenic	__ Dust Resistant
__ Butyl	__ Neoprene	__ Leather	__ Not normally required

Eye

✓ Safety glasses with side shields	__ Face Shield
__ Chemical monogoggles	__ Welders goggles

Body

✓ Flame retardant coveralls or smock	__ Foil Laminate Apron
__ Welder's protective clothing	__ Foil Laminate Sleeves
__ Tyvek suit	__ Foil Laminate Shoe Covers
__ Rubber Apron	