RCRA Part A & B Permit Renewal Applications

Alliant Techsystems Incorporated
The Proving Ground
23100 Sugarbush Road NW
Elk River, MN 55330

MND 081 138 604

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Orbital ATK

Alliant Techsystems Operations LLC – The Proving Grounds
23100 Sugarbush Road NW
Elk River, MN 55330
EPA ID: MND081138604

RCRA Part A & B Permit Renewal Application

Operator Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

02-24-2016

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RCRA PART B PERMIT RENEWAL APPLICATION
ALLIANT TECHSYSTEMS OPERATIONS LLC, THE PROVING GROUNDS
ELK RIVER, MN

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1.0 FACILITY DESCRIPTION

1.0 FACILITY DESCRIPTION

The Proving Grounds (TPG) is owned by Orbital ATK, Inc. and operated by Alliant Techsystems Operations LLC. It is located in the northwest corner of Anoka County, Minnesota about 40 miles northwest of Minneapolis and St. Paul, MN in Sections 28-33 of St. Francis Township (T 34N, R 25W). Figures 1.1 and 1.2 are maps showing the general location of TPG.

TPG is a research and development facility for the storage, assembly and testing of various ordnance. This facility also conducts low run initial production and demilitarization of ordnance/munitions that are identified for disassembly and destruction. Hazardous waste is currently managed on site under the facility's hazardous waste storage and treatment permit issued during 2005 and subsequently modifications in accordance with state and federal regulations. Waste explosives and devices containing explosives are received from on-site operations and off-site ATK facilities, third-party companies/facilities, and from governmental entities, such as the U.S. military for storage and/or treatment.

Hazardous waste storage operations consist of containerized storage of waste ignitable liquids and sludges, waste ignitable or reactive solids, characteristic and/or listed solid and liquid waste, lab pack waste, scrap x-ray film, scrap electronic material, open burn treatment residue, explosives, explosive devices, and propellants. Universal wastes, such as fluorescent light bulbs, mercury-containing devices and lead-acid batteries, are stored on site. Non-hazardous wastes, such as used oil, used oil sludges, used oil absorbents, used oil filters and other non-regulated wastes are also stored on site.

Typically all hazardous wastes except explosives, explosives devices, and propellants are either recycled or treated at a permitted or authorized off-site facility. Open burn treatment residues are shipped to and disposed at permitted off-site facilities.

Hazardous waste treatment operations consist of open burning of explosives and propellants and devices containing explosives and propellants. Open detonation is used on explosives and explosive-containing devices, which are not amenable or safe to open burn. This process is also used to demilitarize intact or off-spec ordnance. Indoor gun firing, within a secure range, is another process used to treat scrap ammunition

The person with overall responsibility for hazardous waste management at TPG is the Site Director:

Greg Filo (763) 241-7531

1.1 General Description of Hazardous Waste Units

Active hazardous waste treatment and storage (T&S) units at TPG consist of the following buildings and areas. Storage or treatment areas, which may be undergoing formal closure, are not listed below. Their locations on TPG property are shown on Figures 1.3a and 1.3b.

Waste Unit Name	Capacity
Non-Explosive Waste Storage Building (T&S 3) - Site 673..........	80 drums (600 cubic ft.) Solid
	20 drums (1100 gal.) Liquid
Ignitable Waste Storage Building (T&S 4)	10 drums (550 gal)
Open Burn Treatment Area (T&S 5) – Site 675.....................	1000 pounds NEW/burn/unit
Explosive Waste Storage Magazines (T&S 6)	
#5A – Site 680..	1000 pounds NEW
#5B – Site 680..	1000 pounds NEW
#6 – Site 680..	10,000 pounds NEW
#7 – Site 680..	20,000 pounds NEW
#14 – Site 683..	50,000 pounds NEW
#18 – Site 692..	30,000 pounds NEW
Explosive/Non-Explosive Liquid Waste Storage (T&S 7)...........	10 drums (550 gal) Liquid (*Not Built Yet*)
Dock & Trailers (T&S 10B) – Site 626..	40,000 pounds NEW
Indoor Gun-firing Range (PSR) (T&S 12) – Site 650....................	This unit has specified hourly, daily, weekly, quarterly, and annual limits

* NEW = Net Explosive Weight

1.1.2 Non-Explosive Waste Storage Building (T&S 3) - Site 673 - Eighty (80) drums of solid hazardous wastes consisting primarily of open burn treatment residues, characteristic and/or listed solid and liquid waste, lab pack waste, PCB light ballasts, PCB-contaminated equipment, scrap x-ray film, spent photo chemicals, and scrap electronic material. Universal wastes, such as, fluorescent light bulbs and lead-acid batteries, are stored at this site. Non-hazardous wastes, which include used oil, used oil sludges, used oil absorbents, used oil filters and other non-regulated wastes are also stored in this unit. Up to 20 drums of liquid wastes are stored in this restricted storage building. The building has metal walls and roof with a concrete floor. It has a waste storage capacity limit of 100 drums (5,500 gallons). Its location on site is shown in Figure 1.3a

1.1.3 Flammable Storage Building (T&S 4) - The location of this building is shown on Figure 1.3b. Lab pack waste and spent solvents generated from on-site activities are stored in the front portion of this building. The solvents may be either characteristic and/or listed wastes. The rear area of the building, which is heated, may be used for holding production materials (e.g., paints and adhesives). The building has metal walls and roof with a concrete floor. It has a waste storage capacity of ten drums (550 gallons). Drums containing liquid waste are placed onto spill control pallets similar to the type shown in Figure 1.4.

1.1.4 Open Burn Treatment Area (T&S 5)- Site 675 - Explosives, propellants, devices containing these materials, and packing contaminated with explosives and/or propellants are open burned at the open burn treatment area (Figure 1.3a). Open burning takes place either on concrete pads, in steel burn boxes with a concrete base, metal evaporation pans with a concrete base, or in a burn cage with a concrete base. Certain explosive devices, which cannot be safely open to burn, are detonated in specially prepared soil borings at the detonation pit subunit. This treatment unit is located more than 380 meters (1,250 feet) from the nearest property boundary. It is also surrounded with firebreaks to help prevent uncontrolled fires resulting from treatment operations. T&S 5 has a waste treatment capacity of 1,000 pounds net explosive weight per burn per unit. An annual treatment limit of 200,000 pounds NEW aggregate has been set for all treatment units at TPG, which includes T&S 5 and T&S 12 operations.

Refer to Section 3 and Appendix C for detailed open burning/open detonation (OB/OD) process descriptions. Individual OB/OD subunits are identified as the:

- Evaporation Pans
- Burn Boxes
- Burn Cage
- Burn Pads
- Detonation Pit
- Culvert (inactive)

1.1.5 Explosive Waste Storage Magazines (T&S 6) - The explosive waste storage magazine complex is comprised of six magazine storage subunits located between earthen berms in accordance with applicable explosive and propellant storage compatibility requirements and quantity distance limits (Figure 1.3b). The combined waste explosive storage capacity for this unit is 112,000 pounds NEW with each magazine individually limited, based on design and compatibility parameters, to the quantity of explosive it may contain. These magazines are also used for storing production-related explosives. The magazines in this subunit and their individual NEW storage capacities are listed in Section 1.1 General Description of Hazardous Waste Units.

1.1.6 Explosive Waste Storage (T&S 10B) Site 626 – T&S 10B consists of a covered concrete loading dock and indoor receiving area with outdoor stalls for two semi-trailers (Figure 1.3a). This unit supports the demilitarization of munitions for subsequent treatment at the burn ground. Storage capacity for this unit is 40,000 pounds NEW which includes storage in the indoor receiving area and outdoor storage in two (2) semi-trailers. No liquid waste storage occurs at this unit.

1.1.7 Indoor Gun-firing Range (T&S 12) Site 650 - This facility consists of three indoor gun-firing ranges of 100, 150, and 200 meters in length. It is located in the southwest portion of TPG (Figure 1.3b). Each range is constructed of reinforced concrete and has a firing/control room, gun room, test range, and bullet catcher. Two exhaust fans at the bullet catcher end of the ranges provide ventilation for the facility. Typically, medium caliber rounds will be treated using gun firing, although it is possible that other smaller and larger caliber bullets also may be fired in the ranges for treatment. This unit has round count limitations associated with it and the treatment capacity will not exceed 1,000 pounds NEW per day. An annual treatment limit of 200,000 pounds NEW aggregate has been set for all treatment units at TPG, which includes T&S 5 and T&S 12 operations.

1.2 Local Land Use and Setting

The general topography and other pertinent ground surface elevation information for TPG are shown in Figures 1.2, 1.3a and 1.3b.

1.2.1 Wind Rose - Seasonal wind roses applicable to TPG are shown in Figure 1.5. The wind roses, one for each calendar quarter of the year, were compiled from data gathered at the St. Cloud, MN airport. Since TPG is located approximately 30 miles southeast of the St. Cloud Airport these data should be representative of the wind conditions expected on site.

1.2.2 Land Use - Land use surrounding TPG consists of rural residential dwellings and farmsteads. TPG lies in the extreme northwest corner of Anoka County with limited acreage in Sherburne and Isanti Counties. It is zoned as “II Isolated Industrial” by the City of St. Francis. A zoning and land use map is provided as Figure 1.6.

1.2.2.1 Local Groundwater Use - As shown on Figure 1.6a, TPG, local farms and residential dwellings utilize wells for potable and non-potable water supplies. These wells typically range from 60 to 400 feet deep with the depth dependent on water production and quality needs. Based upon existing data, it appears that the majority of the residential wells are less than 120 feet deep. The deeper production wells at TPG range from 300 to 400 feet deep.

1.2.2.2 Surface Water and Wetlands - Figure 1.6b is a map showing the identified wetlands on TPG. It shows the locations of state-protected waters and wetlands close to TPG. Measures have been implemented at each T&S facility to ensure that run-on/run-off has minimal impact adjacent surface water bodies.

1.3 Location Information

1.3.1 Seismic Standard - TPG, primarily located in Anoka County, Minnesota is considered to be in compliance with 40 CFR 264.18 (1) since it is not listed in Appendix VI of 40 CFR 264. This appendix lists all political jurisdictions, which are considered to be seismic risk areas.

1.3.2 Floodplain Standard - TPG is not located in a 100-year floodplain as shown in Figure 1.7. The facility is in an area designated as Zone C on maps issued by the National Flood Insurance Program, which indicates that it is an "area of minimal flooding."

1.3.3 Access Control - TPG facility - A single strand fence marking the property boundary surrounds the proving ground. Warning / no trespassing signs are attached to the fence at regular intervals. Entrance to the facility is limited using a powered gate that is controlled by security personnel. Each hazardous waste storage area is fenced and/or locked.

1.4 Traffic Patterns

Typically 40 to 70 employees enter and leave the facility parking lot each work day. In addition, approximately five to ten commercial delivery vehicles enter and leave the facility daily enroute to the facility shipping/receiving building. On-site traffic involves an estimated 30 vehicles traveling to and from the facility operations building approximately five times daily.

1.4.1 Access – Licensed commercial hazardous waste transport vehicles which might move hazardous waste to and from hazardous waste treatment and storage facilities located on site travel on blacktop-surfaced roads rated for 9 tons per axle. Typically, these vehicles weigh 32,000 pounds empty and up to 72,000 pounds loaded. All vehicles enter and leave through the front gate, which is controlled by security personnel.

The common route to TPG involves US Highway 169 to Sherburne County Road 21 to Anoka County Road 70 to the facility entrance road (Figure 1.7a). These roads are all built and designed to handle heavy truck traffic. It should be noted that seasonal weight restrictions are typically in effect for a portion of the year for the public roads servicing TPG.

1.4.1.2 Non-Explosive Waste Storage Building (T&S 3) - Non-explosive solid and liquid hazardous wastes are stored in this building prior to shipment off site. See Figure 1.9 for hazardous waste transportation routes.

1.4.1.3 Ignitable Waste Storage Building (T&S 4) - Transportation distance for ignitable liquid waste is minimized because this storage unit is located near generating sites and the Operations Building. See Figure 1.10 for transportation routes.

1.4.1.4 Open Burn Treatment Area (T&S 5) - Waste explosives and propellants and energetic-containing devices are transported by approved facility explosive-hauling vehicles (see paragraph 4.4.3) from the on-site hazardous waste storage areas and/or production areas to the on-site open burn treatment area. Figure 1.11 presents the various transportation routes associated with T&S 5 activities.

1.4.1.5 Explosive Waste Storage Magazines (T&S 6) - Waste explosive and propellants and energetic-containing devices received from both on and off-site are stored in explosive waste storage magazines 5A, 5B, 6, 7, 14, and 18, which comprise T&S 6. See Figure 1.12 for hazardous waste transportation routes.

1.4.1.7 Explosive Waste Storage (T&S 10B) - Traffic patterns to and from T&S 10B are shown in Figure 1.14. Waste munitions are transferred to this storage unit either from another storage unit located on site and/or directly from an incoming shipment from an off-site facility. Scrap munitions, which might be repackaged / or disassembled in the building housing T&S 10B will have their energetic components either transferred to an on-site storage unit and/or directly to the Open Burn Treatment Area (T&S 5) for treatment.

1.4.1.8 Indoor Gun-firing Range (T&S 12) - Waste ammunition is transferred to this treatment area either from an on-site storage unit by approved facility explosive-hauling vehicles or directly from an incoming shipment from an off-site facility (Figure 1.15). Ammunition not treated (gun-fired) is returned to T&S 6 and is not stored at this site.

1.4.1.9 Waste Shipping and Receiving Areas - The shipping / receiving building is a metal frame building with metal walls and roof. It has 12-foot high overhead doors at the loading dock. The loading dock is concrete and has a concrete apron at ground level. The area leading to and from the loading dock is topped with asphalt. Waste transfer at the dock typically would involve explosive waste that is in containers such as, drums, ammunition cans or wooden crates all of which may be palletized. Waste is hauled from the shipping/receiving building to the individual T&S storage units. Hazardous waste is not stored at the shipping/receiving building.

Larger loads of explosive waste that are received may instead be transferred directly from the commercial delivery vehicle to the designated hazardous waste storage unit. In the case of multiple truckloads of hazardous waste, the trucks line up in order of arrival in the parking lot and drive way. The arrival of multiple transports delivering hazardous waste at the same time has rarely occurred.

1.4.2 On-Site Vehicle Description - TPG-owned vehicles that are used to transfer hazardous waste on-site are not subject to any special operating conditions except for those vehicles used to haul explosive-related wastes. Explosive-hauling vehicles are inspected and modified per the DoD 4145.26 M Contractor's Safety Manual. These modifications include spark arrestors, fire extinguishers and placards indicating that explosives are being transported.

2.0 WASTE CHARACTERISTICS

2.0 WASTE CHARACTERISTICS

This section provides information on waste characteristics and a waste analysis plan for the hazardous waste being generated, stored, and/or treated at TPG.

2.1 Chemical and Physical Characteristics

There are three general categories of hazardous waste being stored in various hazardous waste storage units on site:

1. Bulk explosives, bulk propellants, and explosive-containing devices are stored in T&S 1, T&S 6, and/or T&S 10B. These wastes are treated at the Open Burn/Open Detonation Treatment Area (T&S 5) and may be generated either on-site or received from off-site locations.
2. Open burn treatment residues, non-explosive characteristic and/or listed solid and liquid waste, PCB light ballasts, PCB-contaminated equipment, lab pack waste, scrap x-ray film, spent photo chemicals, scrap electronic items, and Universal Wastes (such as, fluorescent light bulbs and lead-acid batteries) are stored in T&S 3. Non-hazardous wastes including used oil, used oil sludges, used oil absorbents, and other non-regulated wastes are also stored in T&S 3. These wastes are generated on-site and are not received from off-site.
3. Flammable solvents and sludges, labs pack waste, non-explosive characteristic and/or listed solid and liquid wastes are stored in T&S 4. These wastes are generated on-site and are not received from off-site.

A breakdown of the hazardous waste that may be stored and their storage location(s) is provided in Table 2.1. Appendix B contains additional general data on explosive waste types that may be stored on-site, such as their physical and chemical properties.

Waste explosive devices are treated at T&S 5 and T&S 12. Waste treatment at T&S 5 subunits will vary depending upon explosive quantity, sensitivity, and form at the time of treatment. Gun firing of waste ammunition at T&S 12 is generally performed on medium caliber rounds, such as 25 mm and 30 mm rounds; however, smaller or larger caliber ammunition also may be treated. T&S 12 only treats complete rounds. The general constituents of the wastes, which might be treated at T&S 5 and T&S 12, are provided in Table 2.1 in the category of wastes being stored in Explosive Waste Storage Buildings T&S 10B and the T&S 6 Explosive Waste Storage Magazines.

TABLE 2.1

HAZARDOUS WASTE STORED

**EXPLOSIVE WASTE STORAGE BUILDINGS (T&S 10B) AND MAGAZINES (T&S 6)
(Storage Capacity: T&S 10B – 40,000 lbs NEW; T&S 6 - 112,000 lbs NEW)**

Material	Hazard	Basis for Hazard Designation
High Explosives:		
HMX: 100% Cyclotetramethylene Tetranitramine	Reactive	Explosive (D003)
TNT: 100% 2,4,6-Trinitrotoluene	Reactive	Explosive (D003)
Tetryl: 100% Trinitrophenylmethylnitramine	Reactive	Explosive (D003)
HNS: 100% Hexanitrostilbene	Reactive	Explosive (D003)
RDX: 100% Cyclotrimethylenetrinitramine	Reactive	Explosive (D003)
Lead Styphnate: 100% Lead Trinitroresorcinate	Reactive Toxic	Explosive (D003) Lead (D008)
Lead Azide: 100% Lead Salt of Hydrozoic Acid	Reactive Toxic	Explosive (D003) Lead (D008)
Tetrazene: 100% 4-quanyl-1- (nitrosoamino- quanyl)-1-Tetrazene	Reactive	Explosive (D003)
DATB: 100% 2,4,5-trinitro-1, 3-Benzenediamine	Reactive	Explosive (D003)
DEGN: 100% 2,2'-oxybioethanol dinitrate	Reactive	Explosive (D003)
Explosive D: 100% Ammonium Picrate	Reactive	Explosive (D003)
PETN: 100% Pentaerythritol tetranitrate	Reactive	Explosive (D003)
Nitrocellulose: 100%	Ignitable/Reactive	Explosive (D003) Ignitable (D001)
DNAN: 100% 2,4-Dinitroanisole	Reactive	Explosive (D003)
CL-20 (HNIW): 100% Hexanitrohexaazaisowurtzitane	Reactive	Explosive (D003)
TATB: 100% triaminotrinitrobenzene	Reactive	Explosive (D003)
NTO: 100% 3-Nitro-1,2,4-triazol-5-one	Reactive	Explosive (D003)
The above explosives may also be mixed in various proportions and/or be present in munitions in various subcomponents containing the following:		
0-40% Aluminum powder	Reactive	Explosive (D003)
0-40% oxidizer:		
- Ammonium Perchlorate	Oxidizer	Oxidizer (D001)
0-25% Mineral Oil		
0-20% Binders:		
- Stearic acid (calcium, barium and magnesium salts of)		
- Wax		
- Polyurethane		
- Vinylchloride/trifluorochloroethylene copolymer		
- Chlorotrifluoroethylene/vinylidene fluoride copolymer		

TABLE 2.1

HAZARDOUS WASTE STORED (Cont'd)

EXPLOSIVE WASTE STORAGE BUILDINGS (T&S 10B) AND MAGAZINES (T&S 6)
(Storage Capacity: NEW; T&S 10B – 40,000 lbs NEW; T&S 6 - 112,000 lbs NEW)

Waste Stream Name	Hazard	Basis for Hazard Designation
- Cellulose Acetate Butyrate (CAB)		
- Hydroxyl-terminated Polybutadiene		
- Polyisobutylene		
- Silicone rubber		
- Vinylidine fluoride/Hexapropylene copolymer		
- Polyethylene		
- Polystyrene		
- Calcium resinate		
0-20% Plasticizer:		
- Xylitol		
- Dioctyl Adipate (DOA)		
- Polybutadiene		
- Bis-(2,2, dinitropropyl) acetal/formal (BDNPA/F)		
- Isodecyl pelargonate (IDP)		
- Dioctyl sebacate		
0-5% gelling agent:		
- Amorphous siliconeoxide		
0-10% Taggant:		
- 2,3-dimethyl-2,3, dinitrobutane (DMDNB)		
0-2% Lubricant:		
- Graphite		
0-5% Abrasives:		
- Barium nitrate	Toxic/Oxidizer	Barium (D005) Oxidizer (D001)
- Antimony sulfide		
- Zirconium powder		
- Lead dioxide	Toxic	Lead (D008)
- Lead thiocyanate	Toxic	Lead (D008)
Tracer Compositions:	Reactive	Explosive (D003)
- 30-50% Strontium nitrate	Oxidizer	Oxidizer (D001)
- 10-30% Strontium Oxalate		
- 30-60% Strontium Peroxide	Oxidizer	Oxidizer (D001)

TABLE 2.1

HAZARDOUS WASTE STORED (Cont'd)

EXPLOSIVE WASTE STORAGE BUILDINGS (T&S 10B) AND MAGAZINES (T&S 6)
(Storage Capacity: T&S 10B – 40,000 lbs NEW; T&S 6 - 112,000 lbs NEW)

Waste Stream Name	Hazard	Basis for Hazard Designation
- 0-10% Potassium perchlorate	Oxidizer	Oxidizer (D001)
- 20-60% Magnesium powder	Reactive	Explosive (D003)
- 20-60% Barium nitrate	Toxic/Oxidizer	Barium (D005) Oxidizer (D001)
- 0-80% Teflon		
- 20-60% Magnesium powder		
- 0-20% Polyvinyl chloride		
- 1-10% Chlorinated rubber		
- 0-10% Hexamethylene tetra-amine phenolic resin		
- 0-10% Calcium resinate		
- 0-10% Polyethylene		
- 0-10% Viton A - fluoroelastomer		
- 0-40% THV-fluorelastomer		
Igniter Compositions:	Reactive	Explosive (D003)
- 50-90% Strontium nitrate		
- 50-90% Strontium peroxide		
- 50-90% Barium peroxide	Toxic	Barium (D005)
- 0-40% Magnesium powder		
- 0-10% Chlorinated rubber		
- 0-10% Polyvinyl chloride		
- 0-10% Zinc stearate		
- 0-30% Calcium resinate		
- 0-5% Graphite		
- 0-5% Charcoal		
- 0-1% Toluidine Red Toner		
Heat/Delay Compositions:	Reactive	Explosive (D003)
- 0-50% Titanium		
- 0-50% Zirconium		
- 0-50% Iron oxide		
- 0-50% Potassium perchlorate	Oxidizer	Oxidizer (D001)
- 0-50% Boron		
- 0-10% Graphite		

TABLE 2.1

HAZARDOUS WASTE STORED (Cont'd)

EXPLOSIVE WASTE STORAGE BUILDINGS (T&S 10B) AND MAGAZINES (T&S 6)
(Storage Capacity: T&S 10B – 40,000 lbs NEW; T&S 6 - 112,000 lbs NEW)

Waste Stream Name	Hazard	Basis for Hazard Designation
- 0-20% Potassium nitrate	Oxidizer	Oxidizer (D001)
- 0-50% Nickel		
- 0-50% Barium chromate	Toxic	Barium (D005), Chromium (D007)
- 0-90% Bismuth Oxide		
- 0-90% Tungsten Oxide		
- 0-10% Silicon		
- 0-50% Lead dioxide	Toxic	Lead (D008)
- 0-20% Silicon		
- 0-50% Cupric oxide		
- 0-50% Barium nitrate	Toxic/Oxidizer	Barium (D005) Oxidizer (D001)
- 0-70% Strontium peroxide	Oxidizer	Oxidizer (D001)
- 0-95% Tungsten		
- 0-20% Ethyl Acetate		
Propellants:	Reactive	Explosive (D003)
- 40-95% Nitrocellulose	Ignitable/Reactive	Explosive (D003) Ignitable (D001)
- 0-45% Diethyleneglycoldinitrate		
- 0-20% Nitroglycerin	Reactive	Explosive (D003)
- 0-10% RDX	Reactive	Explosive (D003)
- 0-10% HMX	Reactive	Explosive (D003)
- 0-10% Ethyl centralite		
- 0-10% Methyl centralite		
- 0-2% Magnesium oxide		
- 0-2% Graphite		
- 0-10% Dinitrotoluene	Reactive	Explosive (D003)
- 0-10% Diphenylamine		
- 0-5% Potassium sulfate		
- 0-20% Nitroguanidine	Reactive	Explosive (D003)
- 0-20% Glycidyl Azide Polymer (GAP)		

TABLE 2.1

HAZARDOUS WASTE STORED (Cont'd)

EXPLOSIVE WASTE STORAGE BUILDINGS (T&S 10B) AND MAGAZINES (T&S 6)
(Storage Capacity: T&S 10B – 40,000 lbs NEW; T&S 6 - 112,000 lbs NEW)

Waste Stream Name	Hazard	Basis for Hazard Designation
Igniter Powders:	Reactive	Explosive (D003)
- 50-100% Black Powder		
- 75% Potassium nitrate	Oxidizer	Oxidizer (D001)
- 15% Charcoal		
- 10% Sulfur		
- 0-50% Nitrocellulose	Ignitable/Reactive	Explosive (D003) Ignitable (D001)
- 0- 5% Acardite II (methyldiphenylurea)	Reactive	Explosive (D003)
- 0- 5% Dibutylphthalate		

NOTE: The above explosives, propellants, and reactive mixtures also may be contained in arms, ammunition and explosive devices (AA&E).

NON-EXPLOSIVE WASTE STORAGE (T&S 3)
(Capacity: 100 55-gallon drums)

Waste Stream Name	Hazard	Basis for Hazard Designation
1. Open Burning Treatment Residue	Toxic	Lead (D008), barium (D005), cadmium (D006) &/or other various D codes
2. Scrap X-ray Film/Photo Chemicals	Toxic	Silver (D011)
3. Misc. Solvents	Listed &/or Toxic	Spent halogenated &/or nonhalogenated solvents (F001, F002, F003, &/or F005) &/or various D codes
4. PCB-Contaminated Equipment and Oil	Toxic	PCBs (MN03)
5. Reactive Metal Contaminated/ Containing Materials	Ignitable, corrosive, reactive, &/or toxic metals	D001, D002, D003, D006, and/or various other D codes
6. Used Lamps	Toxic	Mercury (D009), &/or Lead (D008)

TABLE 2.1

HAZARDOUS WASTE STORED (Cont'd)

NON-EXPLOSIVE WASTE STORAGE (T&S 3)
(Capacity: 100 55-gallon drums)

7. Lead-Acid Batteries	Toxic/Corrosive	Lead (D008) & Corrosive (D002)	
8. Lab Pack		Variable	MN02 with various D, F, P, &/or U codes

Flammable (NON-EXPLOSIVE) WASTE STORAGE BUILDING (T&S 4)
(Capacity: 10 - 55 gallon drums)

Waste Stream Name	Hazard	Basis for Hazard Designation
1. Ignitable Solvent, Solids &/or Sludge	Ignitable &/or Toxic	Spent halogenated &/or nonhalogenated solvents with various F &/or D codes
2. Lab pack	Variable	MN02 with various D, F, P, &/or U codes

2.2 Waste Analysis Plan

2.2.1 Parameters and Rationale – This section describes the procedures that will be used to obtain chemical and physical data from representative samples of hazardous waste using approved methodology. These data are obtained primarily to ensure that proper handling, storage and transportation of hazardous wastes for treatment and/or disposal is achieved. These procedures also are used in selecting effective waste management alternative(s).

2.2.2 Sampling Methods – Department supervisors and/or the environmental engineer will identify those wastes streams that require analytical testing in order to obtain the data needed for making proper management decisions. A certified contract laboratory will normally analyze waste samples.

In general, liquid wastes and dilute sludges will be sampled using a Coliwasa device. While solids and thicker sludges will be sampled using a spatula, a split spoon sampler, or an equivalent device. All samples will be placed in a clean container supplied by the laboratory or another source. Samples, where necessary, may be composited in order to obtain a representative sample for analysis. If a waste has distinct phases, each phase will be sampled and analyzed separately. The sampling methods described in the Code of Federal Regulations, Title 40, Part 261, Appendix I that incorporates SW 846 Test Methods for Evaluating Solid Waste, will be used whenever appropriate.

2.2.3 Test Methods - Table 2-2 lists the test methods that typically will be used to characterize waste materials.

2.2.3.1 Additional Requirements for Off-Site Wastes – Certain waste streams, which have D003 as a primary or secondary waste code, are accepted from off-site facilities for storage and/or treatment at TPG. These wastes will be accepted at TPG only if properly characterized and prepared in accordance with local, state, and federal regulations and in conformance with TPG's RCRA hazardous waste permit.

As discussed in Section 2.2.5, the chemical and physical characteristics of explosives, propellants, and related materials are not significantly altered during the manufacture of products. Thus, analysis of these reactive materials within products is not necessary in order to determine proper storage, handling, and treatment requirements. Disassembly of explosive devices is also very dangerous for plant personnel. The storage and handling requirements for explosives is well established by Department of Defense and Bureau of Explosives regulations and standards. Prior to accepting reactive waste from off-site facilities, TPG will require a complete disclosure of the waste's characteristics and, where appropriate, analytical laboratory data, which characterize the waste stream.

Any analyses required for waste streams originating from off-site facilities, or for waste generated on site, will be performed by an a laboratory certified either by the Minnesota Department of Health or by an equivalent governmental unit in the state of origin; unless special conditions warrant that certain analyses be performed internally (i.e., safety concerns due to extreme reactivity).

TABLE 2.2

Test Methods for Waste Analysis

Test	Methods	Reference
Ignitability	Pensky-Martens Closed-Cup Tester	Method 1010 EPA SW-846 (1)

Toxicity Characteristics	Toxicity Characteristic Leaching Procedure	EPA SW-846 (1)
Corrosivity	Electrometric	Method 1110 EPA SW-846 (1)
Explosive Residues Chromatography & other physical/chemical methods Method, 3-2-84 (2)	High Performance Liquid EPA SW-846 & U. S Army Forwarded	Method 8330-1
Specific Organic Constituents	Gas Chromatograph/ FID	EPA SW-846 (1)
Specific Metals Spectroscopy	Atomic Absorption	EPA SW-846 (1)
Free Liquid	Paint Filter Test	EPA SW-846 (1)

(1) Test Methods for Evaluating Solid Waste, Physical and Chemical Methods. U.S. EPA SW-846, current edition and updates.

(2) These methods are provided in Appendix G.

Upon receipt of an incoming explosive/reactive waste shipment at the TPG:

1. The hazardous waste manifest will be reviewed to ensure that the shipment originated from an TPG-approved facility and that the incoming wastes are those that have been approved for in-shipment by the environmental engineer.
2. The shipping paperwork, including the manifest and the Land Disposal Restriction (LDR) form, are examined in order to ensure that each is properly completed and that the number of waste containers received matches that noted on the manifest. If there is an inconsistency between the container count and the paperwork, the off-site facility is immediately contacted to resolve the discrepancy.
3. The shipment is then transferred, if necessary, to an inspection area where the containers are opened and the contents are compared with an inventory provided by the off-site facility. Items, which are typically reviewed are the following:
   - i) Item/material name
   - ii) Net explosive weight

iii) Gross item weight

4. The shipment is either shipped to an on-site treatment unit and/or to a waste explosive storage magazine.
5. The shipment is logged into the facility explosive waste log for proper tracking.

A shipment will be rejected if:

1. It comes from an un-approved facility
2. Discrepancies in the paperwork cannot be resolved within 10 days, or
3. The shipment contains material TPG is not permitted to receive.

2.2.4 Frequency of Analysis – If the composition of a waste stream varies over time it will be analyzed at least once per year or more frequently if required by the environmental engineer. Waste streams that do not vary significantly in composition because of a stable generating process will be only sampled and analyzed initially to determine their characteristics and composition. Any further sampling and analysis of such waste streams will be performed at the discretion of the environmental engineer or if the generating process has been significantly altered resulting in a new waste stream being created. Refer to the next section for the rationale for not normally sampling and analyzing explosive/reactive wastes.

2.2.5 Additional Requirements for Ignitable, Reactive or Incompatible Wastes - Flashpoint testing, based on knowledge of the generating process or other information will be run to determine whether a waste exhibits the characteristic of ignitability. Information from this testing will be used in determining proper handling, storing, and waste management options for the waste.

Containers of explosives, propellants, and explosive devices either received from off-site facilities or generated on-site also may be visually inspected to ensure that each is properly labeled as to content and quantity of waste.

Because the physical and chemical nature of explosives, propellants, and related materials are not significantly altered during the manufacturer of products, the sampling and testing of these materials is not necessary prior to their treatment on-site. Also the sampling of these products, especially sealed ones, exposes plant personnel to unacceptable danger. The storage and handling requirements of explosives is well established by Department of Defense and Bureau of Explosives regulations and standards.

2.3 Lab Packs

TPG generates a wide variety of small-quantity chemical wastes, which are not part of a regular waste stream. These wastes include items, such as research and development materials, out-of-shelf-life reagents and commercial products, and miscellaneous laboratory chemicals. These waste items are shipped off site for management at permitted hazardous waste facilities. If needed, Safety Data Sheets (SDS) are obtained for these waste items in order to determine proper storage, handling, and management requirements.

3.0 STORAGE AND TREATMENT PROCESS INFORMATION

3.0 STORAGE AND TREATMENT PROCESS INFORMATION

This section addresses specific process information for storage and management of containers and treatment operations conforming to the requirements of 40 CFR 270.15 and Minnesota Rules Parts 7045.0526 and 7045.0478.

3.1 Description of Containers

Hazardous waste is stored in DOT and/or DoD certified containers as appropriate for a given waste stream. Reactive wastes received and/or stored at TPG are contained in DoD-approved containers for the particular type of product, such as, bulk propellant in fiber drums and intact projectiles in ammo boxes or other specialized packaging.

Other types of waste streams generated at TPG, such as, burn ground ash and flammable solvents, are stored and transported in certified Performance Oriented Packaging (POP)-tested containers. These containers are certified to be in compliance with 49 CFR 173 Subpart L and 49 CFR 178 and are tested per 49 CFR 173 Subpart M.

3.1.1 Container Specification - Containers are selected for a particular waste stream based on matching the waste's characteristics with the design specifications of the container as determined by POP testing per 49 CFR 173 Subpart M. The packaging engineer is responsible for selecting the appropriate container for each type of waste stream.

3.1.2 Container Reuse - Reuse of a container is optional and it must meet the following requirements:

a. The container type must be authorized and/or re-certified for that waste class.

b. The container must be physically sound.

c. Previous markings must be removed or totally obscured by painting over (spray paint is acceptable).

d. The container must be "clean" of any residual "foreign" matter. "Foreign" is defined as any material not chemically compatible with the waste, which will be placed into the drum. "Clean" is defined as not being able to see any significant quantity of foreign material inside a container.

e. New or reconditioned containers must meet the requirements for Items “a-d” above.

3.1.3 Compatibility of Wastes with Containers - All containers must be compatible with the waste materials each is to hold. Proper containers are determined by the packaging engineer and where required are specified in the packaging layout for each waste class. Compatibility is determined by matching the physical and chemical properties of the waste with the physical characteristics and limitations of the container.

3.2 Container Management Practices

Hazardous waste containers are handled and stored in a manner that will minimize the risk of leakage, vapor loss or rupture. All containers of hazardous wastes are stored inside enclosed buildings or trailers in designated storage areas. This section describes responsibilities and procedures for container filling, labeling, movement and storage prior to shipment off-site and/or on-site transport for treatment.

Container management requirements for each T&S unit are described in Section 3.3.

3.2.1 Container Filling Procedures - Container filling procedures are as follows:

1. Accumulation containers are used only to collect wastes of the same or compatible chemical composition in order to avoid unintended chemical reactions, fires or explosions. Wastes may be combined only after receiving approval from the environmental engineer.

2. For liquid wastes, a 5-inch air gap is left at the top of each drum or liner to allow headspace for vapor expansion.

3. Containers are kept closed at all times except during the addition or removal of waste for sampling.

4. Drums are opened and closed using a bung wrench or ratchet. Ignitable waste drums are opened and closed with a non-sparking wrench and are grounded to avoid ignition.

3.2.2 Identification Labels - All hazardous waste containers are identified with the words "Hazardous Waste”, a description of contents, and the accumulation start date and fill date, as appropriate.

3.2.3 Shipping Labels - Upon shipping, either on-site personnel or a waste management firm under contract to receive the waste will attach appropriate DOT transportation warning labels, an EPA waste label, and other labels and markings required by state and federal regulations. When a waste shipment is made by Alliant personnel, the markings and labels specified in the packaging layout, if one is required, will be followed. Packaging layouts are prepared and approved by the packaging engineer.

3.2.4 Forms- The environmental engineer or the waste management firm under contract to receive the waste will prepare the hazardous waste manifest for each off-site waste shipment. If the waste management firm prepares the manifest, the environmental engineer will approve the document prior to its use. At the time of shipment the environmental engineer, or his designee, will sign the manifest and obtain the transporter's signature and will distribute manifest copies as required. Also the shipping department will prepare of a Bill of Lading when required for a shipment.

3.2.5 Container Stacking Practices - In no case will containers be stacked or stored in a manner, which will cause tipping, collapse, and/or waste spillage from a container. Container stacking, particularly rectangular or square wooden boxes may occur in the explosive waste storage units in accordance with safety practices. No liquid waste containers of greater than 55-gallon capacity will be double stacked.

3.3 Building Design Parameters and Specifications

This section discusses the design and specifications of each T&S unit at TPG.

3.3.1 Non-Explosive Waste Storage Building (T&S 3) – Site 763 - Construction details of T&S 3 are presented in Figures 3.2 – 3.5. Solid and liquid wastes are stored in DOT-approved bulk containers in this storage unit to accumulate and/or store wastes prior to their shipment off-site for disposal. Waste storage containers typically are closed and open-head steel drums, plastic drums or open-head fiber drums. Over-pack drums are typically present for use in holding leaking waste drums or other similar uses.

3.3.1.1 Run-on/Run-off Prevention - T&S 3 stores both liquid and solid hazardous waste. It has a concrete floor, which has a slab elevation higher than that of the surrounding area outdoors to prevent run-on into the building. Floor drains do not exist at the structure.

A 3.5-inch deep recess in the concrete floor in the south portion of T&S 3 provides secondary containment for storing liquid waste. The floor in this area has sealed seams and is coated with an epoxy material that is compatible with the wastes stored there. The total area of the secondary containment (i.e., the area within the 3.5-inch recess) is 350 square feet. Thus, the total volume of the secondary containment is 350 ft^2 x

0.292 ft = 102 cubic feet = 763 gallons. This volume is more than sufficient to contain the minimum of 10% of the permitted liquid storage (10% x 20 drums x 55 gallons/drum = 110 gallons).

3.3.1.2 Security and Access Control – Access to T&S 3 is controlled by a 7-foot high chain link fence topped with barbed wire and locked doors. Security personnel control access to the building on a 24-hours a day basis.

3.3.2 Flammable Waste Storage Building (T&S 4) – The general design of the Ignitable Waste Storage Building (T&S 4) is shown in Figure 3.6. It is a metal structure with a 4-inch thick concrete floor. The building is designed to be explosion-proof per NFPA guidelines and has a waste storage capacity of 10 drums (550 gallons). Hazardous waste storage is limited to the unheated portion of the building.

Waste accumulation and storage containers in this storage unit are typically steel drums of various capacities, such as, 55- and 30-gallon drums. Since this is a satellite accumulation site for lab pack waste, it will be common to have original product containers up to 5-gallon size (e.g., paint cans and pails, aerosol cans, ink bottles, and epoxy resin tubes) being collected in either an open-head drum or a grounded safety cabinet.

3.3.2.1 Run-on/Run-off Prevention - This unit is totally enclosed and it has a concrete floor, with a slab elevation higher than that of the surrounding area outdoors to prevent storm water run-on. Floor drains do not exist at this unit. Secondary containment and control of free liquids is accomplished by use of spill control pallets as depicted in Figure 1.4. Each spill control pallet has a capacity of 80 gallons.

As required by Minnesota Rules the secondary containment system must be sized for ten percent of the volume of all stored containers or the volume of the largest container, whichever is greater. One spill control pallet will be utilized for each grouping of up to four 55-gallon liquid waste drums or equivalent volume of smaller capacity drums. Each pallet has a containment capacity of 80 gallons. For example, ten percent of the volume of four 55-gallon drums is 22 gallons (10% x 4 drums x 55 gallons) and the largest container volume is 55 gallons. Overall, three spill pallets will be required to store the ten (10) 55-gallon drum storage capacity of this unit. As designed, the spill pallets provide 240 gallons containment (3 pallets x 80 gallons/pallet = 240 gallons). This exceeds the requirements for secondary containment.

3.3.2.2 Security and Access Control - Security personnel control access to the building on a 24-hours a day basis.

3.3.3 Open Burn Treatment Area (T&S 5) - Site 675

TPG treats reactive (explosive) wastes through open burning or open detonation (OB/OD). The waste treated typically consists of bulk propellants and explosives, waste explosive derived from production processes, manufactured explosive-containing devices, or off-specification product. While every effort is made by TPG to maximize the re-use of good quality material, there will inevitably be reactive materials generated which must be managed as hazardous waste. Maps showing the Open Burn/Open Detonation Treatment Area (T&S 5) and the individual treatment subunits in it are shown in Figures 3.7 and 3.8, respectively. This treatment area is located about 1250 feet from the property line.

Precautions are taken when treating explosives to ensure that only compatible types are processed at the same time to limit the possibility of uncontrolled reactions when the waste is handled and treated. Open burning operations are limited to 1,000 pounds net explosive weight (NEW) aggregate for all treatment activities occurring at one time. In other words, simultaneous burns may occur at various subunits but the NEW of the wastes being treated must not exceed the 1000-pound limit. An annual explosive waste treatment limit of 200,000 pounds net explosive weight is in place for TPG.

There are five forms of reactive waste that are currently treated at the Open Burn/Open Detonation Treatment Area (T&S 5) using various treatment methods. These include:

- Bulk material not completely encased in a cartridge, shell, or warhead
- Items containing unexposed, encased explosives
- Wastewater containing low levels of bulk material in suspension or dissolved
- Low-mass confined explosives and detonators
- Packaging material with trace amounts of reactive material

Each of these forms of reactive waste is treated by a unique procedure or in a specific treatment subunit at T&S 5. Refer to Section 3.3.4.1. through 3.3.4.4 and Appendix C for detailed OB/OD process descriptions. Individual OB/OD subunits that are currently active at T&S 5 are the:

- Burn Pads
- Detonation Pit
- Evaporation Pans
- Steel Burn Boxes
- Burn Cage

These units are shown in Figures 3.9 through 3.15. A discussion of the methods used to treat the types of reactive waste listed above is presented in the following sections.

3.3.3.1 Burn Pads – Generally bulk propellants and bulk explosives are treated by open burning at this subunit. Material designated for open burning is treated on any of four concrete burning pads lined with firebrick. Three burn pads are active and the fourth is approved but has not been built yet. The construction of the fourth pad will not impact existing limits. The firebricks are used to insulate the concrete from heat and shock which can occur during treatment. The open burn procedure typically used for high explosives involves placing the waste on top of a bed of straw or wood chips. The mixture is then ignited using a small volume of fuel oil. Bulk propellants typically are burned without the need for supplement fuel. Figure 3.9 shows a typical concrete burn pad without a firebrick lining.

This subunit has a treatment limit of 1,000 pounds NEW per burn per pad with three burns allowed per pad per day. Thus, the total subunit treatment capacity is 9,000 pounds per day. Safety considerations may lead to a lower capacity which is dependent on the material being treated.

3.3.3.2 Detonation Pit - Encased explosives or those devices that have sufficient confinement that a detonation might occur if open burned are detonated in the detonation pit (Figure 3.10). Detonations are triggered remotely via an electric match and/or donor charge to initiate the reaction.

The treatment limit for this unit is 25 pounds NEW per detonation with 500 detonations allowed per day. Thus, the total subunit treatment capacity is 12,500 pounds NEW per day.

It should be noted that all explosive configurations can occasionally detonate or deflagrate at a sufficiently high rate to appear as detonations when burned. If this behavior is noted for a particular type of waste, then measures are taken, if possible, to enhance burning instead of deflagration or detonation.

3.3.3.3 Evaporation Pans - Contact-cooling water with suspended and/or dissolved explosives and other reactive waste waters are treated by evaporation and flash burning in this subunit. The evaporation procedure involves transferring explosive-contaminated wastewater from the generating site to the evaporation pans, which are shown in Figure 3.11. Three (3) evaporation pans are located in this subunit.

Typically a tank, which is either mounted on a trailer or a truck, is used to transfer the contaminated water by gravity into the evaporation pans. This transfer is controlled by an operator who opens and closes a manual valve to regulate the flow of wastewater into the treatment unit. Also a powered pump, under the control of an operator, may be used in the transfer process. The evaporation pans are located over a concrete pad, which is lined with firebrick as shown in Figure 3.12. Evaporation of water is done by heating the underside of the pan(s) with a propane-fired burner. After this is completed, fuel oil may be placed in the evaporation pans and ignited (remotely) to destroy any residual explosive material.

The treatment limit per pan is 200 gallon of wastewater per day with 600 gallons per day being the capacity for the entire subunit.

3.3.3.4 Steel Burn Boxes - The steel burn boxes are used to burn exposed high explosives contained in munitions and to initiate small explosive devices like primers and detonators. The boxes allow for a controlled burn of a large number of projectiles and other smaller components within a treatment unit without having to physically remove the explosives from each unit before treating. Ordnance that contain small quantities of explosives (usually less than 20 grams), such as, fuzes, detonators, primers, cut projectiles and related materials are processed in the boxes. The fuel used in the boxes is propane gas.

A typical burn box has dimensions of about 2 feet x 3 feet x 3.75 feet as shown in Figure 3.13. The five (5) burn boxes in this subunit are located on an elevated concrete pad. The typical design of the pad is shown in Figure 3.14. The explosive components, which are processed in these boxes, may either burn or detonate. For this reason, the boxes are usually covered during operation. These covers are made of heavy gauge steel mesh, which is welded into a steel frame. The frame has wheels, which ride on rails attached to the sides of each box, making the opening and closing of the unit easier for the operator. The use of the mesh cover during a burn limits the scattering of waste and metal fragments due to small detonations.

The treatment capacity for this subunit is 1,000 pounds NEW per burn with 3 burns per day yielding a treatment capacity of 3,000 pounds NEW per day. Note that more than one box may be used simultaneously, but neither the 1,000 pounds NEW per burn nor 3,000 pounds NEW burned per day will be exceeded. However, as with other burn ground subunits, safety considerations may lead to lower treatment rates than the stated capacities.

3.3.3.5 Burn Cage - Bulk combustibles, such as paper, rags, shipping boxes and related materials, which might contain residual amounts of explosives or propellants are burned in the burn gage. It is an expanded metal cage located on a concrete pad as shown in Figure 3.15. Waste combustibles are accumulated in the cage before being burned in batches. The treatment capacity is 35 cubic yards per burn with two (2) burns allowed per day (or 70 cubic yards per day). This unit is included in this discussion of hazardous waste treatment subunits at T&S 5 for completeness. It is very likely that the waste material burned in this subunit is not reactive hazardous waste because of the very low quantities of explosive residues that may be present.

3.3.3.6 Run-on/Run-off Prevention - The individual subunits at T&S 5 are covered as soon as it is safe to do so with either plastic tarps and/or metal covers to minimize the entry of rainwater. In addition, the concrete burn pads contain 3-4 inches of freeboard to minimize run-off in the event that rainwater accumulates on a pad. Also each pad is surrounded by an asphalt apron to prevent the direct introduction of run-off into the surrounding area.

Metal covers exist for the burn pads. The burn cage is not covered, but typically there is an insignificant amount of hazardous material present. The steel burn boxes are routinely emptied of residue and following treatment and a cool down period are covered with metal weather covers.

3.3.3.7 Security and Access Control - T&S 5 access is limited by security personnel on a 24-hour basis. The area surrounding all the subunits, except the detonation pit and the burn cage, is surrounded by a 7-foot high chain link fence topped with barbed wire. The gates into this area are locked except when personnel are present.

3.3.3.8 Air Emission Considerations - Air emissions from T&S 5 are monitored via the tracking of fuel use, and the type and mass of waste material treated. This data in entered into a database that uses empirical emission factors to determine the mass of priority pollutants and hazardous air pollutants emitted. Further air emission characterization has been performed as part of the OB/OD Environmental Assessment Process (Section 9).

3.3.4 Explosive Waste Storage Magazines (T&S 6) - The list below shows those storage magazines, which are designated as explosive waste storage units:

- Magazine 5A*
- Magazine 5B*
- Magazine 6
- Magazine 7
- Magazine 14
- Magazine 18

* Explosive Waste Storage Magazines 5A and 5B are located within Explosive Storage Magazine 5 and are separated from each other by an interior concrete partition.

Figures 3.16 through 3.20 provide construction details and specifications on the waste explosive storage magazines 5A, 5B, 6, 7, 14, and 18.

Hazardous waste storage in these magazines is limited to only explosive wastes. Explosive waste may be stored with a desensitizing agent, such as, mineral oil, as a safety precaution. Explosive hazardous wastes are typically segregated within each storage magazine from products that may also be stored there. All storage within the explosive waste storage magazines will meet applicable explosive storage compatibility and quantity requirements.

Containers for waste explosives stored in this unit consist of DoD-approved ammo cans, wooden crates, fiber or plastic drums and containers, and other approved packaging that may have been originally used to store products. Waste explosive wetted with mineral oil in order to desensitize the explosive will be placed in 5-gallon plastic containers within a secondary containment unit as shown in Figure 3.21. No more than 12 such containers will be stored within each secondary containment unit with three (3) secondary containment units allowed per magazine. This yields a storage capacity of thirty-six (36) 5-gallon containers of wetted explosive per explosive waste storage magazine. Since this waste is not different from the original product, it is considered safe to use the same type of container to store the waste explosives in as was the product.

All of the above storage magazines are constructed to meet the Arms, Ammunition & Explosives (AA&E) storage requirements of the Department of Industrial Security (DIS) and the Bureau of Alcohol Tobacco, Firearms, and Explosives (BATFE). All explosive storage magazines, including those identified for storage of explosive wastes, have been located on TPG in accordance with the explosive safety quantity/distance tables found in DoD regulation 4145.26M and are identified as such in the safety site plan. These magazines are regularly inspected by DIS and BATFE, as well as, by the DoD Defense Logistics Agency for compliance with explosive safety requirements.

Total waste explosive storage in T&S 6 is limited to 112,000 pounds NEW, which is distributed among the various magazines as follows:

- Magazine 5A 1,000 lbs NEW
- Magazine 5B 1,000 lbs NEW
- Magazine 6 10,000 lbs NEW
- Magazine 7 20,000 lbs NEW
- Magazine 14 50,000 lbs NEW

- Magazine 18 30,000 lbs NEW

3.3.4.1 Run-on/Run-off Prevention - The explosive waste storage magazines are totally enclosed and have a concrete floor with an elevation higher than that of the area immediately surrounding the structure. Floor drains do not exist at any of the explosive waste magazines.

3.3.4.2 Security and Access Control – All of the individual storage units within T&S 6 are surrounded by a common 7-foot high chain link fence topped with barbed wire. Access to the magazine area is strictly controlled by security personnel on a 24-hour basis. The buildings are securely locked and access to the gate and magazine keys is limited to only those personnel who have the approval of plant management.

3.3.5 Explosive Waste Storage (T&S 10B) Site 626 – T&S 10B is made up of two storage units, which combined support the teardown of munitions prior to treatment at OB/OD Treatment Area (T&S 5). The first storage area is an outdoor trailer receiving/storage area consisting of bays for two (2) semi-trailers. It is here where munitions in trailers are received from either off-site facilities, the explosive waste storage magazines (T&S 6), or directly from production areas located on site. Disassembled munitions may be also stored in these trailers prior to their transfer to T&S 6 for storage or transfer directly to the OB/OD Treatment Area (T&S 5) for treatment. The second storage area in T&S 10B is an indoor receiving/storage area consisting of an indoor concrete dock and an adjoining receiving area, which also supports the munition demilitarization process. No free liquid containing wastes will be stored in T&S 10B. The outdoor and indoor storage units will have a combined storage capacity of 40,000 pounds NEW. This unit is shown in Figure 3.23.

The containers used to store waste munitions in T&S 10B both before and after teardown are DoD-approved containers, such as, ammo cans and wooden crates. For munitions received from off-site facilities the storage containers will be the ones in which the munitions were received.

Munition disassembly, which T&S 10B supports, is used to either remove and/or expose the explosive content of scrap munitions. Water jetting, remote band sawing, other mechanical processing and/or manual teardown are used to disassemble munitions into energetic and non-energetic components, such as scrap metal and circuit assemblies. The later materials are sent off site for reclamation. These processes are used only to prepare explosive devices for subsequent treatment and are not themselves considered treatment of hazardous waste. This is true because no reduction in the reactivity characteristic of the energetic components occurs during this processing. Instead these steps only repackage the explosive waste to make it safer and/or more compatible for treatment in the T&S 5 subunits. For example, water jetting of a munition opens the unit to expose its high explosive contents. This allows an otherwise "confined" explosive to be safely open burned rather than requiring it to be open detonated. The water-jetting process occurs in an area of the building designed to be explosion-proof for safe operation. During the process, the munitions are placed onto a specially designed tray which is then passed beneath a high-pressure stream of water containing garnet cutting sand. The process is remotely operated and is monitored by video cameras to ensure operator safety. Following cutting the munition parts are collected in properly labeled DoD-approved containers and are placed back into storage in T&S 10B. From there the cut munitions are either transferred to on-site explosive waste storage magazines (T&S 6) or to the OB/OD Treatment Area (T&S 5) for burning.

The typical munition throughput rate for teardown varies with the type of unit being processed and the mechanical operations being performed. However, up to 5,000 units a day may be processed in this repackaging activity.

3.3.6.1 Run-on/Run-off Protection - The building in which T&S 10B is located is totally enclosed and has an elevated concrete slab designed to prevent run-on of storm water. The loading dock has an overhang with an awning designed to prevent rainwater from entering the building. No secondary containment is necessary since no wastes containing free liquids are stored in T&S 10B.

3.3.6.2 Security and Access Control – Access to the building is strictly controlled by security personnel on a 24-hour basis.

3.3.7 Indoor Gun-firing Range (T&S 12) Site 650 - This facility has three (3) separate indoor gun-firing ranges of 100, 150, and 200 meters in length. The facility design is shown in Figure 3.24. Each range is constructed of reinforced concrete and consists of a firing/control room, gunroom, test range, and bullet catcher. Two exhaust fans at the bullet catcher end of the range provide ventilation for the ranges. Typically, 25mm and 30 mm rounds will be treated using gun firing, although smaller and larger caliber bullets may be also treated here. The throughput rate for this unit is as follows:

Hourly	500 bullets
Daily	500 bullets
Weekly	1,500 bullets
Quarterly	4,000 bullets
Annually	16,000 bullets

Since T&S 12 is considered a miscellaneous unit, it is also under the annual 200,000 pounds NEW treatment limit for TPG.

There is no container storage at T&S 12. Rounds that are to be gun-fired there arrive in marked, DoD-approved containers. Spent cartridge cases left after firing are typically recycled.

3.3.7.1 Run-on/Run-off Protection - This structure is a totally enclosed, above-grade building that has a concrete floor with an elevation higher than that of the surrounding area to prevent storm water run on. The facility does not treat wastes that contain free liquids.

3.3.7.2 Security and Access Control - T&S 12 is maintained as a locked structure with access limited to personnel trained in the operation of an indoor gun-firing range and ammunition testing. Security personnel strictly control access to the building on a 24-hour basis.

3.3.7.3 Air Emission Considerations - The primary air emission source at T&S 12, besides heating sources, are the exhaust fans from the gun range. Using air emission factors similar to those used for estimating the impacts from T&S 5 operations, air modeling based on the projected emissions from this unit being used to treat waste bullets was performed. Appendix H provides a detailed discussion of the results of this study.

3.4 Removal of Liquids from Containment Systems (T&S 3, T&S 4, and T&S 6)

Liquid spills or leaks will be controlled, cleaned up, and residues containerized as soon as possible after an incident is detected. Cleanup of significant spills will be accomplished using the procedures outlined in the Hazardous Waste Contingency Plan (Appendix E) and the methods recommended for the class of material involved per the Emergency Response Guidebook published by the U. S. DOT. Container leaks during non-operating hours will be detected and removed at least weekly as part of routine waste storage unit inspections. Typically, detection and removal of such leaks will occur sooner because personnel enter storage areas at least several times per week.

Characterization of spill cleanup residue will be determined by the nature of the material involved (e.g., flammable liquid or oil), existing data, and knowledge of the process from which the spill occurred. This assessment will aid in determining the proper storage, transport, and disposal method for the material. If further information is required on the physical and chemical properties of the cleanup residues then it will be analyzed per the waste analysis plan in Section 2.0.

3.5 Lab Pack Management

This section provides the procedures for managing lab pack wastes on site. Typically these wastes are classified, packed, and shipped off site for treatment with the assistance of a hazardous waste vendor who is under contract with TPG. The environmental engineer and other facility personnel, as required, will assist the contractor during these efforts.

Containers of waste to be lab packed will be initially inspected either by the generating department and/or stores personnel. This is to ensure that each has a legible product label and if not one is prepared and attached to the container that describes its contents. The containers also must be securely sealed and non-leaking. Whenever possible, materials are kept in their original containers. If the original container has deteriorated, the contents will be either transferred to another container of the same or similar type that is compatible with the waste, or it will be over packed into another container. Lab pack waste containers are stored either in the Ignitable Waste Storage Building (T&S 4) or the Non-Explosive Waste Storage Building (T&S 3).

Ignitable lab pack wastes will be collected and stored per the procedures outlined in this section and in Section 4.5.

3.6 Operating Records

As a hazardous waste storage and treatment facility TPG must maintain a written operating record. This record details information for wastes that it receives, stores and/or treats; significant spill incidents requiring implementation of the facility contingency plan; inspection records of both the storage and treatment units; and, facility closure cost estimates. Table 3-1 provides an overview of the information in the operating record and the location where it is located on the facility.

Records on open burn/open detonation (OB/OD) activities also are maintained in the operating record. These records include: Burn dates for each subunit, waste type and amount burned, waste drum storage start date for burn ground ash; and, the replacement date for treatment subunits.

Also the Hazardous Waste Contingency Plan, Closure Plan and Cost Estimate, and Financial Assurance Mechanism will be maintained in the environmental engineer's files. These documents will be periodically updated, as required, in accordance with Minnesota Rules Chapter 7045.

3.7 Records Retention and Disposition

The retention period for the records noted below, as required under Minnesota Rules 7045.0450 to 7045.0544, will be three years:

- Inspection Logs
- Personnel Training Records
- Operating Records
- Manifest Documents

This retention period will be automatically extended during the course of an unresolved enforcement action involving the facility.

TABLE 3.1
TPG STORAGE AND TREATMENT FACILITY
OPERATING RECORD

Item	Description	Location
1) Names and EPA ID numbers of generators	List of each HW generator whose waste is being sent to TPG	Facility Environmental Files
2) Date of arrival for each incoming hazardous waste (HW)	Contains arrival date w/ transporter name and EPA ID number	Facility Environmental Files
3) Description and quantity of HW stored	Includes method and date of storage and/or treatment at facility	Facility Environmental Files
4) Location of HW stored at the facility	To be updated every two weeks and cross-referenced to the manifest accompanying the waste	Facility Environmental Files
5) Waste analysis data	Results of waste analyses performed	Facility Environmental Files
6) Inspections	Inspection forms from the inspections performed at permitted T&S units; corrective actions are also noted	Facility Environmental Files
7) Monitoring	Data from monitoring performed at TPG	Corporate & Facility Environmental Files
8)HW Contingency Plan	Summary reports and details of all incidents that required implementation of the Contingency Plan	Facility Environmental Files
9) Annual reports	Annual reports and supporting information	Facility Environmental Files
10) Corrective Action	Corrective action data/materials for any actions taken at TPG	Facility Environmental Files

TABLE 3.1 (Cont'd)
TPG STORAGE AND TREATMENT FACILITY
OPERATING RECORD

Item	Description	Location
11) Notices to off-site facilities	Notices required, per MN Rules 7045.0452, Subpart 3, Item C, that TPG has the appropriate permits to manage & accepted their waste	Facility Environmental Files
12) Land Disposal Restrictions	LDR notifications required under MN Rules 7045.1315	Facility Environmental Files
13) Closure Cost	Estimates of facility closure costs for permitted T&S units	Facility Environmental Files
14) Waste Minimization Plan / Pollution Prevention Plan	Certification that such plans are in place	Facility Environmental Files
15) Manifest Information	Specific manifest numbers for wastes shipped or received and the corresponding dates	Facility Environmental Files

3.8 Incidental Handling

Upon arrival of a transporter at the receiving dock, shipping papers are examined to determine if the shipment contains explosive hazardous waste. If it does, the Logistics Coordinator, or a designated technician, will review the accompanying hazardous waste manifest and accompanying paperwork to identify the generator and type of waste on board. A visual inspection of the condition of the shipping containers and their count is also conducted. If there are any concerns about the waste shipment, the environmental engineer is immediately contacted to help resolve the matter. This assessment will usually occur within several hours of the truck's arrival at the receiving dock. If based on this assessment, the incoming waste is acceptable for storage and/or treatment on site, the manifest is signed and the waste is received.

After the shipment has been received, it is then transported either directly to the OB/OD Treatment Area for treatment, to a permitted storage unit, or to a breakout facility to prepare the waste for treatment or storage. This is typically done the same day as the arrival of explosive waste at the receiving dock.

Transport to a breakout facility is conducted to facilitate segregating the waste into: 1) groups compatible for treatment at the same time; 2) appropriate quantities for treatment; and/or, 3) groups requiring cutting into smaller pieces to reduce the potential for damage to treatment equipment.

From the on-site storage units, wastes are either transported to a treatment unit, as capacity allows, or to a breakout facility to unpack and/or cut the items into smaller pieces using a water jet, remote band saw, or other appropriate equipment. These processes are used only to prepare explosive devices for treatment and are not themselves considered treatment of hazardous waste. Instead these steps are only repackaging of the waste to make it safer and/or compatible for treatment in the T&S 5 subunits. Waste is not held outside of a storage area for incidental handling or to prepare it for treatment usually longer than twenty-four hours.

4.0 HAZARD PREVENTION

4.0 HAZARD PREVENTION

4.1 Security

The ATK Plant Security Manual details the security procedures used at TPG. It describes the use of measures, such as sign-in procedures, security guard duties and responsibilities, staff and visitor badges, and physical and administrative controls that are used to manage access onto the facility and requirements that visitors must follow while on site.

4.1.1 24-Hour Surveillance System - The main facility gate is staffed by security personnel on a 24-hour basis. If the guard is temporarily away from the main guard desk entry to the facility by visitors and personnel is not allowed until the guard returns. Security personnel routinely patrol the facility grounds by vehicle.

4.1.2 Barriers - The facilities are surrounded by a fence, and the property boundaries marked. Warning signs are attached to the fence at 90-foot intervals. Entrance to the facility is via a powered gate. Access is controlled by security personnel and each hazardous waste storage area is fenced and/or locked as described previously.

4.1.3 Means to Control Entry:

a. All employees are required to wear an authorized photo identification badge.

b. All visitors, sub-contractors, vendors and off-site Alliant Techsystems employees are required to register at the main gate prior to entry to the facility. Each is instructed by security personnel regarding applicable on-site restrictions and requirements. Temporary badges are issued to all employees who do not have their own badges, as well as to visitors, sub-contractors and vendors for use while on-site. These badges must be turned into the guard upon leaving the site.

c. Alliant personnel who are authorized by management can escort vendors, bidders, or authorized visitors to controlled areas.

d. Non-Alliant personnel who are preapproved through security are allowed non-escorted access to limited areas of the facility. Entry onto the site is allowed only after access approval is verified by security via a computer network database and after an Alliant employee verifies the identity of the visitor. Next the employee and the visitor both sign and date a visitor log sheet before the visitor is issued a color-coded non-escort badge. This badge must be returned to security at the conclusion of the visit.

d. Use of personal vehicles on TPG is restricted and must be approved by site management before entry is allowed. The subject vehicle is searched before and after usage on site.

4.1.4 Warning Signs - Posted at key points at hazardous waste management unit perimeters are signs bearing the legend Authorized Personnel Only, NOTICE, Authorized Personnel Only or equivalent that notifies personnel of restricted access to the area. Smoking on site is strictly prohibited.

4.2 Inspection Schedule

4.2.1 General Inspection Requirements - All equipment checks and procedures for general safety and emergency equipment have been incorporated into inspection schedules performed on a routine basis by personnel knowledgeable of hazardous waste management practices. These inspections are intended to insure standard operation of hazardous waste facilities and to insure readiness of equipment and supplies in the event of an emergency.

All equipment and supplies used to prevent and control fire hazards are routinely inspected as detailed below.

4.2.2 Specific Process Inspection Requirements - Inspection schedules for the operation of the storage units, open burning equipment and facilities at TPG are found in Tables 4.1 and 4.2, respectively.

4.2.3 Corrective Measures - Any deficiency that is detected during an inspection are remedied in a timely manner to prevent environmental or human health hazards. The inspector will contact the area supervisor if any deficiencies are detected. The area supervisor will supervise corrective measures. Deficiencies that are not being handled properly or in a timely fashion will be brought to the attention of the Site Director who will insure that proper corrective action is achieved.

4.2.4 Inspection Log - An inspection and monitoring log is maintained which shows the date and time of inspection, inspector's name, observation of deficiencies, and the date of corrective action and/or repairs. All inspection logs will be maintained on-site for a minimum of three years. Each T&S unit has its own inspection log and assigned personnel responsible for the inspections (see Figures 4.1 & 4.2) for samples of the inspection logs).

4.2.5 Maintenance Plan for Treatment Units (T&S 5) - Maintenance of the treatment units will be addressed based on findings from inspections. Maintenance procedures for permitted treatment units are as described in the following sections.

4.2.5.1 T&S 5- Open Burn/Open Detonation Unit - The sub-units will be maintained through inspections and the specifics discussed below:

1) Burn pads - Breaks in the walls should be repaired with concrete patching whenever they will no longer contain sand fill (if it is used). Each should be cleaned of residue when it will no longer remain on the pads.

2) Evaporation pans - The pans should be cleaned of residue periodically if under heavy use. Repairs shall be made when a leak in excess of one-gallon per hour is detected from the pan to the containment pad.

3) Steel Burn Boxes - The burn boxes should be cleaned of residual metal periodically to ensure safe operation. Any significant deterioration of a box that will impair proper operation should be repaired prior to further use.

TABLE 4.1

EMERGENCY RESPONSE EQUIPMENT INSPECTION SCHEDULE

Equipment	Inspection Frequency
Fire Extinguishers	Annually
Absorbent (T&S 3, T&S 4)	Weekly
Fire Fighting Equipment (grass fire fighting)	Bi-monthly during fire season typically April 1 through October 31.

TABLE 4.2

HAZARDOUS WASTE FACILITIES INSPECTION SCHEDULE

Location	Inspection Frequency
T&S 3, T&S 4, T&S 5 T&S 6, T&S 10B and T&S 12	Weekly
Water/Explosives Handling Equipment	
Water Pump and Hoses	Before each use
300-Gallon Transfer Tanks	Before and after each use

4.3 Emergency Access to Hazardous Waste Facilities

4.3.1 Aisle Space- As shown in the relevant figures for T&S 3, 4, and 6 in Section 3.0, all storage facilities have adequate aisle space for cleanup of spilled material and to permit inspection of containers.

4.3.2 Emergency Communications - Most hazardous waste storage and treatment units either have telephones located immediately in the area/structure or readily available within walking distance. These phones are connected to the Site Director's office and the main security desk. Emergency assistance can be summoned by dialing x7777, the on-site emergency number, 24-hours a day. When personnel work in hazardous areas without telephones, two-way radios are provided that are capable of transmitting or receiving from anywhere on site to a base station monitored at the guard station. This communication system is used to report spills, fires and medical emergencies.

4.3.3 Emergency Equipment - Maintenance of emergency equipment is performed to ensure proper operation during an emergency. Such maintenance is typically initiated as a result of equipment inspections.

4.3.3.1 Grass Fires- TPG maintains fire-fighting equipment sufficient to provide rapid response. This equipment is identified in the facility Contingency Plan (Appendix E).

Fire control vehicles are typically refilled at a rate of 300 gallons per minute from a 1,000-gallon reservoir. The reservoir is refilled at a rate of 50 gallons per minute from an adjacent well.

4.3.3.2 Building/Structure Fires- Fire fighting for building/structure fires where explosives are not involved is provided by the St. Francis Fire Department. Water tankers are used in rural areas, such as TPG because no municipal water supply is available.

4.3.3.3 Fires with Explosives - Buildings that contain explosives which catch on fire are allowed to burn. This avoids the risk of injury should an explosion occur. These buildings are either located within earthen barriers or are sufficiently remote which should limit the hazard resulting from an explosion.

4.3.3.4 Emergency Power - A generator at the Operations Building provides emergency power for the facility telephone system insuring that the communication system is operational during an incident.

4.4 Prevention Procedures, Structures, and Equipment - This section describes the procedures, structures, and equipment used to prevent various hazards associated with hazardous waste storage areas on site.

4.4.1 Loading and Unloading - All drums are moved via barrel tongs, barrel picker, drum dolly, or are transported on pallets. Drums that are damaged or otherwise are in danger of leaking are immediately placed in an over pack drum, sealed to prevent the leak, or will have their contents transferred to another container.

4.4.2 Equipment Failure/Power Outages - The Operations Building area has a 10-kilowatt (minimum) generator for emergency power supply. It is the only building serviced by the generator.

4.4.3 Operation of Explosive-Carrying Vehicles - Procedures for the safe operation of forklifts and other vehicles hauling hazardous waste on the facility are detailed in facility procedures which are maintained on site. The explosives truck that is used to move explosives between waste storage magazines and the open burn treatment area is specially equipped. For example, the gas tank of the truck is equipped with an anti-static device.

4.4.4 Personnel Protection Equipment - TPG maintains an inventory of protective clothing and equipment to be used by personnel working with hazardous waste. All personnel handling hazardous waste are required to wear safety glasses with side shields or goggles. Face shields are not a substitute for safety glasses or goggles, but may be worn over approved industrial safety glasses for added protection. Protective clothing and respirators are used if the properties of wastes being handled require additional protective measures.

4.4.5 Prevention of Surface Water and Groundwater Contamination

4.4.5.1 Surface Water - The Flammable Waste Storage building (T&S 4) contains a maximum of ten drums of hazardous waste including lab pack wastes. The Non-Explosive Waste Storage Building (T&S 3) contains a maximum of 20 drums liquid. The wastes stored in these structures are at least 250 feet from the nearest surface water and these are the only storage areas at TPG permitted to store liquid waste. All liquid waste drum storage incorporates spill containment and control as specified in Sections 1.0 and 3.0.

Due to the small quantities of waste stored, the secondary containment provided in the storage areas, and the distance to the nearest water body, it is highly unlikely that a liquid hazardous waste spill will reach surface water.

4.4.5.2 Groundwater- The loading/unloading area is protected from groundwater contamination from a spill by the following:

a. The loading/unloading area is paved with both concrete and asphalt. This allows clean-up of spills normally before there is an impact to groundwater.

b. The drums are handled by forklifts equipped with barrel tongs. Each is operated only by trained and certified drivers.

c. Drum placement in an over-the-road truck is done in a manner that prevents harsh treatment which might damage the containers.

As discussed in Section 4.4.5.1, there are two T&S units that store liquid hazardous waste. These areas have secondary containment that exceeds the minimum requirements for containment of spills. Thus, the risk to groundwater from a release inside these facilities has been minimized to the most practical extent possible.

The other hazardous waste units on site, i.e. T&S 5, T&S 6, T&S 10B, and T&S 12, only store or treat solid hazardous waste, which contain no free liquids. (The only exception is that the Explosive Waste Storage Magazines may contain explosive that is wetted with a small amount of mineral oil as a desensitizer.) Releases or spills of waste explosives, especially those contained in enclosed devices can be readily cleaned up. Since there are no liquids involved in such incidents, these relatively rare events do not pose a significant threat to either surface or ground water.

However, as is evidenced by the groundwater quality at the old burn ground near T&S 5, it is possible that groundwater quality may be impacted by the mismanagement of hazardous waste and hazardous waste treatment residues. Current operations at T&S 5 are designed to minimize the possibility of groundwater impacts by the proper management of waste and waste treatment residues. These practices are discussed in the Detailed Operating Procedures in Appendix C and the Ash Management Plan in Appendix I.

The environmental impact of T&S 5 operations, including groundwater issues, has been determined with the completion of the Human Health and Ecological Risk Assessment, which is discussed in Section 9.0.

4.4.6 Prevention of Run-Off in Hazardous Waste Handling Areas - All hazardous waste handling and storage areas are enclosed structures, with the exception of the Open Burn/Open Detonation Treatment Area (T&S 5). Run-off management at the OB/OD unit (T&S 5) is accomplished by conducting open burn treatment operations within diked concrete burn pads and covering these pads when not in use. The diked pads (Figure 3.9) are constructed above-grade and serve to both contain treatment residue and prohibit surrounding run-off from entering the pad. Run-off cannot access the steel burn boxes because they are on an elevated concrete pad.

The open burn treatment subunits are covered following each treatment event. This is done after the waste has been fully burned and after an adequate cool down time has elapsed in accordance with TPG safety procedures. The precipitation covers, which are placed over the treatment subunits, are made of heavy-gauge metal or equivalent materials. Metal lids are also used to cover the burn boxes and recyclable metal residue removed from the burn boxes. Run-off prevention for the open detonation area is an earthen berm which is located up gradient of the subunit to minimize run-on directly into the area.

Special precautions to prevent run off at the shipping and receiving dock area are not taken due to the fact that the materials are packaged in closed DOT-approved containers. As such there is no feasible exposure pathway to surface water.

4.5 Prevention of Reaction of Ignitable, Reactive, or Incompatible Waste

4.5.1 Identification Labels - All liquid and chemical waste containers are identified with a hazard waste label during collection and storage on site as specified by Minnesota Rule 7045.0292.

The labels are available from the environmental engineer.

4.5.2 Container Filling Procedures - Containers are to be used only for hazardous waste materials of the same designated chemical composition. Hazardous chemicals can be combined only upon written approval of the environmental engineer.

For liquids, a five-inch air gap is left at the top of the container to allow for expansion.

4.5.3 Special Wastes

4.5.3.1 Flammable Wastes - Flammable wastes will be handled and stored according to procedures. Stores will move waste flammable liquids to the approved flammable storage area to await pickup by a disposal vendor.

Appropriate labels and markings will be applied to the container and the name of the waste material written legibly on the label (see Section 4.5.1). For ignitable mixtures, the general components will be listed. Storage cabinets may also be used for accumulation when approved by Safety. Drums being stored in the ignitable waste storage area will be grounded when wastes are being added.

4.5.3.2 Explosives - Specific procedures for the proper handling and storage of explosives are identified in procedures maintained on site.

4.5.4 Waste Storage Compatibility Consideration - Different classes of hazardous wastes are stored in different buildings. Compatible raw materials and wastes may be stored in the same building. See Table 4.3 for examples of waste materials acceptable for storage in each building.

Incompatible wastes will not be stored adjacent to each other in storage areas. Incompatible wastes and raw materials will be stored at least an aisle space apart and will be physically separated by a secondary containment device. Wastes from different but compatible classes may be stored next to each other without separation devices. Different classes of wastes are not mixed in the same container.

4.5.5 Immediate Response to Hazardous Waste Spills - Site personnel will immediately respond to small spills of hazardous waste within or outside of a secondary containment area. Upon discovery, the inspector will notify the environmental engineer (or designated alternate) and proceed with appropriate cleanup activities.

For liquid wastes, this would involve pumping and/or mopping up the liquid that was spilled. The collected liquid will be placed in an appropriately labeled container and placed into storage. For solid waste spills, the material will be swept up and placed in an appropriately labeled container and placed into storage. Spills of solid explosives will require special clean-up methods utilizing non-sparking and anti-static tooling to prevent unplanned reactions.

4.6 Arrangements with Local Authorities

Copies of recent correspondence with local emergency response agencies are provided in Appendix D.

4.6.1 Fire Departments - The St. Francis Fire Department is encouraged to review the facility so it is familiar with on-site operations and hazards. It is the primary responder for incidents that occur at TPG with the Oak Grove Fire Department acting as a supporting department. Appendix D contains documentation of arrangements with these fire departments.

4.6.2 Hospitals - Mercy Hospital in Coon Rapids, Minnesota serves as the primary medical emergency facility for TPG. North Memorial Medical Center will also provide medical assistance during an emergency. Appendix D documents the notification given to the hospitals regarding the types of injuries that may occur on site and potential chemical hazards.

4.6.3 Police - Formal contact has been made with the St. Francis Police and the Anoka County Sheriff's Department for emergency assistance. Initial response during an emergency will be from the St. Francis Police Department with the Anoka County Sheriff's Department acting as a supporting department. Appendix D contains documentation of arrangements with the St. Francis Police and the Anoka County Sheriff's Departments.

TABLE 4.3

EXAMPLE COMPATIBLE WASTE CHART

NON-EXPLOSIVE WASTE STORAGE (T&S 3)

Fluorescent Light Bulbs
Lead-Acid Batteries
PCB & Non-PCB Light Ballasts
Open Burn Treatment Residue
Dried Paint Filters
Lab Pack Wastes
Photographic Chemicals/Scrap Film
Used Oil
Used Oil Absorbents & Sludges
Used Oil Filters
Miscellaneous Non-ignitable Wastes

IGNITABLE WASTE STORAGE BUILDING (T&S 4)

Waste Paint Solvent/Paint Sludge
Miscellaneous Ignitable Solvent Mixtures
Xylene
Toluene
Halogenated Hydrocarbons
Ketones
Alcohols
Lab Pack Wastes

TABLE 4.3

EXAMPLE COMPATIBLE WASTE CHART (Cont'd)

EXPLOSIVE WASTE MAGAZINES (T&S 6)

Explosives
Propellants
Detonators (segregated per compatibility)
Primers (segregated per compatibility)
Complete Medium Caliber Ammunition (typically containing high explosive, fuzes, propellant, &/or, tracers) and/or various teardown units
Complete and/or Cut Medium Caliber Projectiles (typically containing high explosive, fuzes, &/or tracers)
Miscellaneous munitions

EXPLOSIVE WASTE STORAGE (T&S 10B)

Complete and Cut Medium Caliber Projectiles (typically containing high explosive, fuzes, &/or tracers)
Complete and/or Cut / Disassembled Munitions other than Medium Caliber Projectiles (typically containing energetic compounds, such as high explosives and propellants, in bulk or in various components
Non-energetic Tear Down Scrap for reclamation or disposal.

Reference: "A Method for Determining Compatibility of Hazardous Wastes" EPA 600/2-80-076, April 1980.

4.7 Emergency Preparedness and Response

This facility has a Hazardous Waste Contingency Plan that is followed whenever there is a release of hazardous waste to the environment. In addition, there is also a facility Emergency Plan that is followed during emergency events. Section 5.0 discusses the Contingency Plan and related procedures.

TPG has also contracted with an emergency response contractor to conduct cleanup of spills or releases of hazardous materials / wastes which exceed the capabilities of on-site resources.

5.0 HAZARDOUS WASTE CONTINGENCY PLAN

5.0 HAZARDOUS WASTE CONTINGENCY PLAN

5.1 General Information

The Hazardous Waste Contingency Plan, which is found in Appendix E, meets the requirements Minnesota Rules Part 7045.0466 regarding planning for and responding to incidents involving hazardous waste.

The Hazardous Waste Contingency Plan was developed for emergencies that typically involve small quantities of hazardous waste, such as burn ground ash, ignitable solvents and explosives. Such incidents will usually pose a low degree of risk to human health and the environment and thus will be addressed by facility personnel as a part of normal job duties. TPG also maintains on-site fire control and emergency medical capabilities which could be used during an incident. However, if an incident requires outside assistance to properly manage, arrangements have been made with local emergency response agencies for their assistance (See Section 4.6). TPG also has an emergency response contractor under contract that can be called in to assist with cleanup after an incident.

5.2 Contingency Plan Initiation Criteria

The Emergency Coordinator, usually the facility environmental engineer, will identify the character, nature, and extent of a release, fire, or explosion initially through evaluation of information provided by the individual reporting the incident and/or other personnel at the scene of the incident. This information will be supplemented by communication with facility, health, safety, and/or environmental support personnel who are present or called upon for assistance. This information will be further verified, whenever possible, by directly inspecting the incident scene and by knowledge of the materials, which are involved. Potential hazards to human health and the environment also will be part of this assessment. The Emergency Coordinator, based on this input, will make a decision if whether or not to formally implement the Contingency Plan.

Implementing the Contingency Plan usually will require reporting to the MPCA as directed in Minnesota Rule 7045.0468. However, depending on circumstances, certain releases that are managed without implementing the Contingency Plan may still require formal reporting to the MPCA under Minnesota Statutes 115.061 and 116.061. TPG is obligated to contact the Minnesota Duty Officer whenever a release, fire, or explosion of any size threatens human health or the environment.

5.3 Contingency Plan Amending

The contingency plan will be reviewed and amended, if necessary, whenever:

a. The hazardous waste facility permit is revised;
b. The plan fails in an emergency;
c. Any hazardous waste unit changes in design (such as, an increase in floor area of 50% or more), construction, operation, maintenance, or other circumstances in a way that materially increases the potential for fires, explosions, or releases of hazardous waste or hazardous waste constituents, or changes the response necessary in an emergency;
d. The list of emergency coordinators changes; or,
e. The list of emergency equipment changes.

5.4 Area Evacuation

Whenever an unplanned fire or detonation of a hazardous waste occurs, personnel shall leave the storage unit and implement the Hazardous Waste Contingency Plan. Because the hazardous waste storage buildings are small in size and because there is usually only one exit from a unit, planning evacuation routes out of a storage unit is not necessary.

6.0 HAZARDOUS WASTE TRAINING PROGRAM

6.0 TRAINING PROGRAM

TPG has a training program for personnel directly involved with hazardous waste storage and treatment. This training program meets the requirements of 40 CFR 264.16 and Minnesota Rules Part 7045.0454.

6.1 Training Program Outline

6.1.1 Job Titles and Descriptions - Hazardous waste management at TPG involves personnel with a variety of skills and backgrounds. Table 6-1 provides job descriptions of personnel as related to hazardous waste management.

6.1.2 Training Content, Frequency and Techniques - Personnel involved with hazardous waste handling receive training commensurate with the specific degree of responsibility including on-the-job training. Table 6-2 contains an example course outline used for hazardous waste training. A list of employees receiving hazardous waste training is maintained on site as part of the operating record. Training is reviewed for pertinent employees on an annual basis.

Accountability is maintained through the use of tests and/or completion documents, copies of which are maintained in the operating record. Within six months of employment, each required employee goes through the training program. Additional training is provided on-the-job by knowledgeable coworkers and/or supervisory personnel.

TPG uses on-line web-based training to instruct personnel on general and site-specific RCRA requirements regarding management of hazardous waste. A competency test or completion of a training certificate follows each module in the program. Employee number and test scores are used to track employee training records were an exam is required. The on-line training includes these topics:

1) Identify Hazards - identify the characteristics of hazardous waste
2) Storage and Handling - MSDSs, waste transferring procedures, labels
3) Labeling and Marking- required information, DOT identification, manifests
4) Emergency Response Plan - contents, rationale, procedures

As required, training is arranged by the training director, which focuses specifically on TPG-related hazardous waste issues. This may include training on SOP 600.03 that applies to the management of hazardous and non-hazardous wastes on site.

6.1.3 Training Director - The hazardous waste training program is administered by the Environmental Engineer and is also responsible for the hazardous waste compliance program. Training Records will be kept on file. He or she will also remain knowledgeable with hazardous waste management practices and regulations through on-line research of MPCA, U.S. EPA and third party websites, conferences and subscriptions to newsletters.

6.1.4 Relevance of Training to Job Position- Table 6-2 outlines an example of a basic training program received by facility personnel. This outline is modified, as required, to provide emphasis on different aspects of hazardous waste management specific to functions and responsibilities of the job position / group receiving training.

6.2 Training for Emergency Response

The intent of the hazardous waste training program is to instruct employees on how to properly and safely perform their day-to-day job duties and on how to properly and safely respond in emergency situations.

Supervisors are responsible for continual instruction of personnel on exit locations, building alarm, and evacuation procedures. In addition to personnel instruction, this information is conspicuously posted in each building area.

6.3 Implementation of Training Program

To implement training requirements specified in Minnesota Rules Part 7045.0454, a training director trained in hazardous waste management procedures is identified within the personnel records. This individual is responsible for development of training materials and record keeping. The environmental engineer is the training director and maintains the following records:

1. Job title and employee name for all hazardous waste management positions.
2. A written job description for each position.
3. A written description of the training given to each person employed in hazardous waste operations.
4. Training records for former and present facility personnel will be kept for a minimum of three years.
5. Documentation that each employee has completed the appropriate training.

TABLE 6.1
JOB DESCRIPTIONS

Environmental Engineer

The environmental engineer has the primary responsibility of coordinating the overall environmental management program to ensure compliance with applicable environmental regulations. This involves obtaining qualified vendors, and preparing and maintaining the necessary permits, and preparing records and reports which are important to managing hazardous waste on site. It is this individual's responsibility to serve as a liaison with regulatory agencies for environmental matters and to communicate these regulatory requirements to the staff. This person also monitors operations to assure regulatory compliance and conducts periodic audits of facilities and processes. The environmental engineer serves as the emergency coordinator for hazardous waste emergencies, such as spills and leaks. The environmental engineer also is the primary hazardous waste training coordinator and provides guidance on waste minimization and pollution prevention. This individual coordinates waste shipments off site with hazardous vendors and is responsible for ensuring that hazardous waste manifest requirements are met. The environmental engineer also is responsible for ensuring that similar requirements are met regarding receipt of explosive waste shipments from off site.

Facility Manager

This individual is responsible for the overall operation and maintenance of the infrastructure onsite including, but not limited to, the waste storage and treatment units, shipping/receiving operations, communication systems, roads, and the emergency generator. The facility manager is the supervisor of the logistics coordinator and the technicians who have vital roles in managing hazardous wastes on site.

Generating Department Supervisor

The first steps in handling hazardous waste on site are the responsibility of the generating department supervisor. The supervisor must first characterize what is in the waste streams generated by their department. The supervisor is assisted by the environmental engineer and outside laboratory resources as necessary. The supervisor is also responsible for obtaining the necessary container and for assuring that the waste is properly collected, accumulated and labeled. As part of continually assessing waste streams, the department supervisor also informs

TABLE 6.1
JOB DESCRIPTIONS (Continued)

the environmental engineer of any new materials used in their department that may change the composition of wastes being generated.

Logistics Coordinator

The logistics coordinator plays a significant role in the management and movement of explosive wastes on site. The coordinator provides proper containers for managing wastes to generating areas based on the type of waste being generated. This person is also responsible for onsite movement of waste containers, both from the generating area to the approved storage or treatment area, and from the storage area to shipping, if required. Before moving any container from a generating area, the coordinator or assistants must first confirm that the waste label is present and complete, and that each container is properly sealed.

The logistics coordinator may prepare hazardous waste manifests with the assistance of the traffic engineer and environmental engineer as required. The coordinator may assist preparation of waste drums for shipment and ensures that proper DOT labels and placards are used. Normally most of these duties are now performed by a hazardous waste vendor which is under contract with Alliant Techsystems.

Burn Ground Coordinator

The burn ground coordinator is in charge of the explosives treatment technicians and is responsible for ensuring that energetic materials are properly and safely treated at the burn ground.

Technician

The technicians perform weekly hazardous waste inspections, label waste containers, and place waste into containers. Technicians with the assistance of the logistic coordinator, as required, also move waste containers into and out of storage areas and transfer explosive waste containers to treatment units. The technicians perform treatment of explosive waste on site.

TABLE 6.1
JOB DESCRIPTIONS (Continued)

Other Support Functions

Some of the other support functions include Shipping, who maintain an inventory of DOT containers, liners, placards, and EPA, DOT, and internal hazardous waste labels; Packaging Engineering provides packaging instructions to Shipping in accordance with DOT and EPA regulations; and, Transportation Logistics provides DOT shipping names, classes, and compatibility requirements for properly completing bill of ladings and hazardous waste manifests.

TABLE 6.2

HAZARDOUS WASTE MANAGEMENT TRAINING - EXAMPLE OUTLINE

I. Introduction: Hazardous Waste Management

II. Hazardous Waste Handling Procedures

A. General Requirements
1. Prohibitions
2. Identification and Collection of Wastes
3. Labeling, Record Keeping and Transportation Overview

B. Responsibilities
1. Environmental Engineer
2. Facility Manager
3. Generating Department Supervisor
4. Logistics Coordinator
5. Burn Ground Coordinator
6. Technician
7. Other Support Functions

TABLE 6.2 (continued)

HAZARDOUS WASTE MANAGEMENT TRAINING - EXAMPLE OUTLINE

C. Waste Classification and Collection
   1. Classes of Hazardous Wastes
      a. Listed Wastes
      b. Characteristic Wastes
      c. Universal Wastes
   2. Labeling Requirements
   3. Packaging Requirements
   4. Container Management

D. Shipping Hazardous Wastes
   1. Labeling/Marking
   2. Manifests
   3. Land Disposal Restrictions

E. Weekly Inspections

III. Waste Minimization

A. Responsibility for minimization
B. Minimization techniques

IV. Emergency Preparedness, Prevention and Response

A. Spill Contingency Plan
B. Facility Emergency Plan
C. Local Arrangements for Emergency Response
D. Emergency Response Contractor

V. Special Requirements

7.0 CLOSURE PLAN/FINANCIAL REQUIREMENTS

7.0 CLOSURE PLAN/FINANCIAL REQUIREMENTS

7.1 Closure Plan

7.1.1 Introduction

This closure plan is maintained as part of the hazardous waste facility operating record. It shall be reviewed and updated annually or whenever there is a change in the hazardous waste facility operation, closure date, or closure cost that will impact the plan. Whenever a permit modification is made that will affect this plan, the plan will be updated and submitted as part of the permit modification. If there is a change in the hazardous waste facility design or operation that affects this plan, it will be modified and a request for closure plan modification will be submitted within 60 days after the hazardous waste facility change occurs.

7.1.2 Closure Performance Standard - This plan is designed to eliminate or minimize the need for maintenance at hazardous waste treatment and storage locations after completion of the closure activities. It also is designed to minimize or eliminate threats to human health and the environment during closure and to eliminate the release of hazardous waste or hazardous waste constituents during the closure activity. If evidence of a spill or leak is detected at or around the units that are being closed, samples will be collected and analyzed to determine the extent of possible soil and groundwater contamination. For significant levels of contamination, a Corrective Action Plan will be prepared for approval by the MPCA which addresses remediation of the impact.

7.1.2.1 Partial and Final Closure Activities - If partial closure does become necessary, this plan will be amended according to the procedures established in Section 7.1.2.3. However, it is possible that individual T&S units may be closed during the operating life of TPG. In this case, the closure plan would be followed as presented in this section.

A final closure date for the facility cannot be established because operations are intended to continue long term. When the closure date is determined, a modification to this closure plan will be submitted. If it is decided to discontinue hazardous waste storage or treatment activities, the procedures in Section 7.1.2.2 will be used for final closure of both treatment and storage areas. This plan also will be updated if any significant change occurs to the facility structures, equipment, or waste management procedures.

At either partial or final closure, the affected waste inventory will be treated either on or off site dependent on the waste type (for example, explosive wastes would be treated on site while lab pack waste would be managed at an off-site facility) or disposed at a permitted hazardous waste facility.

7.1.2.2 T&S Unit Closure - Closure will start with the removal of waste containers from the subject T&S unit. This task will involve packaging the waste materials from the treatment or storage areas for transfer to an off-site hazardous waste treatment/disposal facility. If any of the wastes present at closure are incompatible, separate off-site shipments may be necessary for each waste category.

After removal of waste containers, treatment / storage facilities and equipment cleanup will begin. The following procedure will ensure that the facilities and waste handling equipment (such as, carts, spare drums, shovels, etc.) will be decontaminated of hazardous waste constituents to levels acceptable for closure approval.

Specific decontamination steps for areas undergoing closure are as follows:

1. Water and detergent/solvent washings used for the facilities and equipment will be collected and containerized. Each container or composite samples from several containers will be analyzed for hazardous constituents according to approved methods. If the analyses show that the wash water is hazardous it will be handled as hazardous waste and will be treated at an approved disposal facility.

2. Facility and equipment washes will be continued until testing specified in step (1) shows the washes to be non-hazardous.

3. Rinses, which are non-hazardous, will be handled as normal sewage.

4. Decontaminated equipment will be reused or discarded as appropriate.

5. For locations that stored explosives or equipment that processed explosive waste (such as, T&S 6) decontamination may occur per DoD 4145 Contractor's Safety Manual. The decontamination involves flashing the structure or equipment, as appropriate, to take it to the "5X" level of explosives decontamination. This will be compared with the option to only decontaminate to the "3X" level, which is "no visible sign" of explosives. It is

highly probable that decontamination of explosives to 5X will result in a non-hazardous status (for explosives) for the structure and equipment.

During facility and equipment cleanup, these activities will be supervised by the environmental engineer and performed by qualified TPG or contract personnel. If an industrial hygienist recommends it personnel performing the decontamination will wear personal safety equipment. Each person might then be equipped with chemical-resistant suits, boots and gloves. Both the wrists and ankles on the suits will be securely taped using an appropriate tape to protect against chemical exposure. Respiratory protection with appropriate contaminant-removing filter cartridges also will be worn when appropriate or equivalent protection will be provided.

An industrial hygienist or other properly trained individual will provide instruction on proper respirator use and perform individual fitting testing. All discarded personnel protective gear will be handled and disposed as either hazardous waste or industrial waste, as appropriate.

If there has been a large spill or fire at any of the waste units prior to the start of closure:

a. The appropriate sections of the Contingency Plan (Appendix E) will be applied when responding to the incident.

b. All cleanup residues from the spill including contaminated equipment will be managed per the Contingency Plan (Appendix E).

c. During building cleanup, washes will be tested for contamination following currently approved guidelines to determine whether these washings are a hazardous waste. Cleaning of a building will be continued until the wash water has levels of hazardous constituents which are below hazardous waste levels.

d. All cleanup residues will be handled as a hazardous waste unless analytical testing shows otherwise. These residues and the inventory of hazardous waste present will be treated or disposed at an approved off-site facility.

e. All equipment relating to hazardous waste will be decontaminated according to the procedures noted earlier in this section. Following decontamination, equipment may be reused on site.

f. Soil and ground water sampling might be performed to determine if the incident has contaminated these media. This decision is dependent upon the nature of the incident, amount of material involved and future use of the area. If necessary, a Corrective Action Plan will be prepared for MPCA approval which addresses the situation.

7.1.2.3 Amendment of Closure Plan - Amendment of the Closure Plan may occur during the operating life of the storage facility. These amendments will be formally submitted to the MPCA. A modification of the Closure Plan will be done if there is a change in the operation of the facility or its design, which affects the Closure Plan or if there is a change in the expected year of closure (Subsection 7.1.2.1).

When any change in the facility operation occurs which requires a major permit modification, a Closure Plan amendment will be submitted, if required.

7.1.2.4 Certification of Closure - When closure of a treatment or storage unit is completed, a certification will be submitted to the Commissioner of the MPCA. ATK and an independent registered professional engineer will execute this certification and it will state that the storage unit closure has been completed in accordance with the approved Closure Plan.

7.1.3 Closure Dates and Closure Notification- The specific final closure date for the hazardous waste facilities on TPG cannot be estimated at this time. Operations are expected to continue long term. When an estimated closure date is established a modification to this closure plan will be submitted. As specified in Minnesota Rules 7045.0486, notification of partial and final closure will be made to the MPCA commissioner at least 45 days before expecting to begin closure.

7.1.4 Maximum Hazardous Waste Inventory - The maximum combined waste inventory in the active hazardous waste storage units on site is estimated to be the following: 1,650 gallons of liquids (T&S 3 & 4); 152,050 pounds NEW of explosives (T&S 6 and 10B); and, 4,400 gallons of non-liquid hazardous waste (T&S 3).

7.2 Specific Closure Plans for Individual T&S Units

The following sections provide closure plans and schedules for presently active T&S units at TPG. A closure plan for the proposed Explosive/Non-Explosive Liquid Waste Storage Unit (T&S 7) will be provided to the MPCA after the agency approves of its operation. Before closure of a permitted unit begins, TPG will determine with the MPCA if a revised Closure Plan needs to be submitted. This may be necessary to address special circumstances concerning the unit planned for closure.

7.2.1 Flammable Storage Building (T&S 4) - Drums of liquid wastes are stored on spill containment pallets. Any spills, which occurred during its operation, will be promptly absorbed and the affected area will be thoroughly cleaned up. The detailed closure plan is as follows:

A. Sample remaining wastes and analyze as described in the Waste Analysis Plan (see Section 2.0), if necessary.

B. Ship waste drums to an off-site disposal facility.

C. Sample soil within two feet of the building and have it analyzed, per the waste analysis plan, for those specific organics and metals, which might been stored in the building. If contamination is found, address its clean up in a Corrective Action Plan for approval by the MPCA.

D. Certify closure.

Closure is anticipated to require 4 to 16 weeks for this unit. Written notification of closure will be provided to the MPCA Commissioner at least 45 days prior to the date closure is expected to begin. The following set of milestones has been established for closure of this storage unit.

Action	Time (days)
Begin closure by accepting no additional waste	0
Soil sampling/analyses	1-30
Ship existing waste inventory	1-30
Remove contaminated soil, if needed	14-28

Action	Time (days)
Manage residuals	30-90
Certify closure	90-130

7.2.2 Waste Explosive Storage Magazines (T&S 6) Closure Plans - All waste is packaged prior to placement in these hazardous waste storage facilities. Due to the packaging of the waste, spills are not anticipated to occur in these hazardous waste storage facilities. Typically a magazine that is being closed will continue being used as an explosive product magazine. The detailed closure plan is as follows:

A. Transport any explosive waste inventory to the open burn treatment area for treatment

B. Sweep the floor and send any residue that is collected to the open burn treatment area for treatment.

C. Perform a 3X visual decontamination and document the findings.

D. Certify closure.

Closure is anticipated to require 3 to 7 weeks for each unit and/or magazine. Written notification of closure will be provided to the MPCA Commissioner at least 45 days prior to the date closure is expected to begin. The following set of milestones has been established for closure of each unit. Each unit or magazine may be closed either individually or concurrently with others:

Action	Time (days)
Begin closure by accepting no additional waste	0
Transfer waste and floor sweepings to open burn ground for treatment	1-7
Perform 3X visual decontamination & document findings	7-15

Action	Time (days)
Transfer any explosive items detected during 3X decontamination to open burn ground for treatment	10-20
Certify closure	20-35

7.2.3 Non-Explosive Waste Storage Building (T&S 3) Closure Plan - This structure may contain both liquid and solid waste. Any spills, which occurred during its operation, will be promptly removed and the area affected thoroughly cleaned up. The detailed closure plan is as follows:

A. Ship any waste inventory to an off-site disposal facility. Based on analysis of waste or process knowledge, the waste will be sent either to a hazardous waste disposal facility or to an industrial waste landfill. (See Section 2.0 for the waste analysis procedure.)

B. Sweep the floor of the building and analyze the residue per the Waste Analysis Plan. (See Section 2.0)

C. Floor sweeping will be disposed of as hazardous waste or at an industrial waste landfill, based on the analytical results of the waste.

D. Certify closure.

Closure is anticipated to require 6 to 9 weeks. Written notification of closure will be provided to the MPCA commissioner at least 45 days prior to the date closure is expected to begin. The following set of milestones has been established:

Action	Time (days)
Begin closure by accepting no additional waste	0
Clean building and analyze floor residues	1-28

Action	Time (days)
Ship remaining waste inventory	1-45
Certify closure	45-60

7.2.4 Open Burn Treatment Area Closure Plan (T&S 5)

The final burn ground closure might be conducted as a series of partial closures of individual treatment area subunits. The closure plan for the treatment subunits is as follows:

A. Remove any treatment residues that are recoverable from the subunits.

B. Analyze the collected residue for specific organic compounds, total metals, and TCLP constituents per the Waste Analysis Plan. (see Section 2.0).

C. Dispose of residue at either an off-site hazardous waste facility or at an industrial landfill, based on the analytical results of the waste.

D. Flash decontaminate the subunit and its concrete pad, if necessary, in place.

E. Dispose of decontaminated subunit metal hardware as scrap metal.

F. Collect discrete surface soil samples (from 0 – 6 inches depth) from pre-approved locations adjacent to each treatment subunit in order to identify if contamination exists. Soil samples will be analyzed for explosives (HMX, RDX, TNT, etc.) and TCLP constituent metals per approved EPA methods. Soil contamination found above established thresholds will be excavated and disposed of at an approved facility. Any impacted groundwater will be addressed through a response action, which will detail any further investigation that is needed.

G. Either remove and transport any contaminated soil to an off-site hazardous waste facility, contain in place by capping the contaminated area, or treat the contaminated soils on site, as appropriate, for the type and level of contamination found and as approved by the MPCA.

H. Certify closure.

Closure of all of the burn ground treatment subunits is anticipated to require 12 to 26 weeks. Written notification of closure will be provided to the MPCA Commissioner at least 45 days prior to the date closure is expected to begin. Each subunit may be closed either individually or concurrently with others. The following milestones have been established for closure of a treatment subunit:

Action	Time (days)
Begin closure, burn no additional waste	0
Remove remaining treatment residue from subunit(s)	1-7
Analyze treatment residue	0-30
Ship treatment residues to an off-site disposal facility	30-90
Flash decontaminate subunit and concrete pad	7-30
Recycle scrap metal	30-180
Initiate field sampling & analysis plan	30-45
Contract with both a bulk hazardous waste transporter and an excavation contractor	35-70
Remove contaminated soil	50-120
Ship any untreated waste explosives inventory	30-120
Certify corrective action	120-180
Certify closure	160-180

7.2.5 Explosive Waste Storage Closure Plan (T&S 10B) - The primary effort will be to dispose of any remaining munitions in the area. Because no munitions have been cut open by water jetting in this area, it is unlikely that any residual contamination will exist either here or in the soils immediately outdoors. Closure for T&S 10B will occur as follows:

A. Collect and ship remaining untreated munitions to an off-site facility or to the burn ground for treatment.

B. Conduct soil sampling within one foot of the trailer loading dock concrete pad and analyze for the specific constituents that have been processed at T&S 10A. Address any contamination through a Corrective Action Plan, which will be prepared, if needed, at closure.

C. Certify closure.

Closure of this subunit should be completed in 4 to 20 weeks. Written notification of closure will be provided to the MPCA Commissioner at least 45 days prior to the start of closure activities. The following set of milestones has been established for this effort:

Action	Time (days)
Begin closure by not accepting additional waste	0
Conduct soil sampling/analyses	1-45
Remove existing inventory of munitions.	1-45
Remediate contaminated soil	30-160
Certify closure.	150-180

7.2.6 Indoor Gun-firing Range Closure Plan (T&S 12) - It is possible that T&S 12 will continue to operate as an indoor gun-firing range following closure as a hazardous waste treatment unit. Since a baseline was established in 1997 for interior wall concentrations of explosives and metals, it is possible to reanalyze the interior walls and compare these data to the baseline. Similarly, comparisons could be made for any impacts to the soils surrounding T&S 12, since a baseline for the soil from 1997 also exists. The following procedures are outlined to conduct closure for this unit:

A. The sand trap located at the end of the 150-meter range will be sorted to remove all inert metal parts. It will then be sampled and analyzed for explosives and metals. If necessary, the sand will be disposed of as hazardous waste. If not, it will be left in place in place for production test firing.

B. Conduct soil sampling and compare results to 1997 baseline levels.

C. Conduct wipe samples of interior walls and compare results to 1997 baseline levels.

Closure for T&S 12 should be completed in 4 to 20 weeks. Written notification of closure will be provided to the MPCA Commissioner at least 45 days prior to the commencement of closure activities. The following milestones have been established for this effort:

Action	Time (days)
Begin closure by not accepting additional waste	0
Conduct soil sampling & analyses	1-45
Ship waste cleanup residue to an off-site waste facility	14-100
Certify closure	100-140

7.3 Closure Cost Estimate

The closure cost information provided in this section is in conformance with the requirements of Minnesota Rules 7045.0502.

Based on individual T&S unit closure plans presented above, it is estimated that $855,564 will be needed to close T&S units at TPG. Closure costs are for the proposed Explosive/Non-Explosive Liquid Waste Storage Building (T&S 7) will be provided after it is constructed and approved for operation by the MPCA. The estimated closure cost for each active unit is shown in Table 7.1 after being adjusted by the cost deflator (0.88%) provided by the MPCA on February 10, 2016.

The assumptions made in the cost estimate are as follows:

1. Sample and Analyze Waste - It is assumed that $350 per sample will cover the costs of any combination of the following analyses: explosives, RCRA metals (total and TCLP), and Volatile Organic Compounds (VOCs).

2. Waste Cost Breakdown - Costs are based on: 1) flammable and miscellaneous solvents being fuel blended or incinerated; 2) lab pack wastes being incinerated; 3) toxic wastes being stabilized then land-disposed; and, 4) explosive wastes being treated on-site via open burning or open detonation. It was assumed that transportation and disposal of a 55-gallon drum of non-hazardous material will be $250 and for hazardous waste $550. For miscellaneous hazardous waste it was assumed that the cost will be $400 per 55-gallon drum.

3. Closure Certification - The cost of certification by a professional engineer (PE) is based on a labor rate of $100/hour.

4. Contingency Provisions - Total closure costs include about a 20% allowance for administrative costs and for contingencies combined.

5. Other site-specific assumptions were made and are discussed in the previous sections or in Table 7.1.

This closure cost estimate is maintained in the facility operating record. The estimate covers the highest closure cost anticipated during the operating life of the facility. A new estimate will be prepared whenever a change in the closure plan affects decommissioning costs. It will be adjusted annually to reflect changes in closure cost resulting from inflation. The Annual Implicit Price Deflator for Gross National Product as developed by the Commerce Department will be used to make this adjustment. Appendix F provides further information on the annual inflation adjustment to closure costs.

7.4 Financial Assurance Mechanism

Financial assurance for facility closure is provided by a Surety Bond as specified in Minnesota Rules 7045.0504 Subpart 5. Documentation is provided in Appendix F.

7.5 Liability Requirements

Alliant Techsystems Operations LLC maintains liability insurance coverage for sudden accidental occurrences involving hazardous waste operations at TPG. This coverage is in accordance with Minnesota Rules 7045.0518 Subpart 1. Documentation is provided in Appendix F.

Alliant Techsystems Operations LLC - The Proving Grounds (TPG)
Closure Cost Estimate Update (2-18-2016)

T&S 3: Non-Explosive Waste Storage Building

Task	Units	Amount	Rate per Unit	Total
Sample/analyze/dispose of existing inventory	drums	100	$ 661.71	$ 69,260.67
Clean structure/drum up residues	hours	6	$ 96.25	$ 604.45
Dispose of residues (non-hazardous)	drums	5	$ 300.78	$ 1,574.11
Certify closure	hours	10	$ 120.31	$ 1,259.28
Subtotal				**$ 72,698.51**
Contingency				$ 20,877.68
TOTAL FOR T&S 3				**$ 93,576.19**

T&S 4: Ignitable Waste Storage Building

Task	Units	Amount	Rate per Unit	Total
Sample/analyze/dispose of existing inventory	drums	10	$ 421.09	$ 4,407.49
Sample/analyze surrounding soil	samples	4	$ 421.09	$ 1,763.00
Building decon and related efforts	lump estimate	1	$ 5,628.12	$ 5,890.94
Certify closure	hours	8	$ 120.31	$ 1,007.42
Subtotal				**$ 13,068.86**
Contingency				$3,003.39
TOTAL FOR T&S 4				**$ 16,072.25**

T&S 5: Evaporation Pan Sub-Unit

Task	Units	Amount	Rate per Unit	Total
Remove and drum up residual ash	hours	20	$ 96.25	$ 2,014.86
Sample/analyze residual ash	samples	3	$ 421.09	$ 1,322.25
Dispose of residual ash (hazardous waste)	drums	4	$ 661.71	$ 2,770.43
Sample/analyze surrounding soil	samples	6	$ 421.09	$ 2,644.50
Excavate affected soils	hours	4	$ 300.78	$ 1,259.28
Dispose of excavated soil (non-hazardous)	yards	8	$ 300.78	$ 2,518.57
Certify closure	hours	10	$ 120.31	$ 1,259.28
Subtotal				**$ 13,789.18**
Contingency				$3,803.04
TOTAL FOR T&S 5: Evaporation Pan				**$ 17,592.21**

T&S 5: Propellant Burn Pads Sub-Unit

Task	Units	Amount	Rate per Unit	Total
Remove and drum up residual ash	hours	20	$ 96.25	$ 2,014.85
Sample/analyze residual ash	samples	4	$ 421.09	$ 1,763.00
Dispose of residual ash (assume hazardous)	drums	20	$ 661.71	$ 13,852.13
Sample/analyze surrounding soil	samples	13	$ 421.09	$ 5,729.74
Excavate affected soils	hours	12	$ 300.78	$ 3,777.85
Dispose of excavated soil (non-hazardous)	yards	80	$ 300.78	$ 25,185.69
Certify closure	hours	16	$ 120.31	$ 2,014.85
Subtotal				**$ 54,338.11**
Contingency				$11,090.54
TOTAL FOR T&S 5: Propellant Burn Pads				**$ 65,428.65**

T&S 5: Burn Culvert and Pad Sub-Unit

Task	Units	Amount	Rate per Unit	Total
Remove and drum up residual ash	hours	15	$ 96.25	$ 1,511.14
Sample/analyze residual ash	samples	3	$ 421.09	$ 1,322.25
Dispose of residual ash (assume hazardous)	10-yd lugger	1	$ 9,624.83	$ 10,074.28
Sample/analyze surrounding soil	samples	10	$ 421.09	$ 4,407.49
Excavate affected soils	hours	5	$ 300.78	$ 1,574.11
Dispose of excavated soil (non-hazardous)	yards	65	$ 300.78	$ 20,463.37
Certify closure	hours	12	$ 120.31	$ 1,511.14
Subtotal				**$ 40,863.78**
Contingency				$9,903.02
TOTAL FOR T&S 5: Burn Culvert and Pad				**$ 50,766.80**

T&S 5: Detonation Pit Sub-Unit

Task	Units	Amount	Rate per Unit	Total
Remove and drum up residual material	hours	4	$ 96.25	$ 402.97
Dispose of residual ash (assume hazardous)	drum	1	$ 661.71	$ 692.61
Sample/analyze surrounding soil	samples	4	$ 421.09	$ 1,763.00
Excavate affected soils	hours	5	$ 300.78	$ 1,574.11
Dispose of excavated soil (non-hazardous)	yards	5	$ 300.78	$ 1,574.11
Certify closure	hours	6	$ 120.31	$ 755.57
Subtotal				**$ 6,762.36**
Contingency				$1,917.89
TOTAL FOR T&S 5: Detonation Pit				**$ 8,680.26**

T&S 5: Burn Cage Sub-Unit

Task	Units	Amount	Rate per Unit	Total
Remove and drum up residual material	hours	8	$ 96.25	$ 805.95
Dispose of residual ash (assume non-hazardous)	drum	8	$ 300.78	$ 2,518.57
Sample/analyze surrounding soil	samples	4	$ 421.09	$ 1,763.00
Excavate affected soils	hours	2	$ 300.78	$ 629.64
Dispose of excavated soil (non-hazardous)	yards	3	$ 300.78	$ 944.47
Certify closure	hours	4	$ 120.31	$ 503.71
Subtotal				**$ 7,165.34**
Contingency				$2,004.77
TOTAL FOR T&S 5: Burn Cage				**$ 9,170.11**
GRAND TOTAL FOR T&S 5: OB/OD GROUNDS				**$ 151,638.03**

T&S 6: Explosive Waste Storage Magazines

Task	Units	Amount	Rate per Unit	Total
Remove/demil remaining explosives	hours	70	$ 96.25	$ 7,052.00
Clean mags and demil residuals	hours	20	$ 96.25	$ 2,014.86
Certify closure	hours	10	$ 120.31	$ 1,259.28
Subtotal				**$ 10,326.14**
Contingency				$2,759.09
TOTAL FOR T&S 6				**$ 13,085.23**

T&S 10B: Explosive Waste Storage

Task	Units	Amount	Rate per Unit	Total
Dispose of existing inventory	pounds NEW	40,000	$ 12.03	$ 503,713.95
Clean building/drum up residues	hours	30	$ 96.25	$ 3,022.28
Sample/dispose of residues (solid)	drums	3	$ 421.09	$ 1,322.25
Conduct soil sampling around structure	samples	5	$ 421.09	$ 2,203.75
Certify closure	hours	10	$ 120.31	$ 1,259.28
Subtotal				**$ 511,521.51**
Contingency				$119,992.22
TOTAL FOR T&S 10B				**$ 631,513.73**

T&S 12: Indoor Gun-firing Range

Task	Units	Amount	Rate per Unit	Total
Sample interior and exterior locations	samples	25	$ 421.09	$ 11,018.75
Interior decon	hours	100	$ 96.25	$ 10,074.28
Dispose of residues (non-hazardous)	drums	10	$ 300.78	$ 3,148.21
Certify closure	hours	10	$ 120.31	$ 1,259.28
Subtotal				**$ 25,500.52**
Contingency				$5,901.02
TOTAL FOR T&S 12				**$ 31,401.54**

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2015 Sub Total	$937,286.98
Inflation Adder (0.88% - MPCA Feb 2016)	$8,248.13
Grand Total	**$945,535.10**

8.0 CORRECTIVE ACTION

8.0 CORRECTIVE ACTION

8.1 Purpose and Regulatory Background

Section 3004 of the 1984 Hazardous and Solid Waste Amendments (HSWA), and Minn. R. 7045.0485 require facilities that were issued RCRA permits after November 8, 1984, to provide corrective action for releases of hazardous waste to the environment from any Solid Waste Management Unit (SWMU) or Area of Concern (AOC).

There are four steps to the RCRA Corrective Action program:

1) RCRA facility assessment (RFA), conducted by the regulatory agency,
2) RCRA facility investigation (RFI), conducted by the Permitee,
3) Corrective Measures Study (CMS), conducted by the Permitee, and;
4) Corrective Measures Implementation (CMI), conducted by the Permitee.

The RFA documents historical information and background on the facility and assesses the potential for a SWMU release. The RFI is the formal investigation of media of concern at the subject SWMUs. The CMS provides an assessment of remedial alternatives based on the data collected during the RFA and RFI phases. The CMI is the actual implementation of the selected remedial alternative at the SWMUs of concern.

8.2 RFA and RFI Results for TPG

The RFA and related work was completed on August 27, 1992. Twenty (20) SWMUs were identified at TPG some of which required further investigation (RFI). Five additional SWMUs were investigated during the RFI phase that was completed on February 1, 1994. These were identified as the following:

a) SWMU 7: Site B (old burn ground area), units 1, 2, and 6
b) SWMU 8: Site C (shallow landfill area)
c) SWMU 10: Sites E, F G (old Flink farm dump area)
d) SWMU 11: Site H (shallow landfill by lake)
e) SWMU 21: NaK burial ground

8.3 Corrective Measures Study for the SWMUs of Concern

The CMS was completed and approved by the MPCA on September 19, 1995, and incorporated as Major Modification Number 3 of the RCRA Part B permit. The approved remedy was to excavate the affected material, stabilize as necessary, and dispose of the soils and waste at an off-site landfill.

8.4 Corrective Measures Implementation

Site work per the approved CMI work plan began in July 1996 and was completed in October 1996 for the five (5) SWMUs of concern. A total of approximately 11,884 tons of excavated material, including wastes, soil, debris, inert ordnance components, and miscellaneous materials, were disposed at the Elk River Landfill in Elk River, MN. A portion of the soil excavated from SWMU 7 Unit 6 was hazardous and required stabilization to render it non-hazardous before it could be sent the Elk River Landfill. This waste consisted primarily of ash and residues from the former open burning operations that took place in the area. Figure 8.1 presents a detail of SWMU 7 with the units of concern. Figure 8.2 presents the locations of SWMUs 8, 10, 11, and 21.

The remedial activity was documented in a CMI Completion Report that was approved by the MPCA in December 1996.

8.5 Continued Groundwater Monitoring

Per the approved CMI work plan, it was agreed to continue monitoring the groundwater at the old burn ground (SWMU 7) by using a pre-existing network of monitoring wells. These wells were installed during the RFA/RFI phase (Figure 8.1). Thus sampling and analysis began in July 1996 for explosive compounds in the groundwater. This initial sampling event showed that detectable levels of explosives, primarily HMX and RDX, occurred in several wells. Sampling results since then have indicated that the existing monitoring well network at SWMU 7 properly defines the areal extent of ground water impact and that the level of explosives is generally decreasing over time.

TPG is continuing this investigation and is providing the findings in engineering reports every six months to the MPCA. Overall it appears that the relative risk to human health and the environment is minimal especially since the area with impacted groundwater is located about 1250 feet from the facility property line.

8.6 Notification Requirements Regarding Newly Discovered SWMUs or Releases from any SWMU(s)

TPG is required to notify the MPCA of the discovery of any previously unknown SWMUs or any releases of hazardous waste from any SWMU; documented or recently discovered. For new SWMUs, the following deliverables are required:

1) Notification to the MPCA Commissioner within 15 calendar days,
2) SWMU Assessment Plan within 90 calendar days of MPCA request,
3) Implement No. 2 above within 15 calendar days of MPCA approval,
4) SWMU Assessment Report within 90 days of completing No. 3 above.

For newly discovered releases from any SWMU, TPG must notify the MPCA within 15 calendar days after discovery.

8.7 Additional Corrective Action Requirements

Despite completion of the recent CMI, further corrective action may be required by the agency if data become available which indicate that additional corrective action is necessary.

9.0 OB/OD TREATMENT UNIT ENVIRONMENTAL ASSESSMENT

9.0 OB/OD Environmental Assessment

In compliance with Minnesota Rules 7001.0625 and 7045.0539 for Miscellaneous Treatment Units of hazardous waste, TPG has completed a Human Health and Ecological Risk Assessment, which characterizes the potential impacts, which may result from operating the Open Burn/Open Detonation Treatment Area (T&S 5). The MPCA approved the final report on October 24, 2000.

9.1 Work Tasks

The OB/OD Environmental Assessment was conducted in accordance with a pre-approved Interim Deliverable Work Plan and Schedule. The specific tasks that were completed are as follows:

1) Hazard Identification
    a) Finalized Emission Characterization
    b) Identify Constituents of Concern
2) Fate and Transport Evaluation
    a) Conduct Air Dispersion Modeling
    b) Interim Deliverable I
3) Exposure Assessment
    a) Identify Exposure Pathways
    b) Conduct Sampling and Analysis
    c) Interim Deliverable II
4) Toxicity Assessment/Interim Deliverable III
5) Risk Characterization
6) Qualitative Uncertainty Analysis- Interim Deliverables IV and V
7) Final Report/Interim Deliverable VI

Based on the operating conditions of T&S 5 presented in this application and used in the Human Health/Environmental Assessment; there were no specific operating limits set for T&S 5 except those contained in relevant sections of the RCRA Part B permit. TPG continues to comply with the operational limits established in the permit.

10.0 APPLICABILITY OF RCRA SUBPARTS AA, BB, AND CC TO TPG HAZARDOUS WASTE OPERATIONS

10.1 Organic Emissions --Applicability of RCRA Subparts AA, BB, and CC to Hazardous Waste Operations

This section discusses the applicability of RCRA Subparts AA, BB, and CC regulations, on organic emissions, hazardous waste operations and waste management practices at TPG.

10.1.1 Hazardous Waste Treatment, Process Vent Standard (Subpart AA)

The TSD Process Vent Standard (40 CFR 265, subpart AA) is applicable to a specific list of hazardous waste management units, such as, distillation, thin-film evaporation, solvent extraction, air stripping and steam stripping. None of these regulated processes are used to treatment hazardous waste on-site.

TPG does use open burning/open detonation (OB/OD) treatment to deactivate reactive wastes, such as, scrap explosives, bullets, bulk propellants, warheads and similar materials. Because OB/OD is not one of the processes regulated under Subpart AA and because reactive wastes are solids, which do not contain VOCs, this regulation does not apply to TPG hazardous waste operations.

10.1.2 Equipment Leak Standard (Subpart BB)

The Equipment Leak Standards of 40 CFR 264.1050 applies to hazardous waste treatment operations, which have:

> “(1) Units that are subject to the permitting requirements of Part 270, or
>
> (2) Hazardous waste recycling units that are located on hazardous waste management facilities otherwise subject to the permitting requirements of Part 270.”

Similar to Subpart AA, this rule focuses on potential air emissions from equipment, which treats hazardous waste containing high concentrations of volatile organic compounds (VOCs). As noted in Section 10.1.1, there are no process equipment or liquid storage tanks on site that contain this type of waste. High VOC wastes are not treated or processed at TPG, thus this subpart does not apply to TPG.

10.1.3 Containers, Tanks, Surface Impoundments (Subpart CC)

Tanks and surface impoundments are not used in processes on site to handle hazardous waste. As such, only the requirements of 40 CFR 264.1086, which regulate VOC emissions from containers of hazardous waste apply to operations at TPG.

Containers used for accumulation of hazardous wastes, which contain high levels of VOCs and which have a capacity of less than $0.46 m^3$ (122 gallons) must comply with Container Level 1 standards. Level 1 compliance requires that such containers meet applicable U.S. DOT regulations on packaging hazardous materials for transportation. As noted in Section 3.0, only containers that meet the DOT specifications in 49 CFR 173 and 49 CFR 178 are used for accumulating and storing hazardous waste at TPG.

Whenever hazardous waste is being accumulated in a container, it is closed or covered except when waste is being added or removed. For example, when waste solvent is generated it is poured into satellite collection drums and the bung is replaced promptly after the waste has been added to the container. Funnels with hinged lids might also be used on these containers to facilitate closing the drum after pouring in waste. When a hazardous waste accumulation drum, which contains high VOC waste, is full it is securely closed and transferred to the Flammable Waste Storage Building (T&S 4) for storage until it is shipped off site for management. To ensure that such waste containers while in storage remain closed and are not leaking, weekly inspections are performed to verify the integrity of the containers. If a drum is found leaking its contents are promptly transferred to a new container and the spilled solvent is removed from the secondary containment system. Spent absorbents resulting from the cleanup of a liquid spill are placed into an open head drum, which is then closed and managed as either a hazardous or non-hazardous waste.

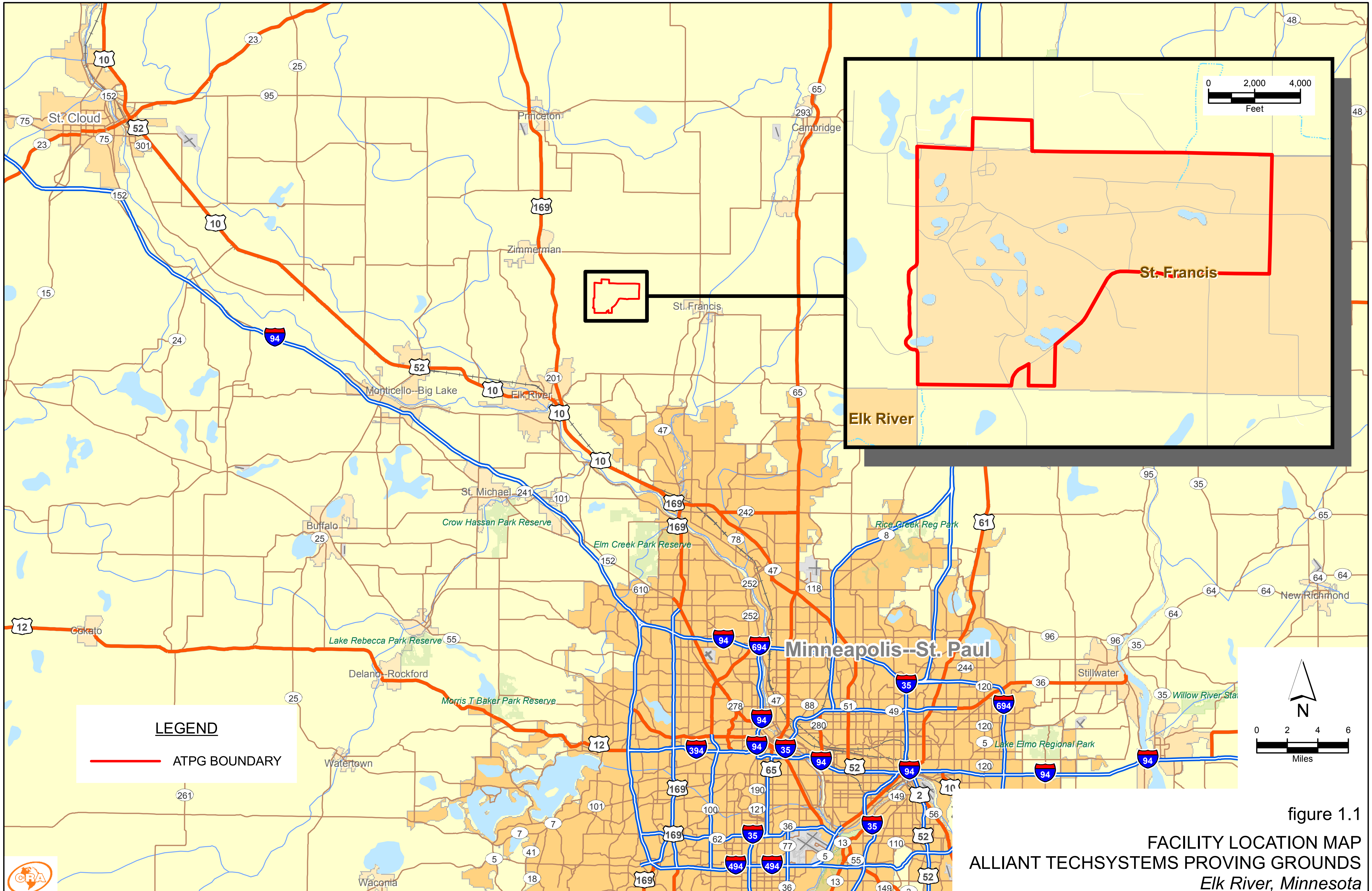
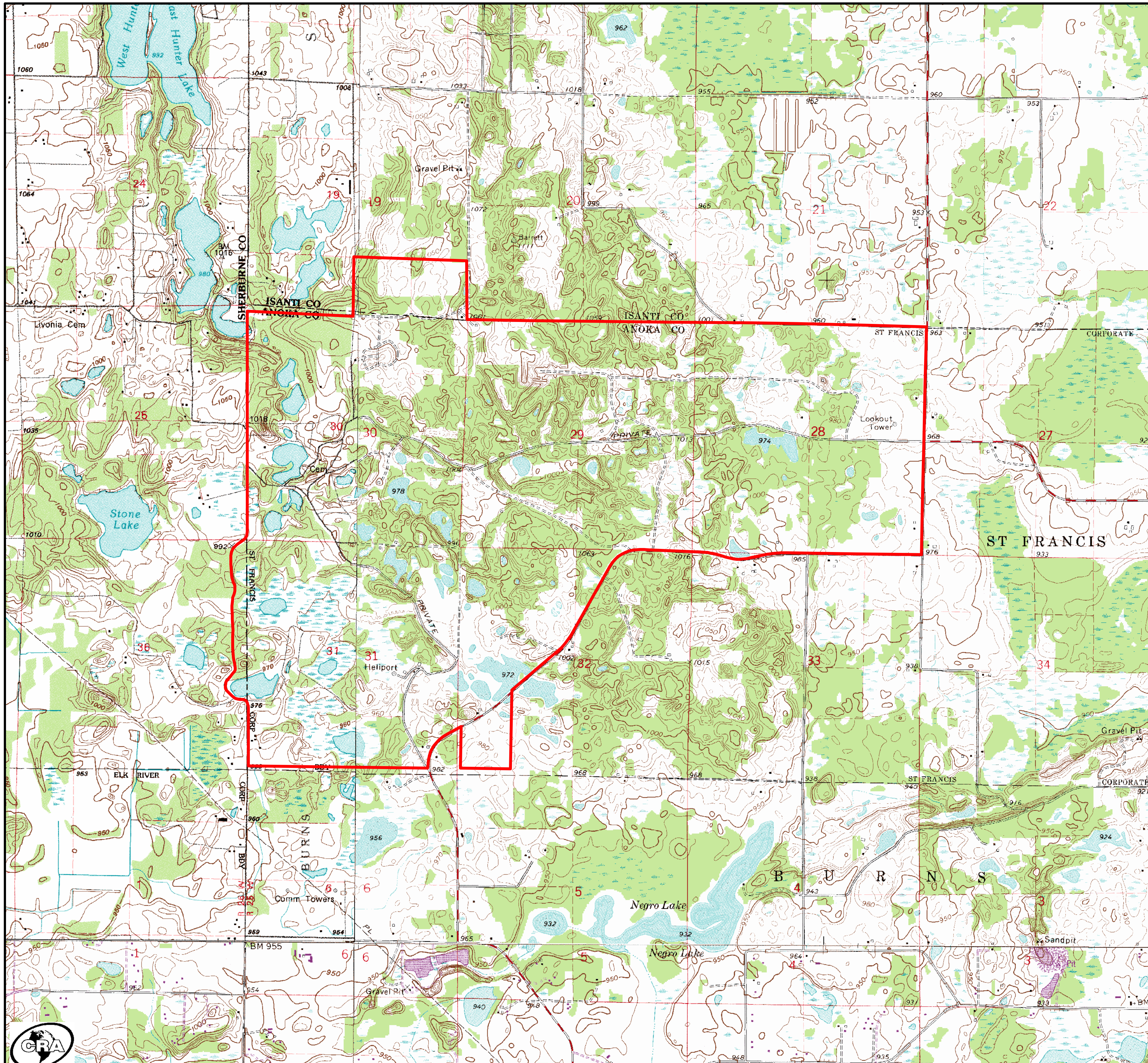


figure 1.1

FACILITY LOCATION MAP
ALLIANT TECHSYSTEMS PROVING GROUNDS
Elk River, Minnesota

048884-20(MISC002)GIS-SP001 FEB 17/2010



N

0 2500 ft

LEGEND

ATPG BOUNDARY

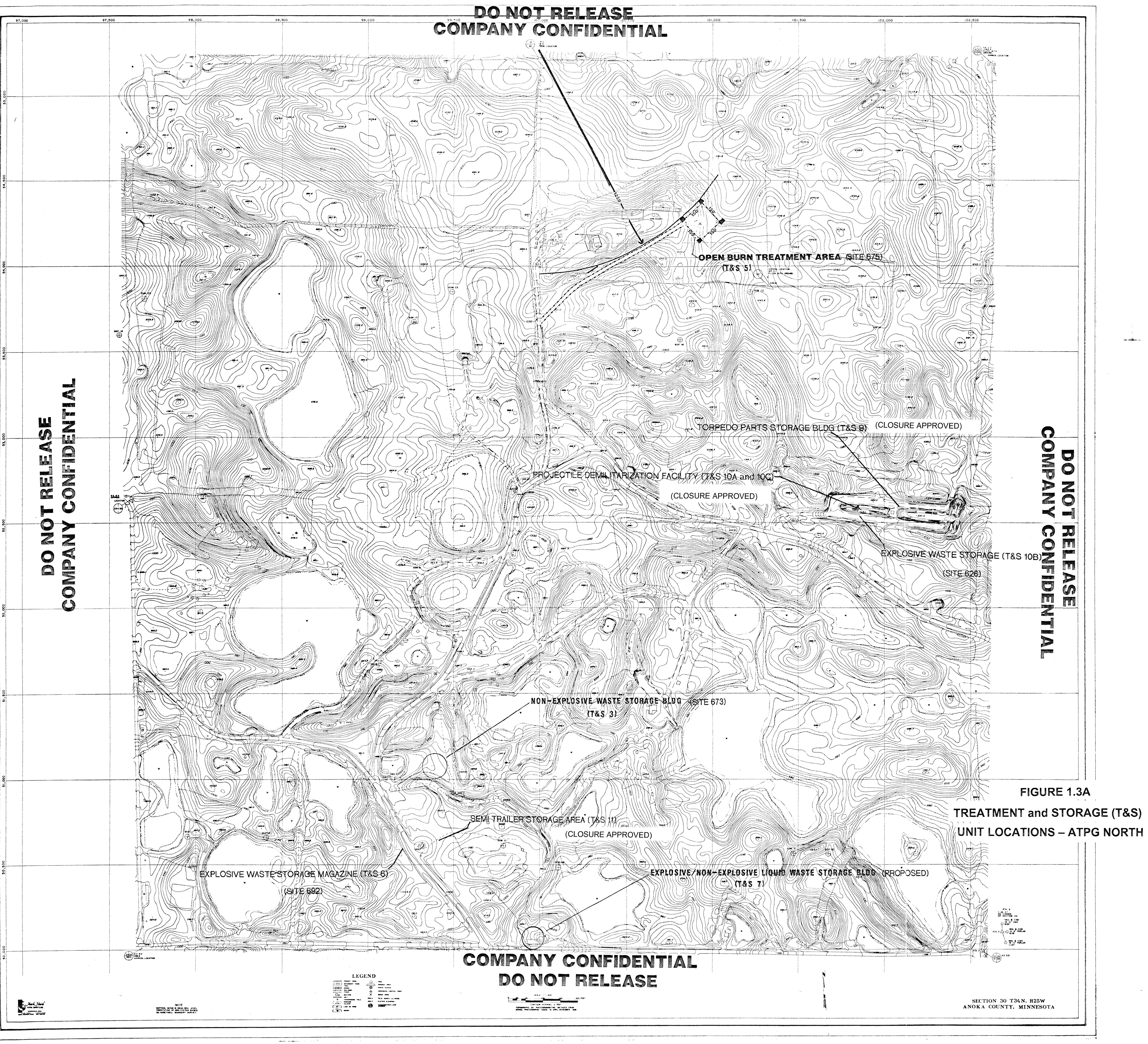
SOURCE
USGS 7.5 MINUTE QUADS:
CROWN
LAKE FREEMONT
NOWTHEN
ELK RIVER

figure 1.2

SITE LOCATION
ALLIANT TECHSYSTEMS PROVING GROUND
Elk River, Minnesota

48884-20(MISC002)GIS-SP003 FEB 16/2010

DO NOT RELEASE
COMPANY CONFIDENTIAL



DO NOT RELEASE
COMPANY CONFIDENTIAL

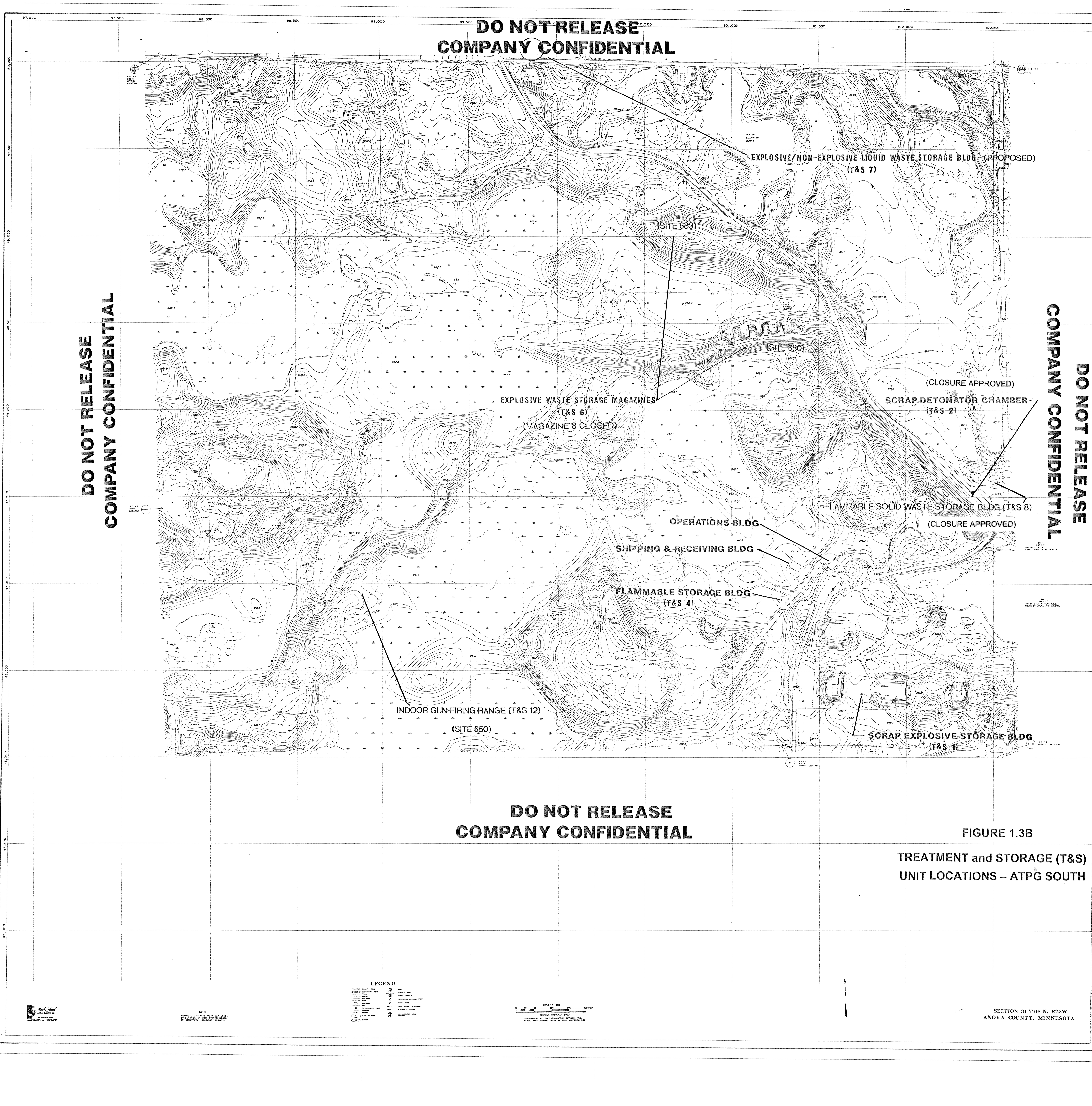
DO NOT RELEASE
COMPANY CONFIDENTIAL

FIGURE 1.3A
TREATMENT and STORAGE (T&S)
UNIT LOCATIONS – ATPG NORTH

COMPANY CONFIDENTIAL
DO NOT RELEASE

SECTION 30 T34N. R25W
ANOKA COUNTY, MINNESOTA

FIG 1.3A



DO NOT RELEASE
COMPANY CONFIDENTIAL

DO NOT RELEASE
COMPANY CONFIDENTIAL

DO NOT RELEASE
COMPANY CONFIDENTIAL

FIGURE 1.3B

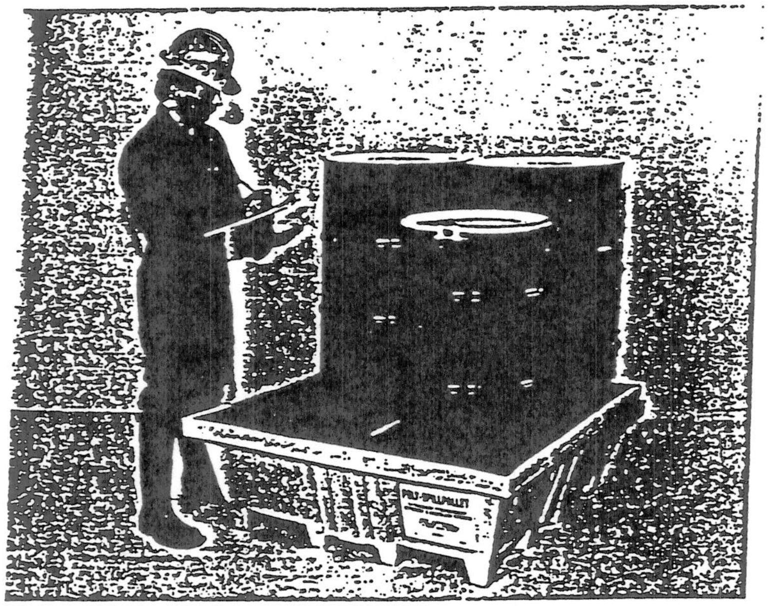
TREATMENT and STORAGE (T&S)
UNIT LOCATIONS – ATPG SOUTH

FIGURE 1.3B

NEW!

POLY-SPILLPALLET™

Portable Secondary Containment Storage and Handling System



Exceeds EPA Container Storage Regulation 40 CFR 264.175

- **Safely Holds Four 55 Gallon Drums**
  48" x 48" Deck is removable for easy cleaning and reuse.
- **Stackable Design**
  Allows stacking of two loaded POLY-SPILLPALLET™ units
- **Four Way Entry**
  Conveniently handled with forklift or pallet jack
- **85 Gallon Sump Capacity**
  Accommodates 150% of largest container; Translucent sidewalls allow convenient visual leak detection
- **100% Polyethylene Construction**
  No wood, metal or fiberglass parts; Offers excellent chemical resistance
- **Options**
  Horizon drum rack • Drain fitting • Drum loading ramp • Caster/frame assembly • "Sliding" cover • "Bell" cover

ENPAC **Better by Design**

Subsidiary of EESEF Corporation

Pat. Pending

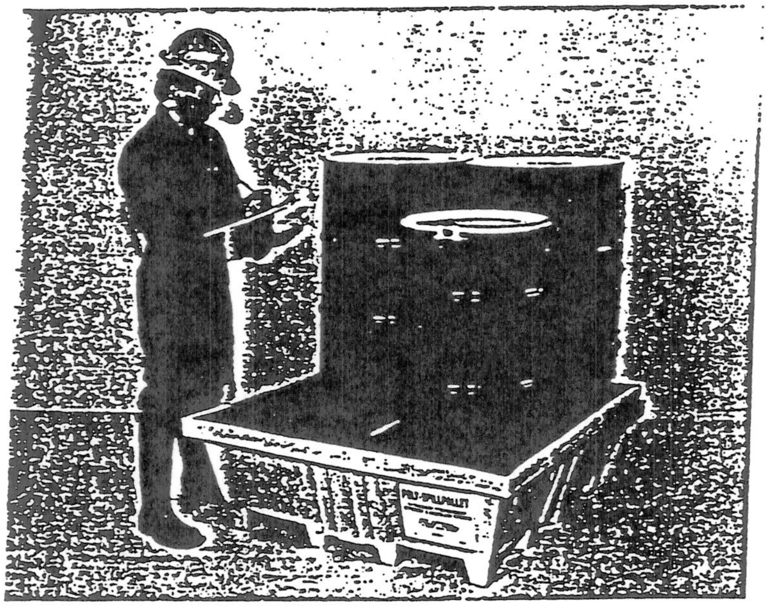
FIGURE 1.4

Example of spill control pallet.
(equivalent device from alternate manufacturer may be used.)

NEW!

POLY-SPILLPALLET™

Portable Secondary Containment Storage and Handling System



Exceeds EPA Container Storage Regulation 40 CFR 264.175

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- **Stackable Design**
  Allows stacking of two loaded POLY-SPILLPALLET™ units
- **Four Way Entry**
  Conveniently handled with forklift or pallet jack
- **85 Gallon Sump Capacity**
  Accommodates 150% of largest container; Translucent sidewalls allow convenient visual leak detection
- **100% Polyethylene Construction**
  No wood, metal or fiberglass parts; Offers excellent chemical resistance
- **Options**
  Horizon drum rack • Drain fitting • Drum loading ramp • Caster/frame assembly • "Sliding" cover • "Bell" cover

ENPAC **Better by Design**

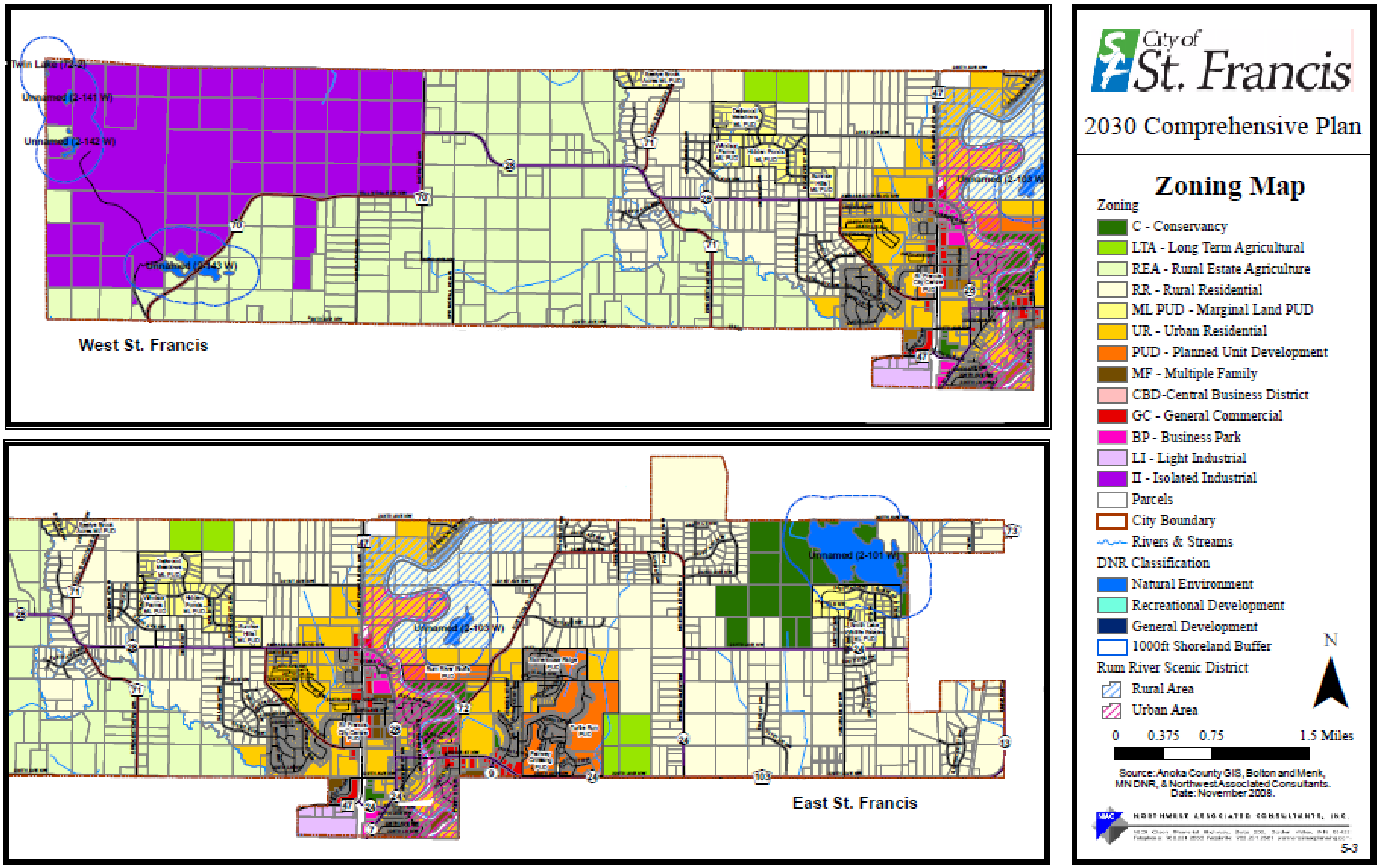
Subsidiary of ESSEF Corporation

Pat. Pending

FIGURE 1.4

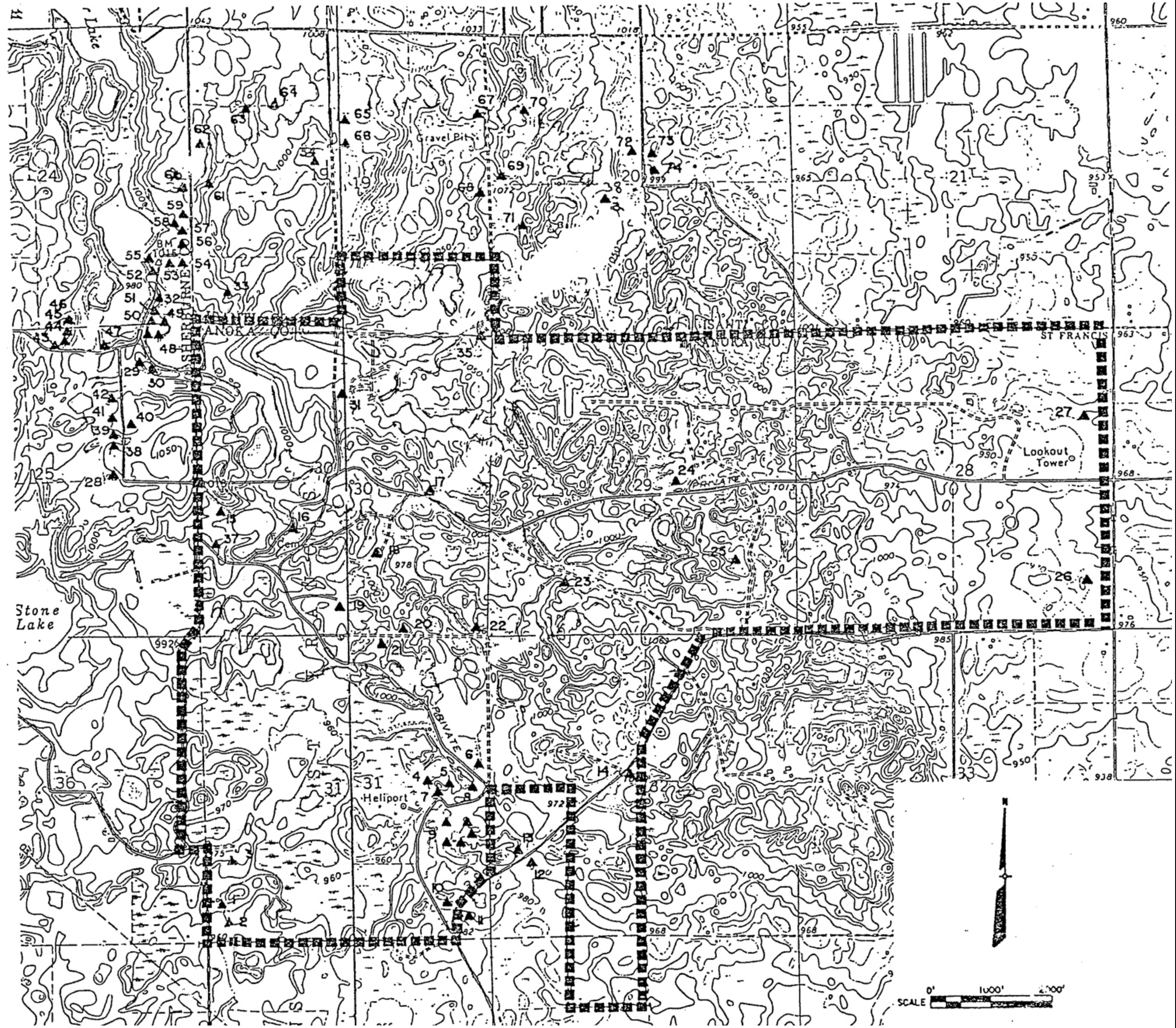
Example of spill control pallet.
(equivalent device from alternate manufacturer may be used.)

FIGURE 1.6 ZONING AND LAND USE MAP



Legend

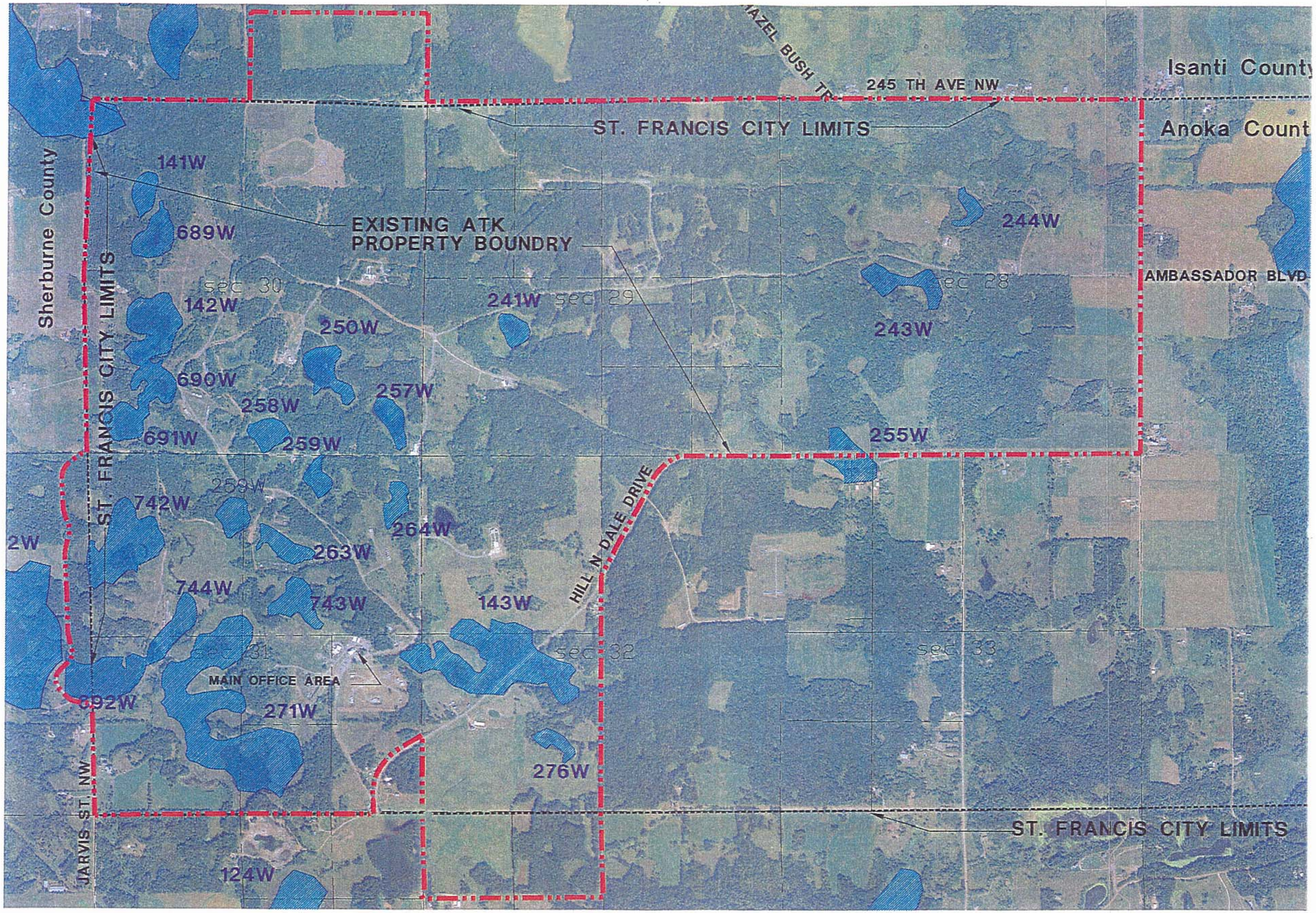
S/N	Facility	Use
1	Former ATK Rental Farm (Building Removed)*	—
2	Part of 1*	—
3	ATK Test Facility	Process/Potable Water
4	ATK Receiving Building	Process/Potable Water
5	ATK Maintenance Building	Process/Potable Water
6	ATK Test Facility	Process/Potable Water
7	ATK Operations Building	Process/Potable Water
8	ATK Load Building	Process/Potable Water
9	ATK Load Buildings	Process/Potable Water
10	Former ATK Rental Home (Building Removed)*	—
11	Private Home	Potable Water
12	Private Farm	Dairy Farm
13	Private Farm	Dairy Farm
14	ATK Rental Home	Potable Water
15	Former ATK Rental Home (Building Removed)*	—
16	Abandoned Farm*	—
17	ATK Test Facility	Process/Potable Water
18	ATK Test Facility	Process/Potable Water
19	ATK Test Facility	Process/Potable Water
20	ATK Test Facility	Process/Potable Water
21	ATK Load Building	Process/Potable Water
22	ATK Load Building	Process/Potable Water
23	ATK Test Facility	Process/Potable Water
24	ATK Test Facility	Process/Potable Water
25	ATK Test Facility	Process/Potable Water
26	ATK Rental Farm – No Home*	—
27	ATK Rental Farm – No Home*	—
28	Private Home	Potable Water
29	Private Home	Potable Water
30	Private Home	Potable Water
31	Abandoned Farm/ATK Open Burn Site*	—
32	Private Home	Potable Water
33	Private Home	Potable Water
34	Private Farm/Chicken Ranch	Livestock, Potable Water
35	Former Farmstead (Building Removed)*	Hay, Corn
36	Private Home	Potable Water
37	Former ATK Rental Home (Building Removed)*	—
38–74	Private Homes	Potable Water



(SOURCES: USOS TOPOGRAPHIC QUADRANGLE AND CITY OF ST. FRANCIS)

FIGURE 1.6A
GROUNDWATER WELLS NEAR ATPG

T107098_map1.pptx



RLK

Alliant Techsystems

DNR PROTECTED WETLANDS

Date: August 30, 2002

FIGURE 1.6B
WETLAND
INVENTORY MAP

T107098_map2.pptx

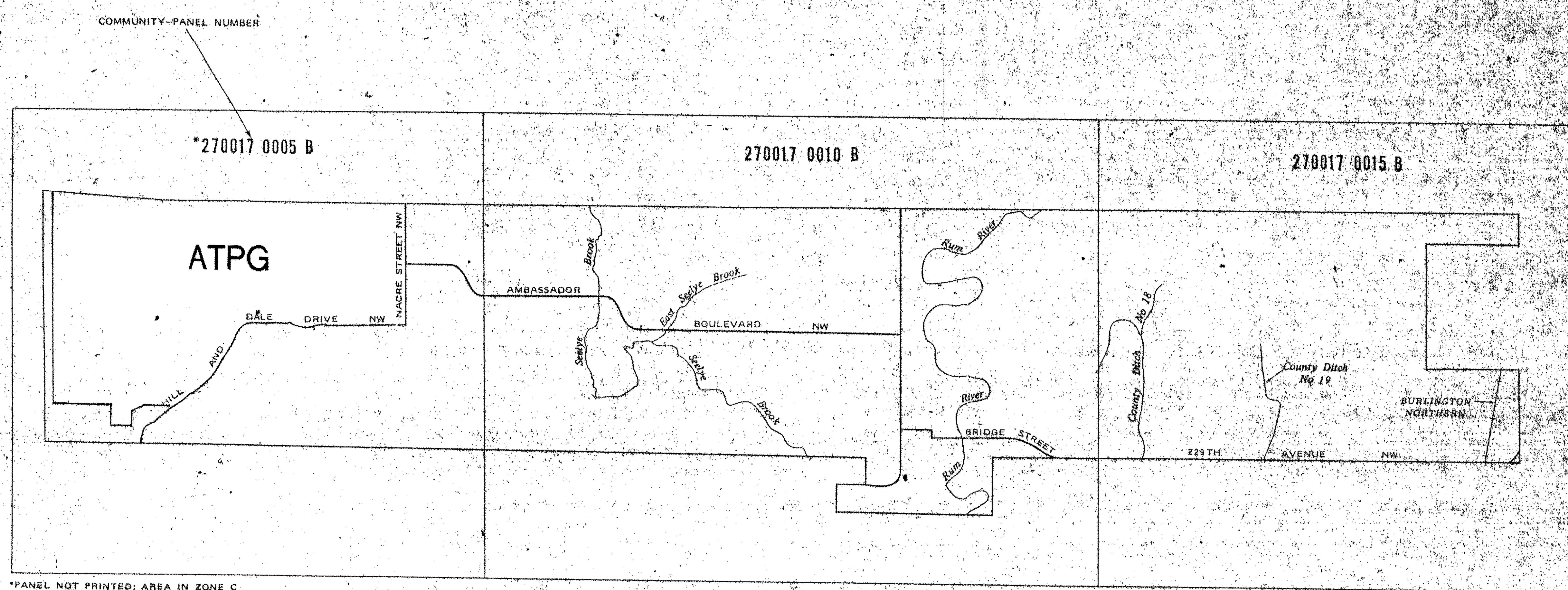


FIGURE 1.7

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
ST. FRANCIS,
MINNESOTA
ANOKA COUNTY

MAP INDEX
PANELS PRINTED: 10, 15

COMMUNITY-PANEL NUMBERS
270017 0001-0015

EFFECTIVE DATE:
MARCH 2, 1981

federal emergency management agency
federal insurance administration

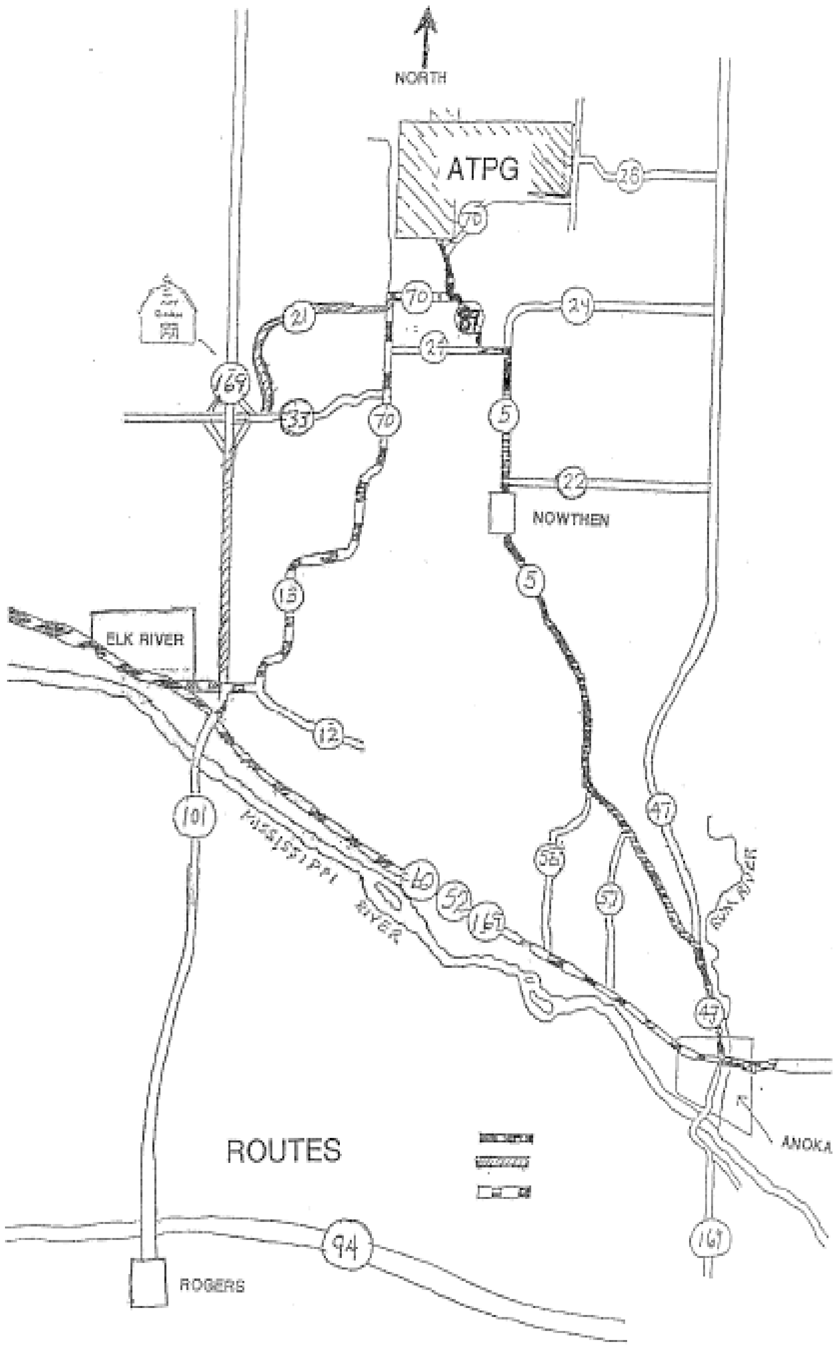
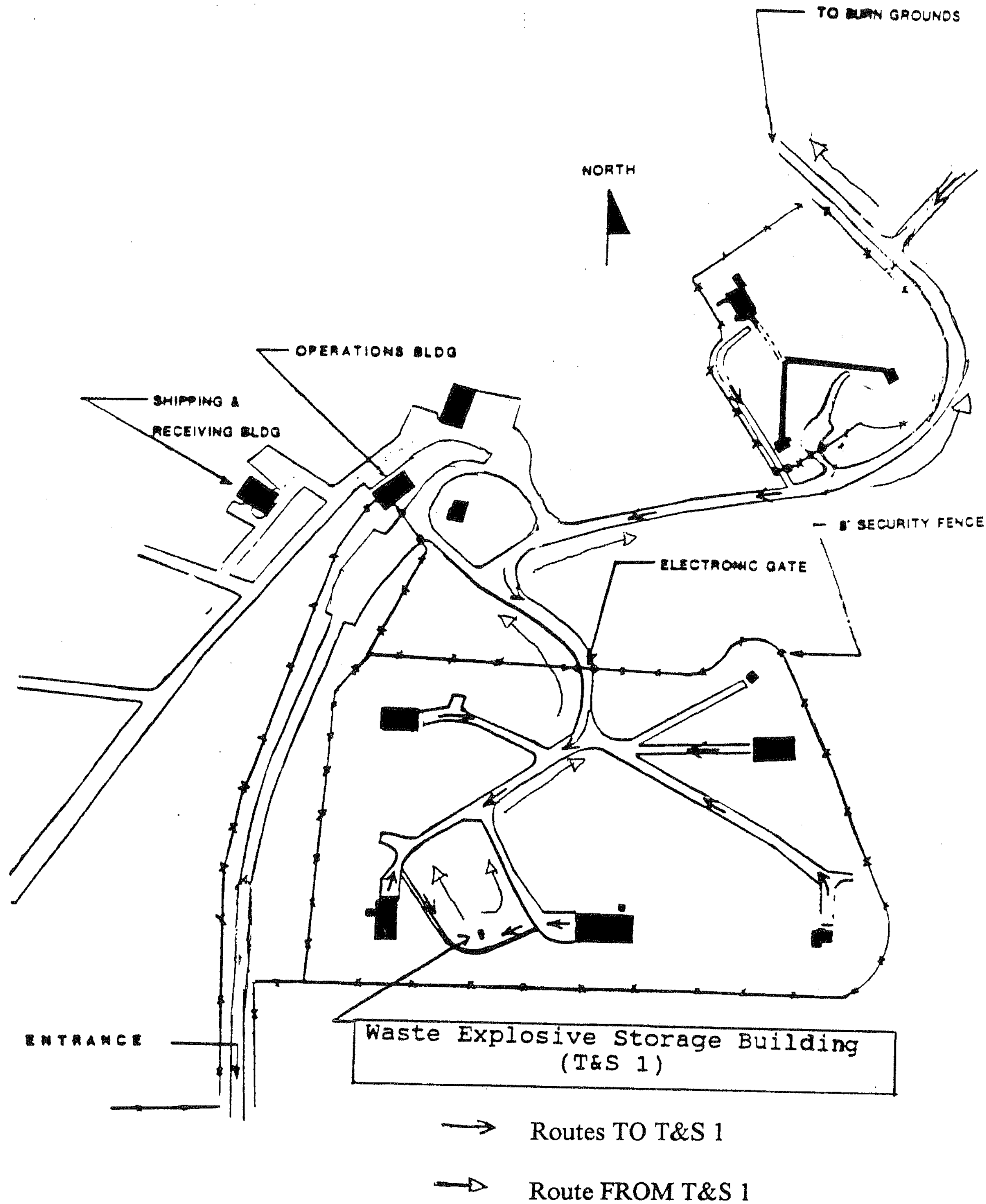


FIGURE 1.7A Public Road Access to ATPG

FIGURE 1.8

ALLIANT TECHSYSTEMS PROVING GROUND
TRANSPORTATION ROUTES

TO/FROM WASTE EXPLOSIVE STORAGE BUILDING (T&S 1)



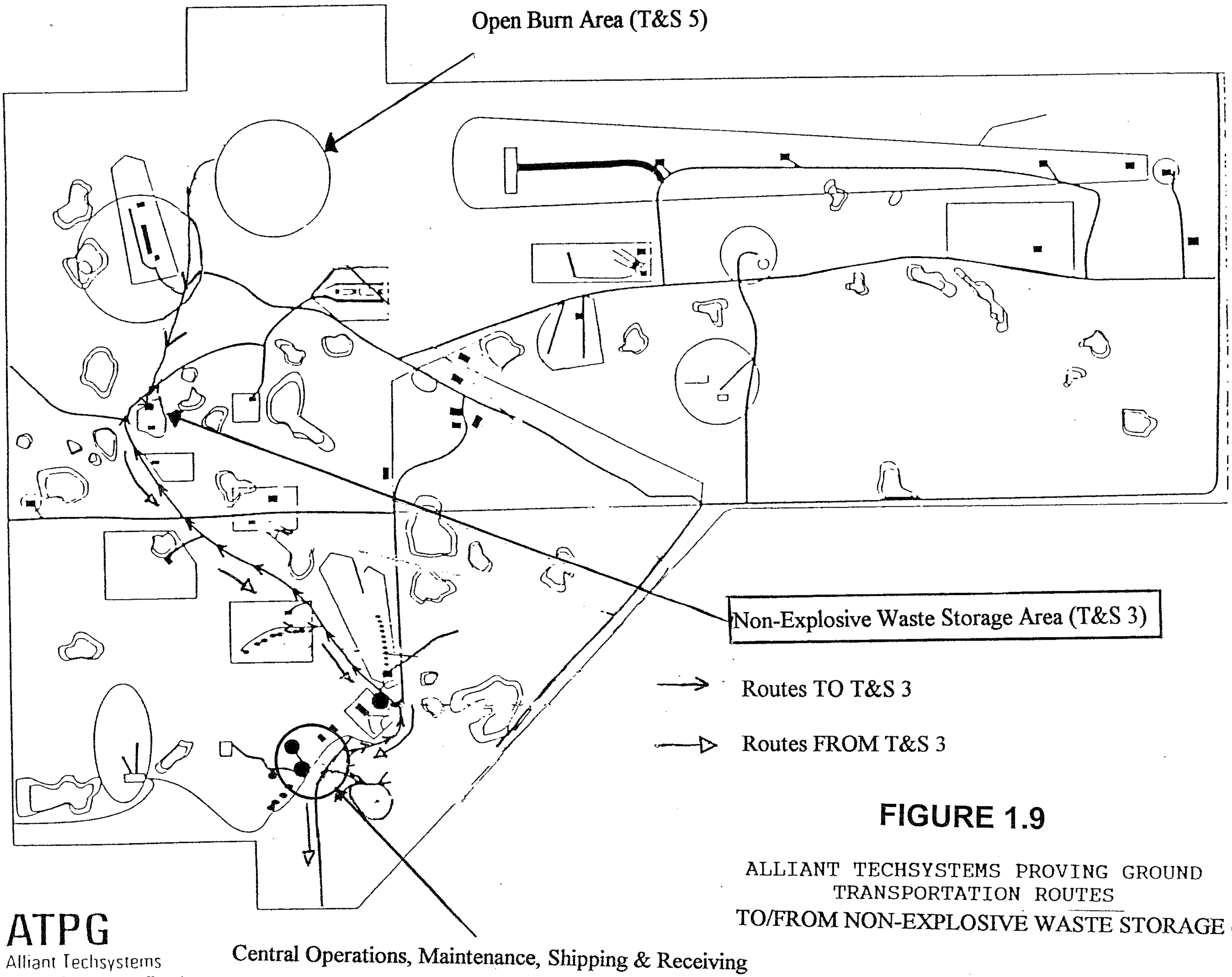


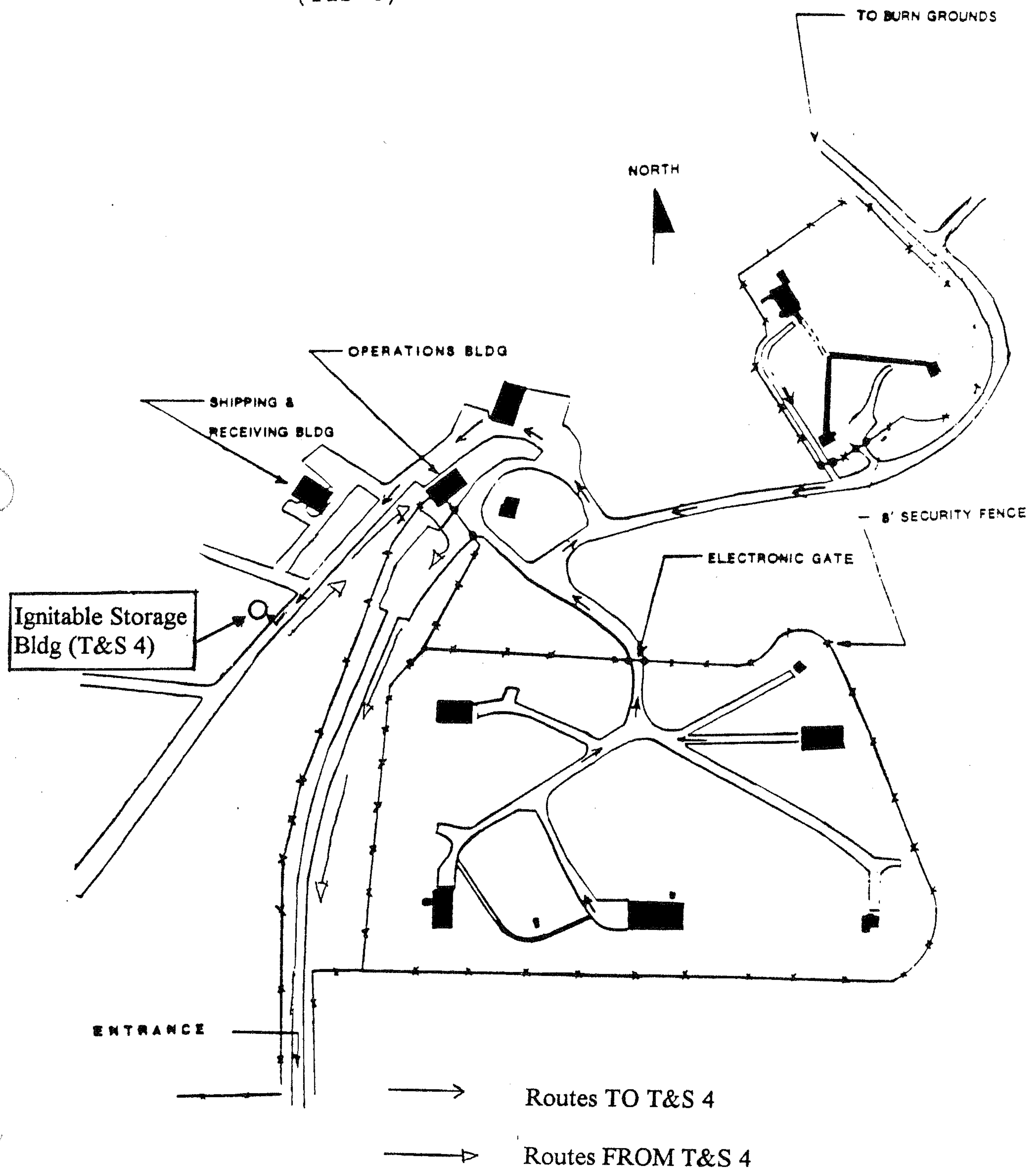
FIGURE 1.9

ALLIANT TECHSYSTEMS PROVING GROUND
TRANSPORTATION ROUTES
TO/FROM NON-EXPLOSIVE WASTE STORAGE (T&S 3)

ATPG
Alliant Techsystems
23100 Sugarbush Road
Elk River, MN 55330

FIGURE 1.10

ALLIANT TECHSYSTEMS PROVING GROUND
TRANSPORTATION ROUTES
TO/FROM IGNITABLE STORAGE)
(T&S 4)



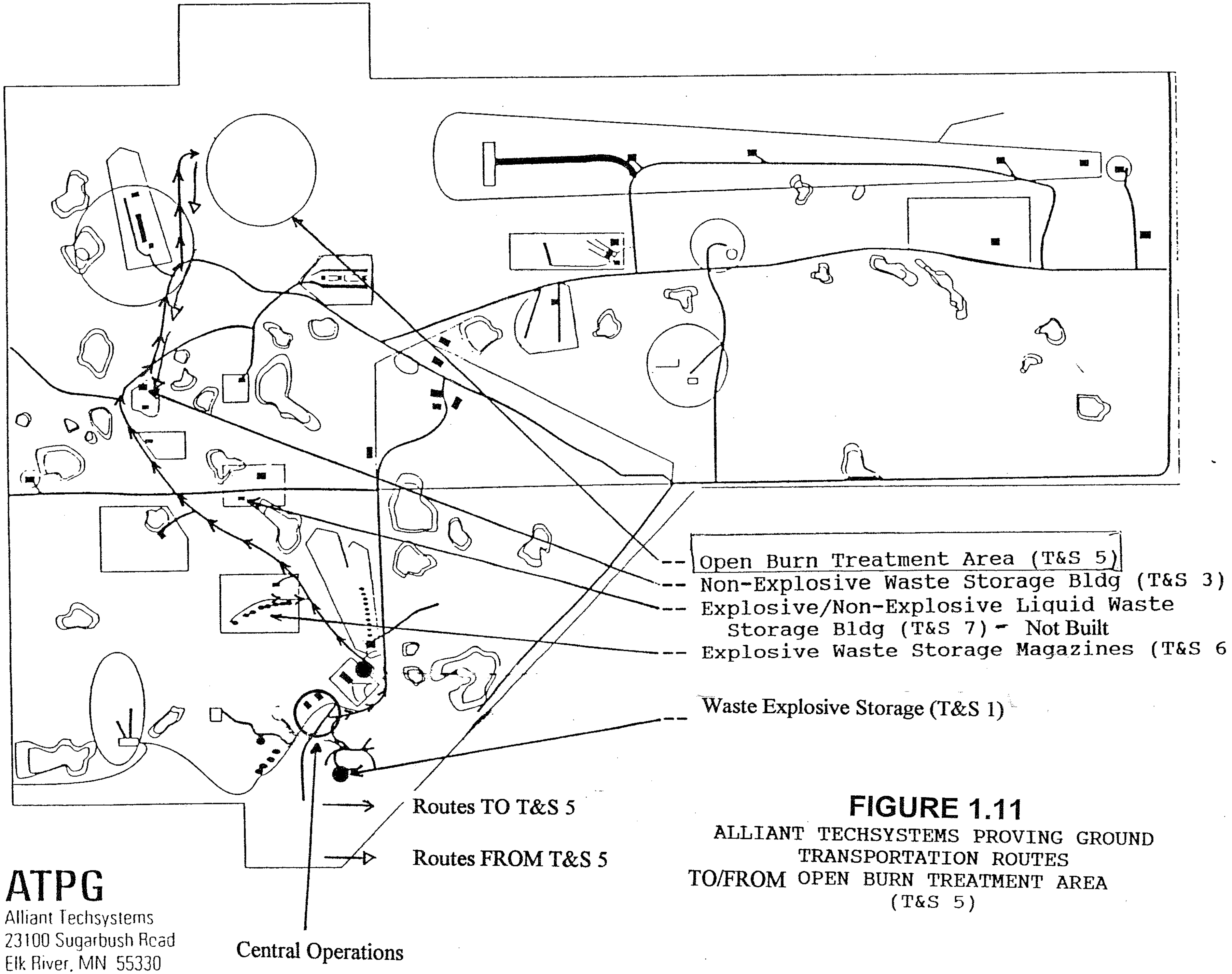


FIGURE 1.11
ALLIANT TECHSYSTEMS PROVING GROUND
TRANSPORTATION ROUTES
TO/FROM OPEN BURN TREATMENT AREA
(T&S 5)

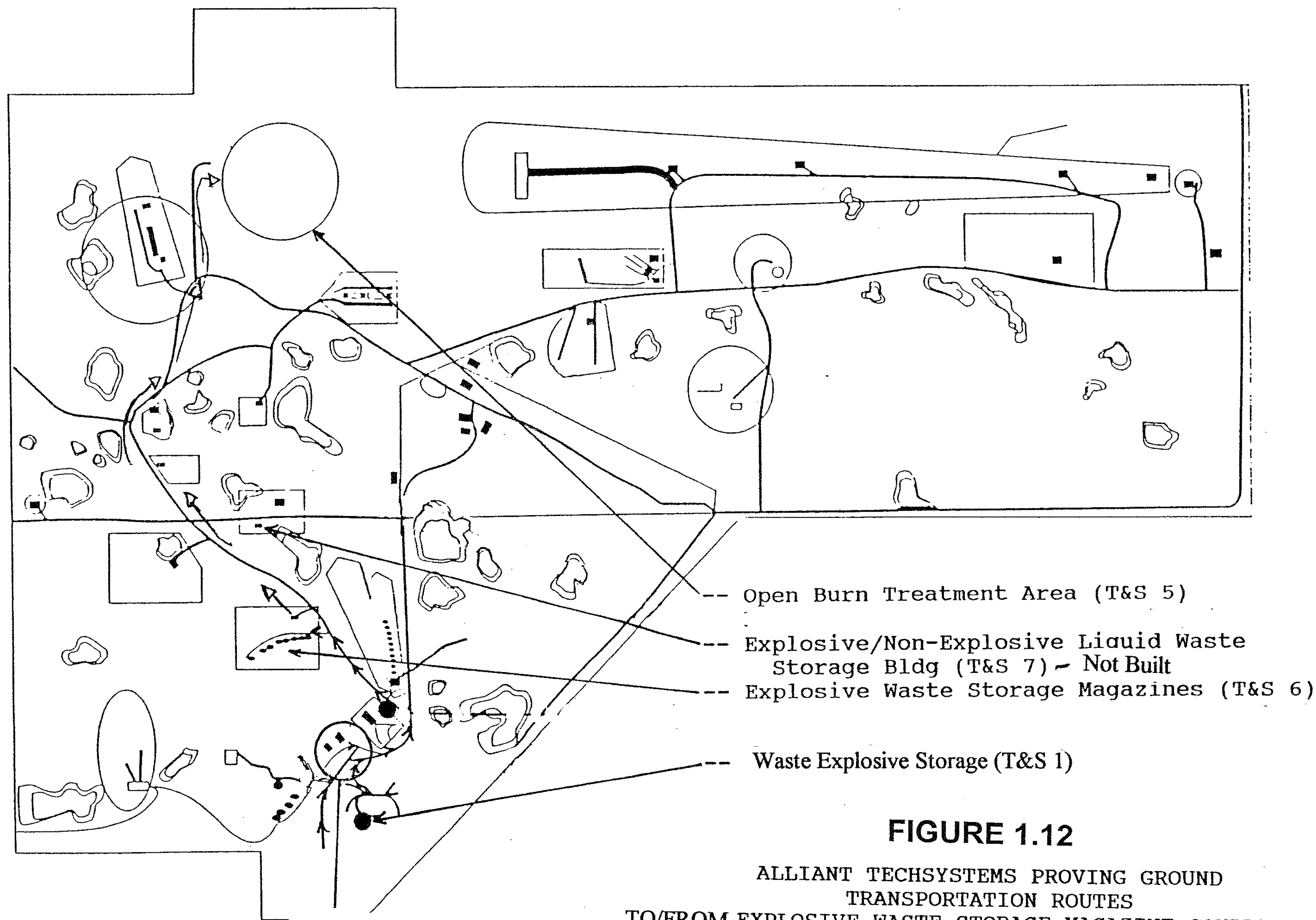
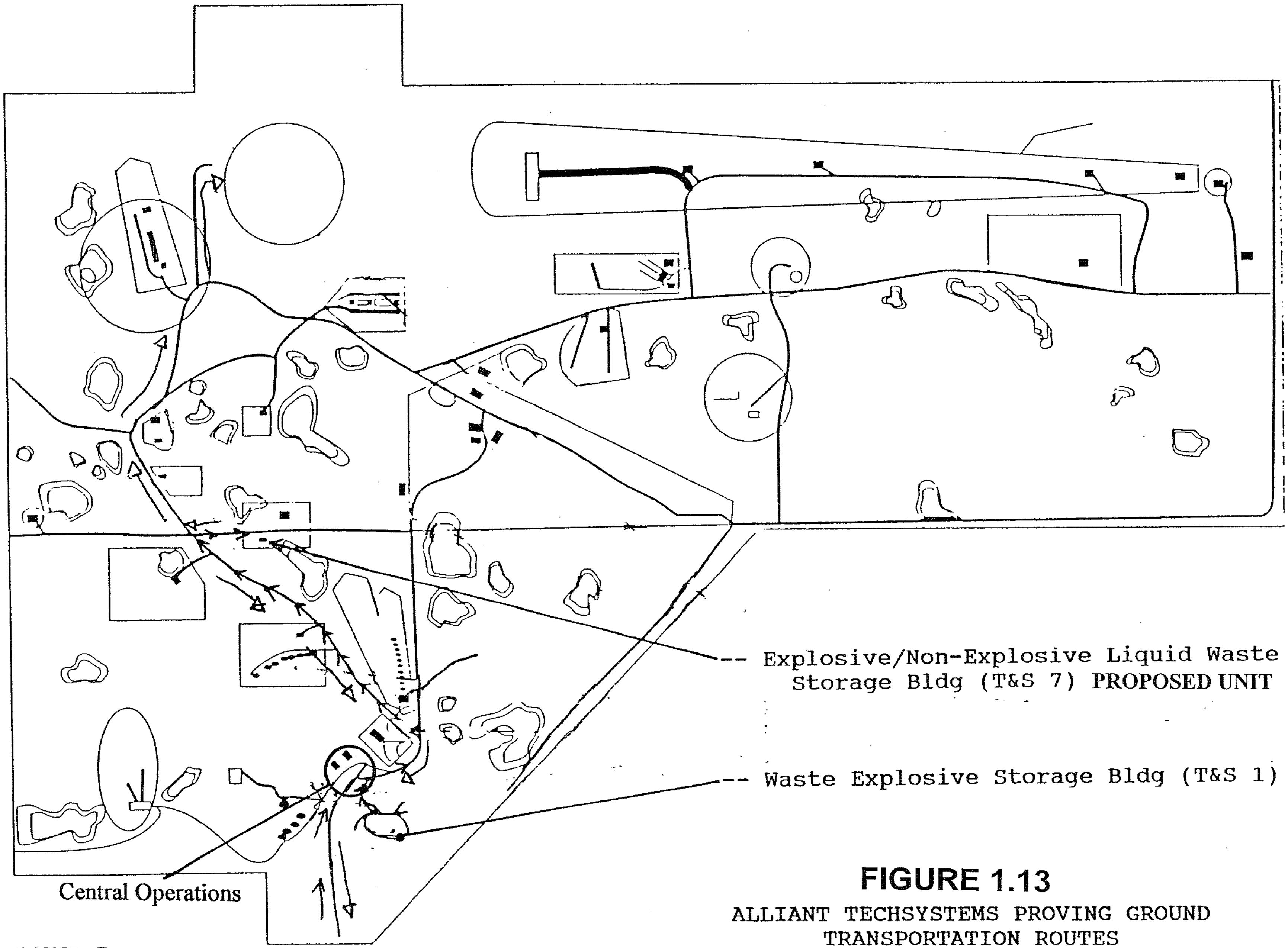


FIGURE 1.12

ALLIANT TECHSYSTEMS PROVING GROUND
TRANSPORTATION ROUTES
TO/FROM EXPLOSIVE WASTE STORAGE MAGAZINE COMPLEX
(T&S 6)

ATPG
Alliant Techsystems
23100 Sugarbush Road
Elk River, MN 55330
612 441-1492



--- Explosive/Non-Explosive Liquid Waste Storage Bldg (T&S 7) **PROPOSED UNIT**

--- Waste Explosive Storage Bldg (T&S 1)

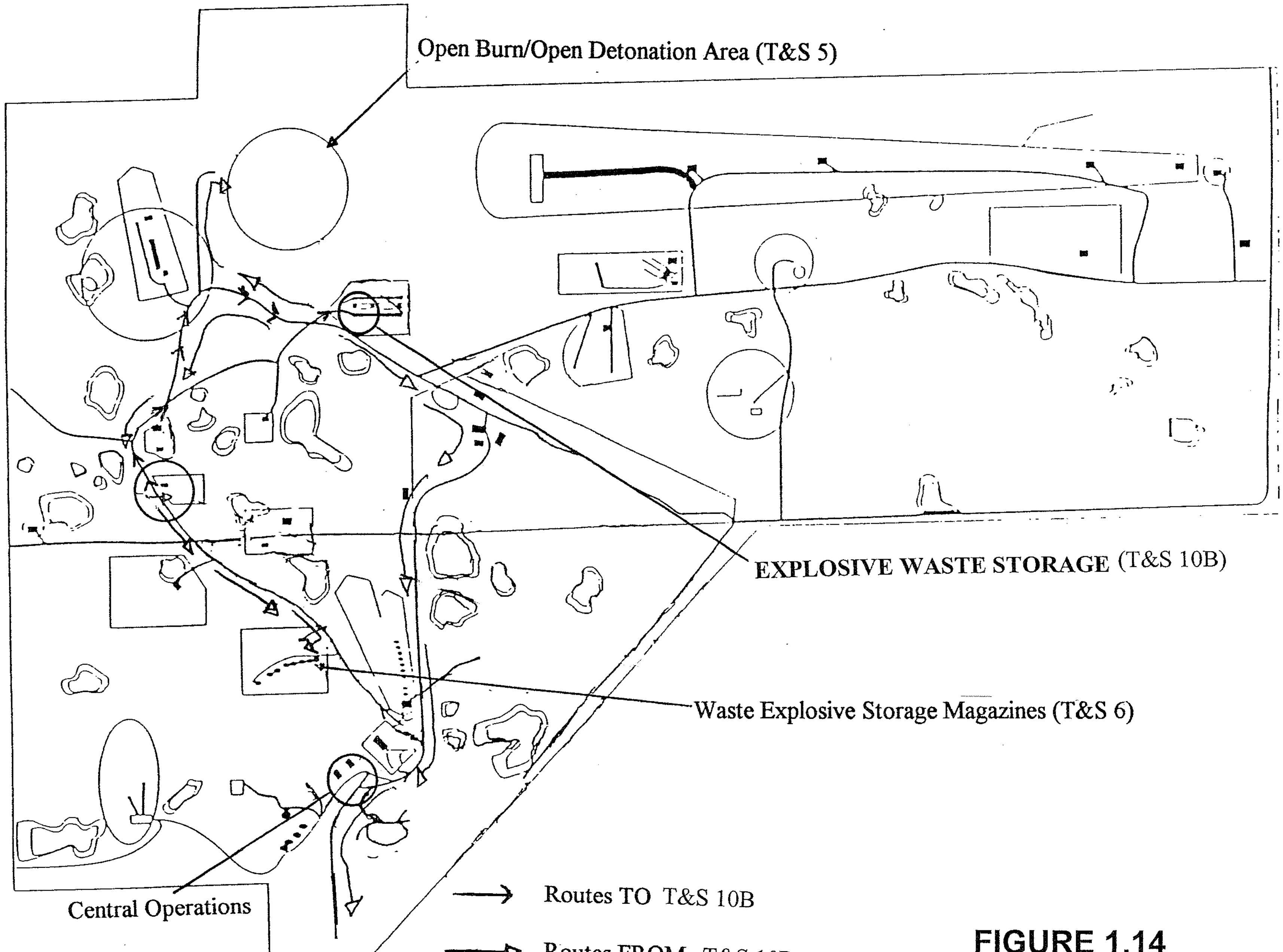
FIGURE 1.13

ALLIANT TECHSYSTEMS PROVING GROUND
TRANSPORTATION ROUTES
TO/FROM EXPLOSIVE/NON-EXPLOSIVE LIQUID WASTE STORAGE BUILDING
(T&S 7) **PROPOSED UNIT**

ATPG
Alliant Techsystems
23100 Sugarbush Road
Elk River, MN 55330

→ Routes TO T&S 7

▷ Routes FROM T&S 7



ATPG
Alliant Techsystems
23100 Sugarbush Road
Elk River MN 55330

FIGURE 1.14
ALLIANT TECHSYSTEMS PROVING GROUNDS
TRANSPORTATION ROUTES
PROJECTILE DEMILITARIZATION FACILITY
(T&S 10B)

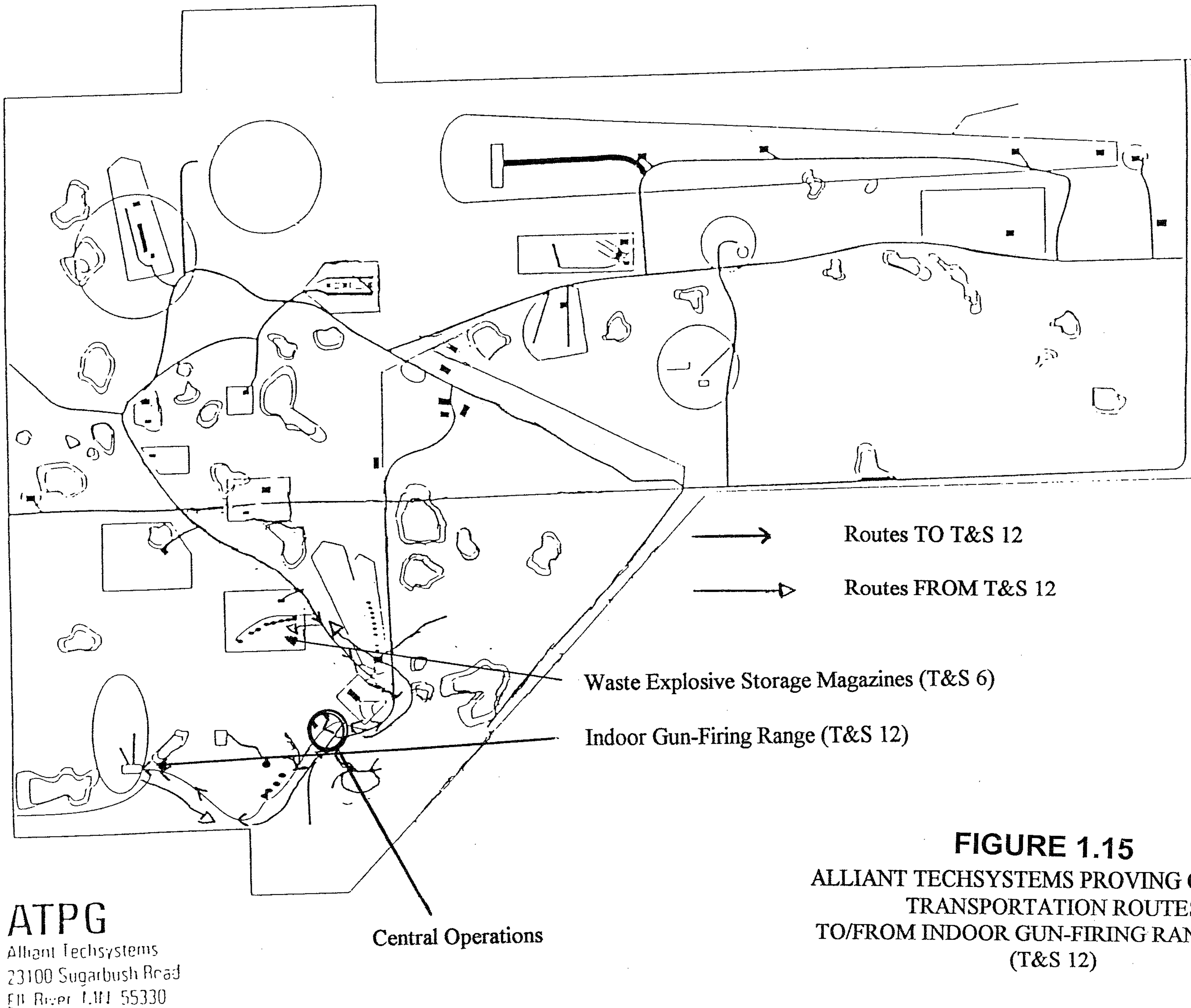


FIGURE 1.15
ALLIANT TECHSYSTEMS PROVING GROUNDS
TRANSPORTATION ROUTES
TO/FROM INDOOR GUN-FIRING RANGE (PSR)
(T&S 12)

FIGURE 3.2

SPECIFICATION SHEET
T&S 3

(Non-Explosive Waste Storage Building)
(ATK dwg No. Site #8A)

BASIC STRUCTURE	APPLICABLE REGULATIONS
Wind loading	MN Amendments to the 1988 UBC Section 1305.4800
Snow loading	MN Amendments to the 1988 UBC Section 1305.4700

Exterior walls: 29 gage steel
Floor: 6 inch thick concrete slab
Ceiling: 29 gage steel
One door (weather-stripped)
- Dimensions 3'x7" (WxH)
- Steel
- Lockable

Six overhead roll up doors
- 8'x8' (WxH)
- Lockable

Square footage: 1518 sq. ft.
Interior finish:
- Floor: Epoxy coated

Exterior fininsh
- Walls:painted galvanized
- Roof: painted galvanized with occasional sun panels

55 gallon drum storage capacity
- 100 drums
  - 80 drums solid hazardous wastes
  - 20 drums liquid hazardous wastes

Signage: at all entrances

No Smoking	DoD4145.26M
NOTICE - Authorized Personnel Only	MN7045.0452 Subp.4

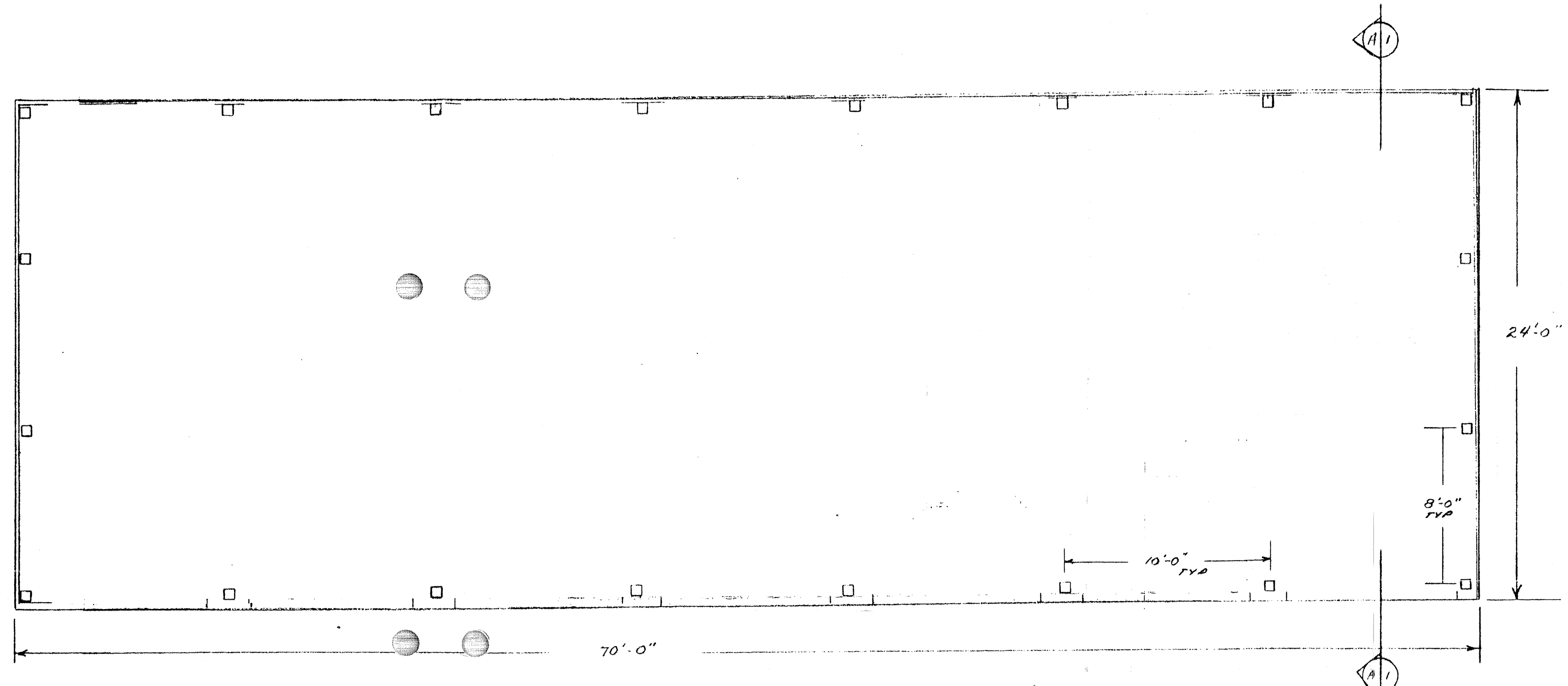
SECONDARY CONTAINMENT:

Liquid storage area - 4 inch recess in concrete floor	
Epoxy enamel coated floor	MN7045.0526 Subp.6

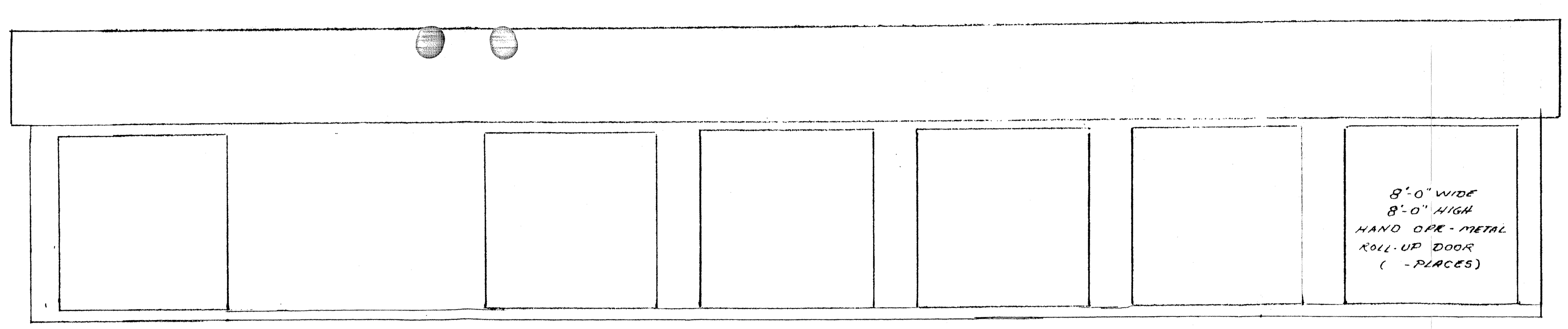
SECURITY:

Locked doors	MN7045.0452 Subp.4
Buildings closed when operators not present	MN7045.0452 Subp.4

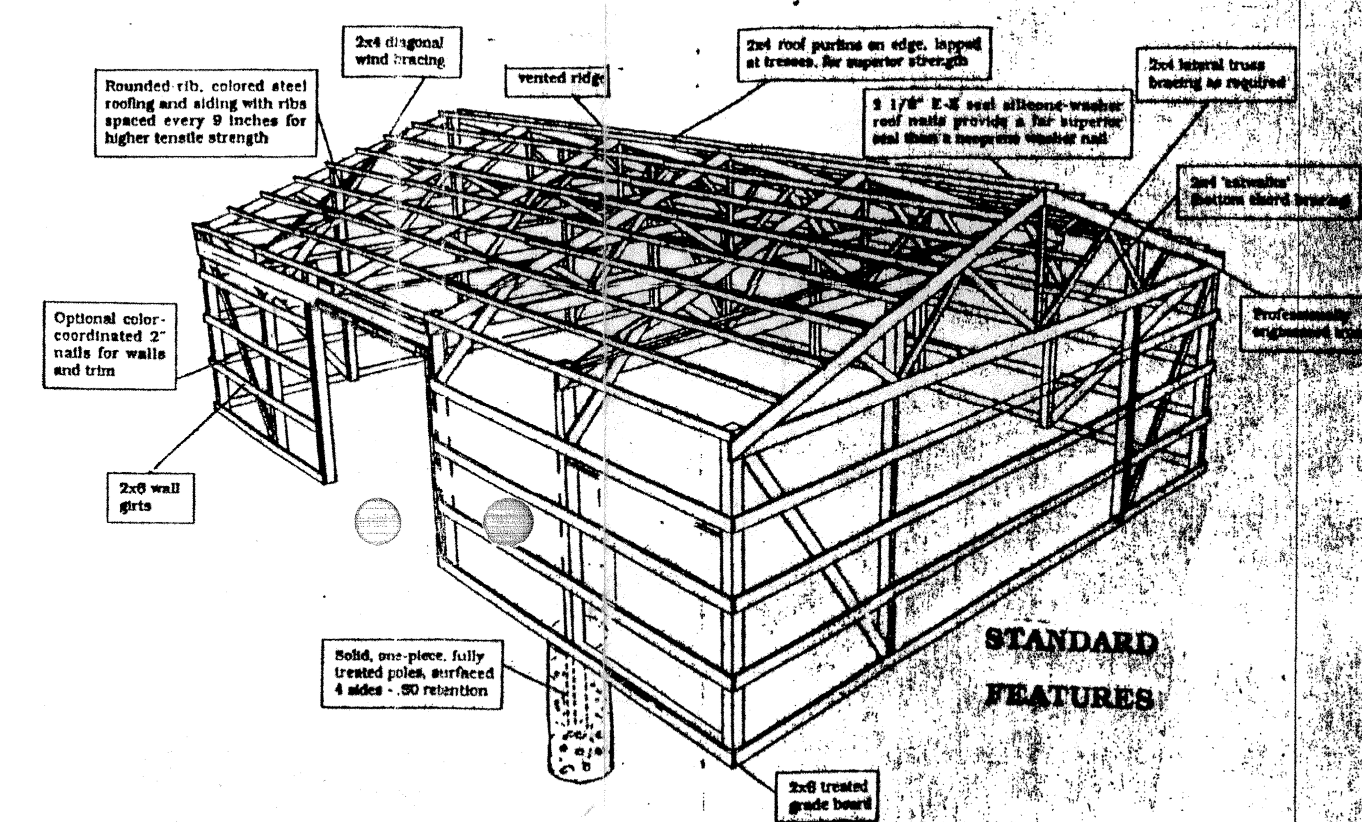
CAUTION: READ ALL NOTES & SPECS. REMOVE UNNECESSARY SHARP EDGES, SCREWS, SPRINGS & DOWELS TO SUIT. MARK TOOL NO. (ON GAGES MARK GAGE NO., PART NO., FUNCT. OF GAGE & LAST REV. LETTER). DON'T FORGET SAFETY

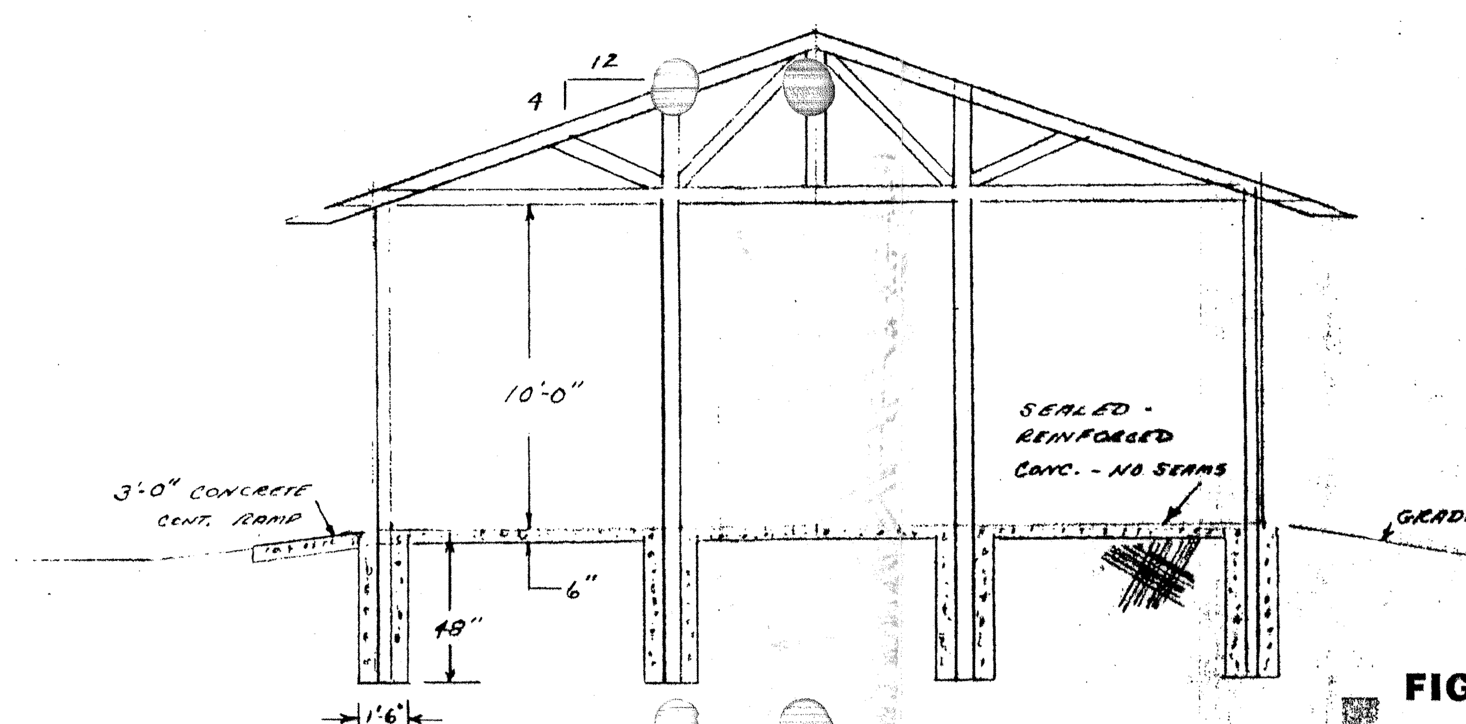


PLAN VIEW
SCALE 1/4" = 1'-0"



FRONT ELEVATION
SCALE 1/4" = 1'-0"

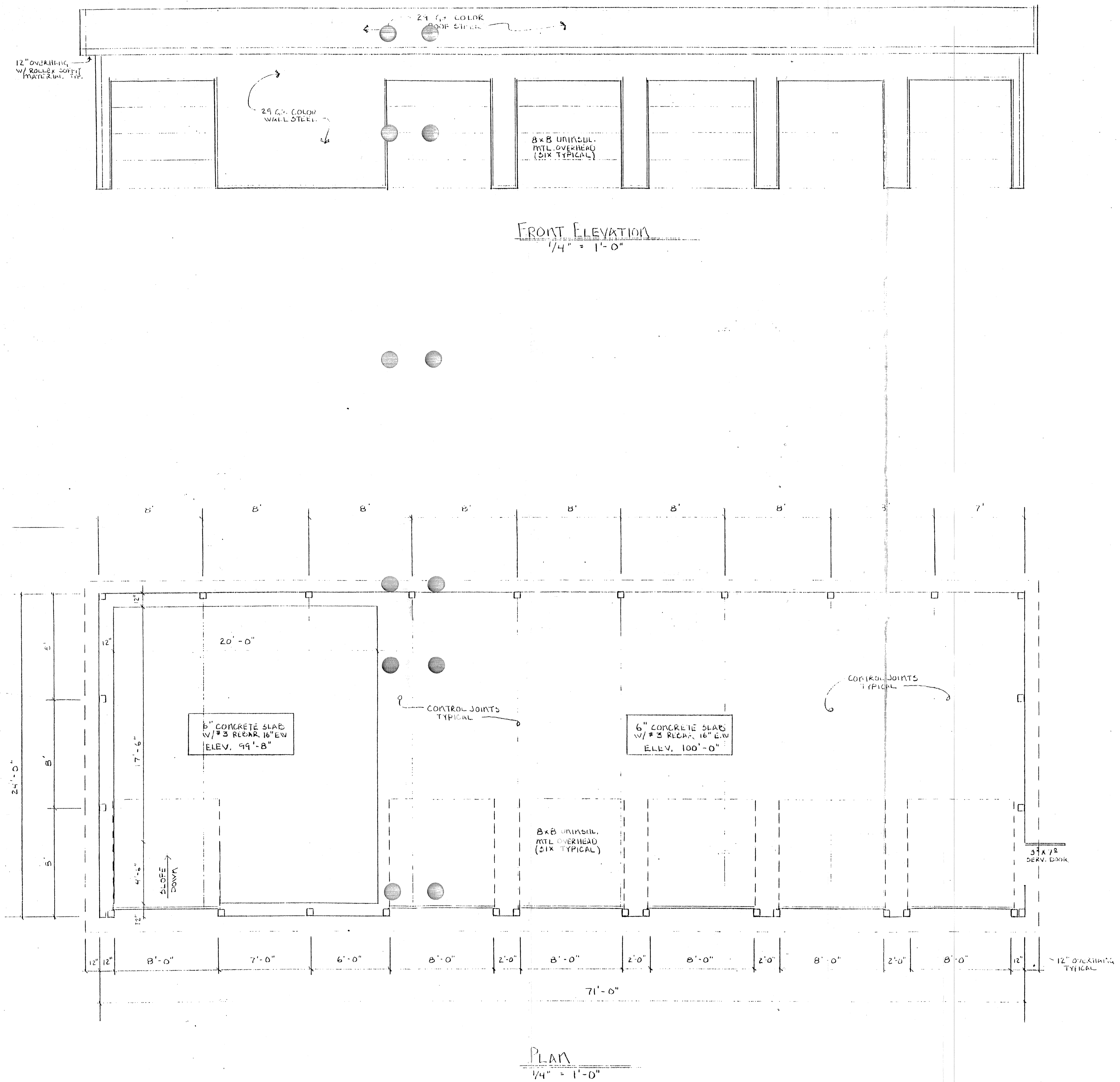




SECTION A-A
SCALE 1/4" = 1'-0"

FIGURE 3.3

ALLIANT TECHSYSTEMS PROVING GROUNDS	
PLANT ENGINEERING DEPARTMENT	
T/S 3 NON-EXPLOSIVE HAZARDOUS WASTE STORAGE BUILDING	
BY J.F. GARRITSEN CRE	DATE
CHECKED	SCALE
APPROVED	SHEET 1 OF 1
DWG NUMBER	98-420



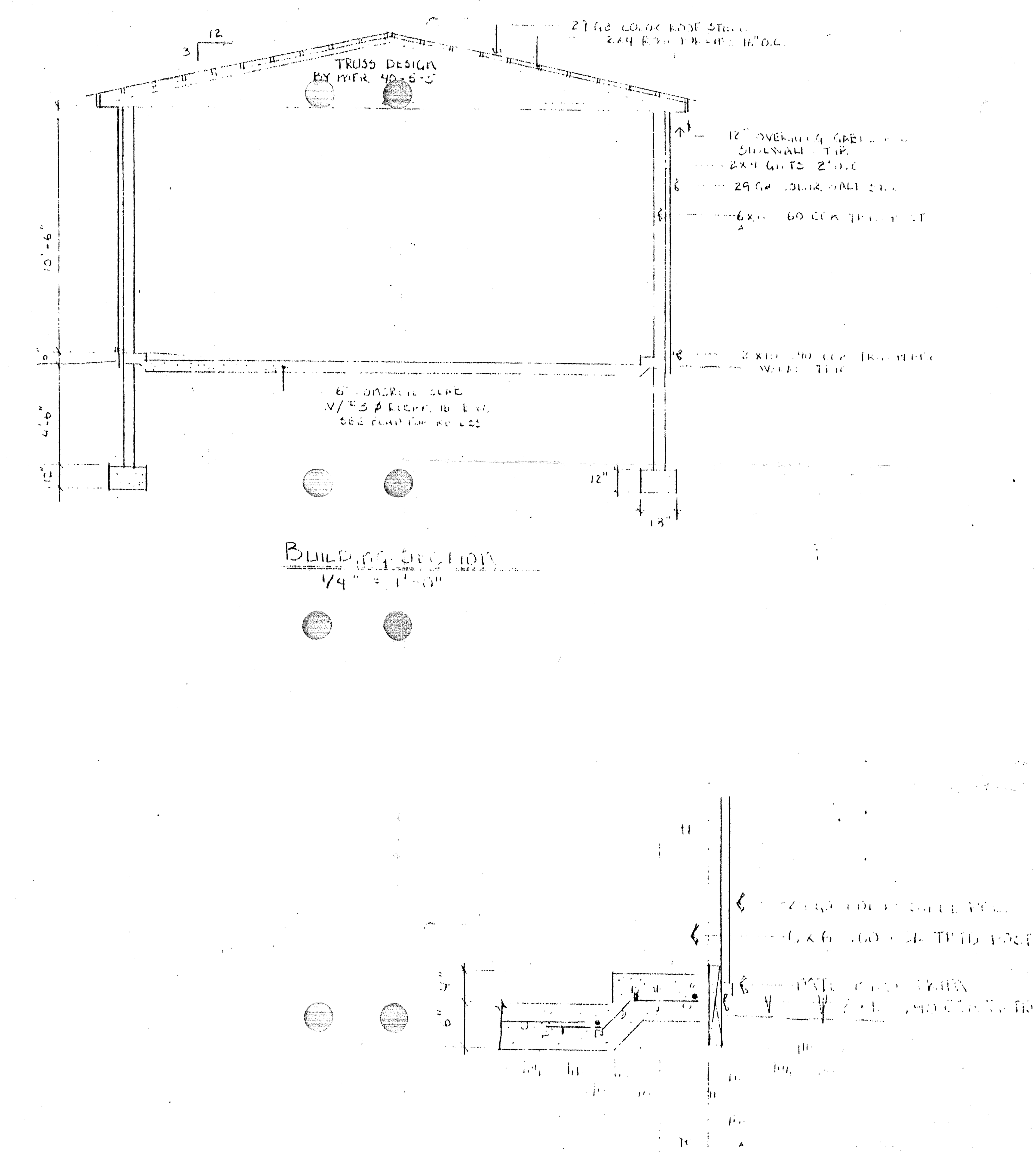


FIGURE 3.4

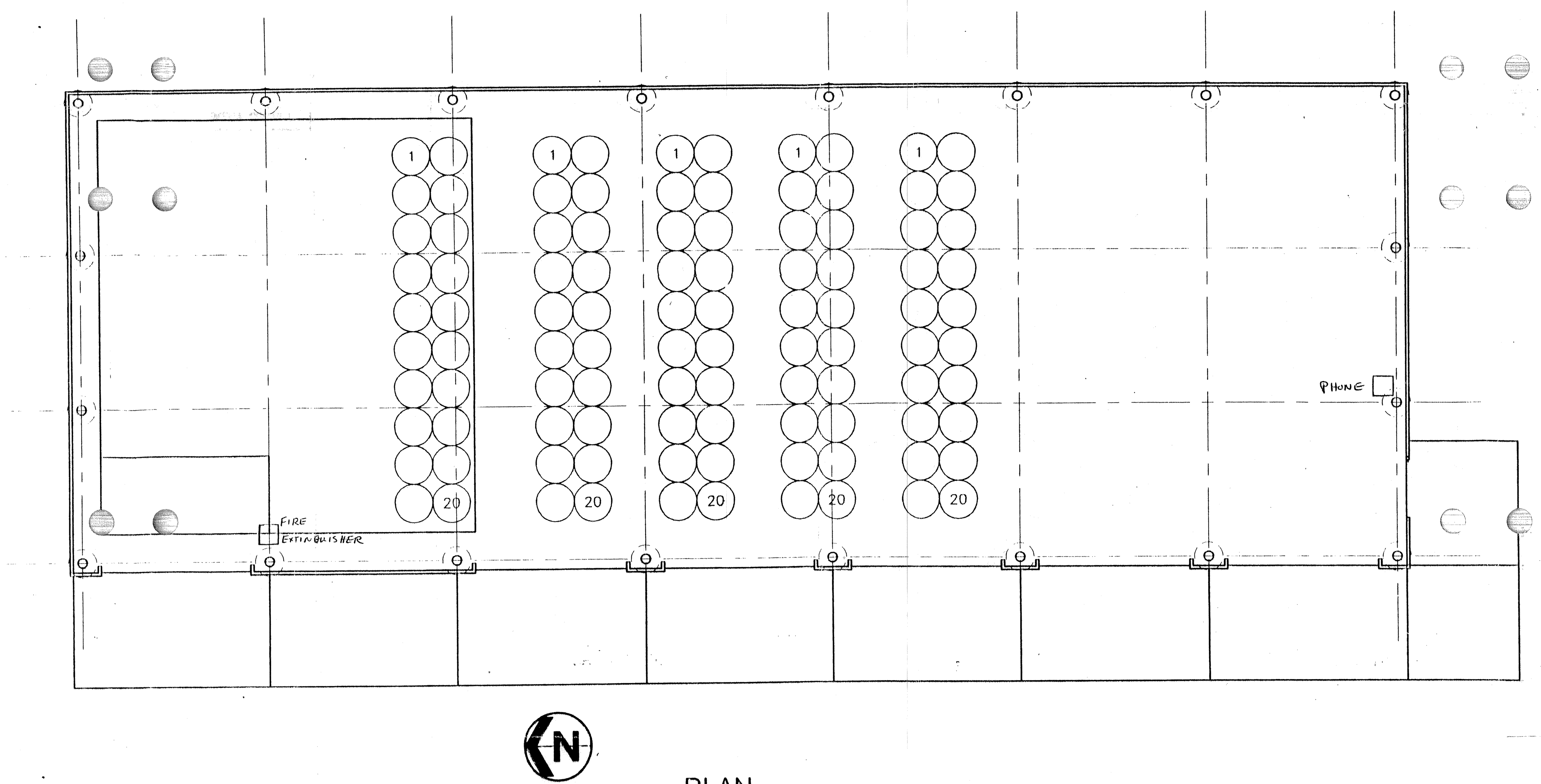
T/S 3 NON-EXPLOSIVE HAZARDOUS WASTE STORAGE BUILDING

ALLIANT TECHSYSTEMS

SCALE NOTED

DATE 0-21-92

TITLE HAZARDOUS WASTE STORAGE



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

FIGURE 3.5

T/S 3 NON-EXPLOSIVE HAZARDOUS WASTE STORAGE BUILDING

ACAD FILE NAME: sre/c10431/gilbarr.dwg
DATE PLOTTED: 10/1/93

ALL CONTRACTORS AND SUBCONTRACTORS SHALL VERIFY ALL DIMENSIONS BY MEASUREMENT AT THE BUILDING AND/OR SITE

NO.	DATE	BY	DESCRIPTION OF REVISIONS

DESIGNED
DRAWN
CHECKED

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA

DATE ____________ REG. NO. ________

TKDA
ENGINEERS ARCHITECTS PLANNERS
TOLTZ, KING, DUVALL, ANDERSON AND ASSOCIATES INCORPORATED
SAINT PAUL, MINNESOTA

Alliant Techsystems Inc.
23100 Sugar Bush Road N.W.
Elk River, Minnesota

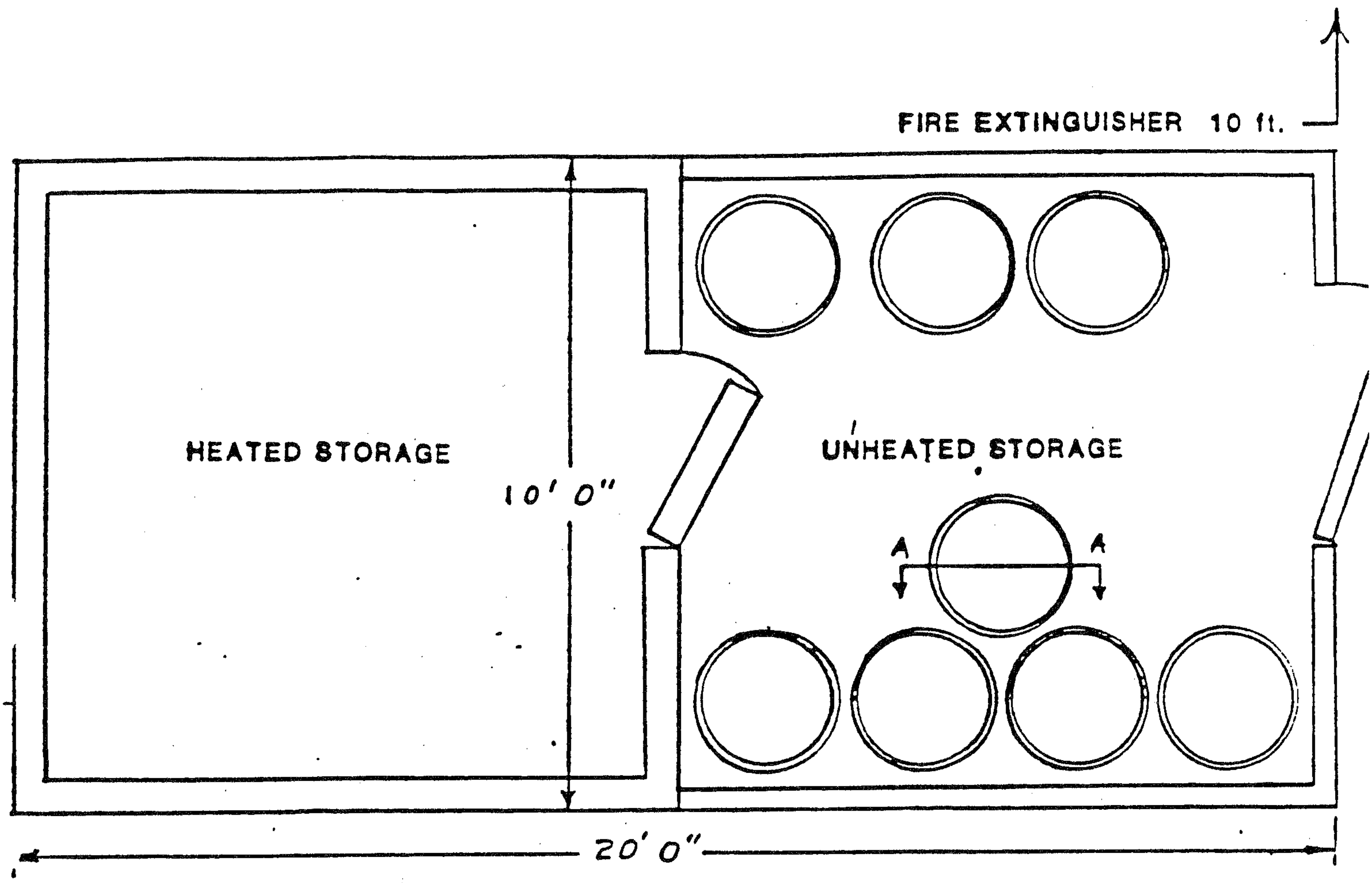
HAZARDOUS WASTE STORAGE BUILDING
T. & S. NO. 3

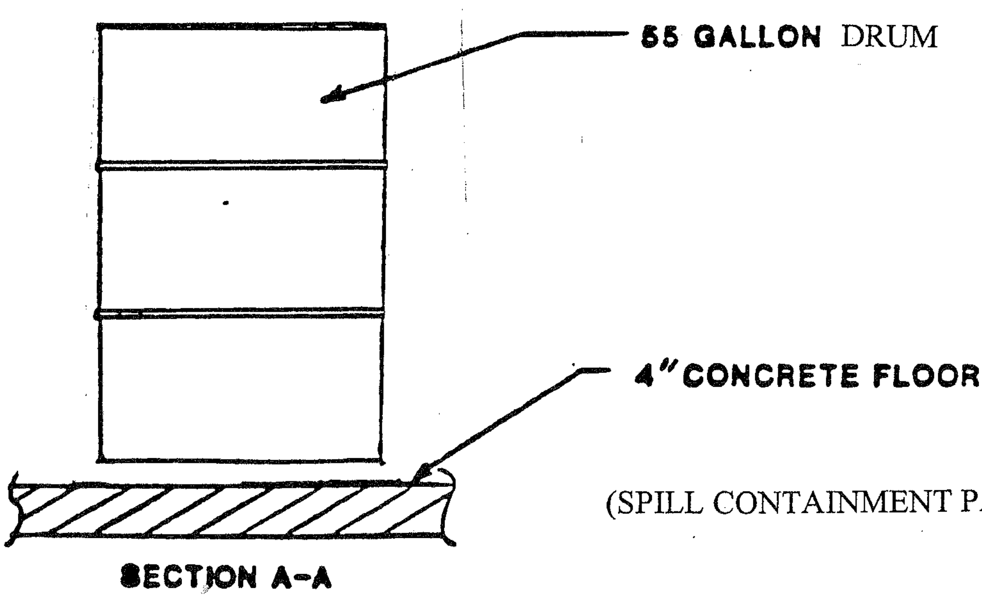
COMM. NO. 10160
DRAWING NO. 1

3.3D

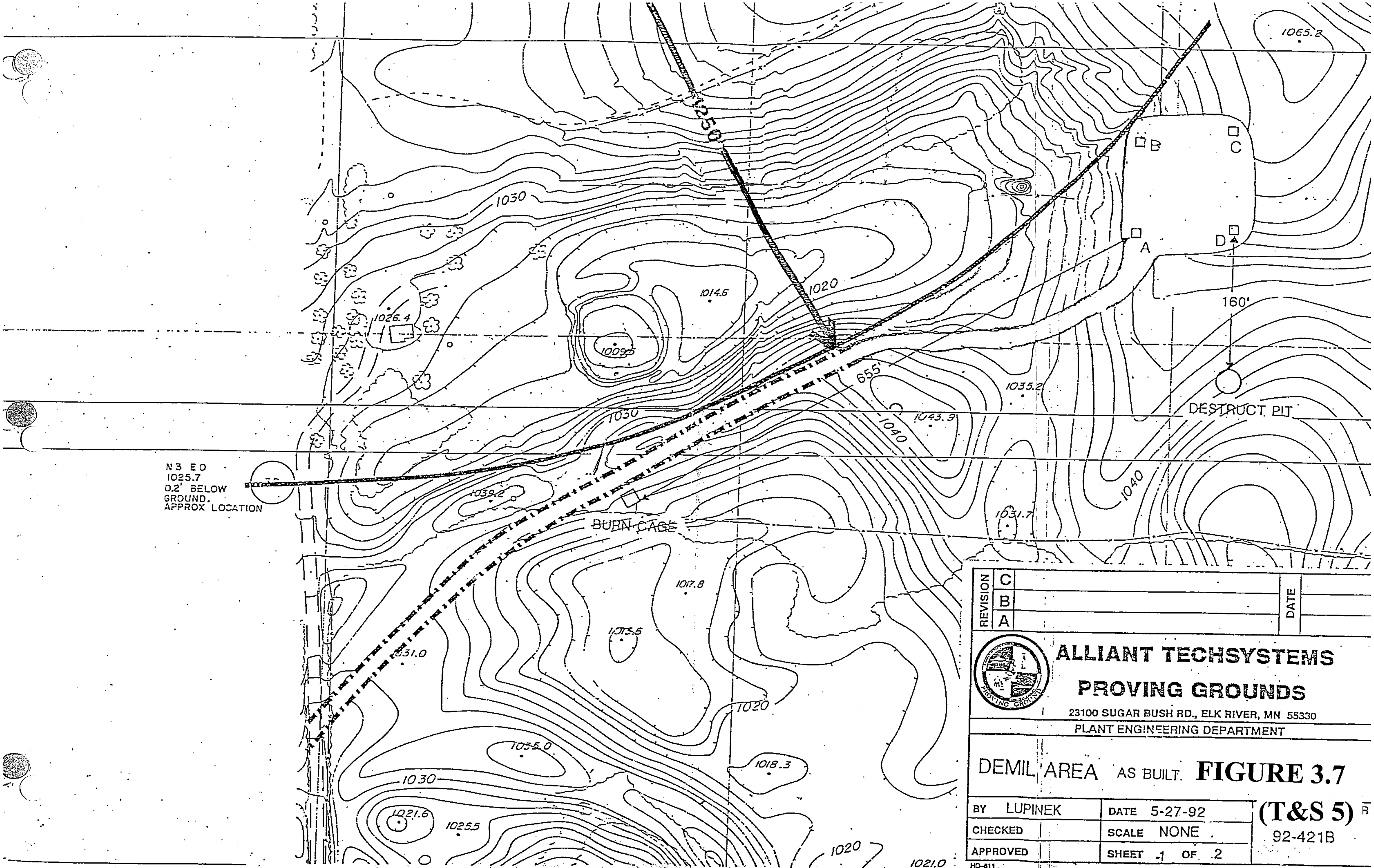
FIGURE 3.6

IGNITABLE WASTE STORAGE BUILDING (T&S 4)





(SPILL CONTAINMENT PALLETS NOT SHOWN)


1065.2
B
C
1250
1030
A
D
1014.6
1020
160'
1026.4
1009.5
655'
1035.2
DESTRUCT PIT
1043.9
1030
1040
N3 E0
1025.7
0.2' BELOW
GROUND
APPROX LOCATION
1039.2
1040
1031.7
BURN CAGE
1017.8
1013.6
1031.0
1020
1035.0
1018.3
1030
1021.6
1025.5
1020
1021.0
REVISION
C
B
A
DATE
ALLIANT TECHSYSTEMS
PROVING GROUNDS
23100 SUGAR BUSH RD., ELK RIVER, MN 55330
PLANT ENGINEERING DEPARTMENT
DEMIL AREA AS BUILT
FIGURE 3.7
BY LUPINEK
DATE 5-27-92
(T&S 5)
CHECKED
SCALE NONE
92-421B
APPROVED
SHEET 1 OF 2
PROVING GROUND

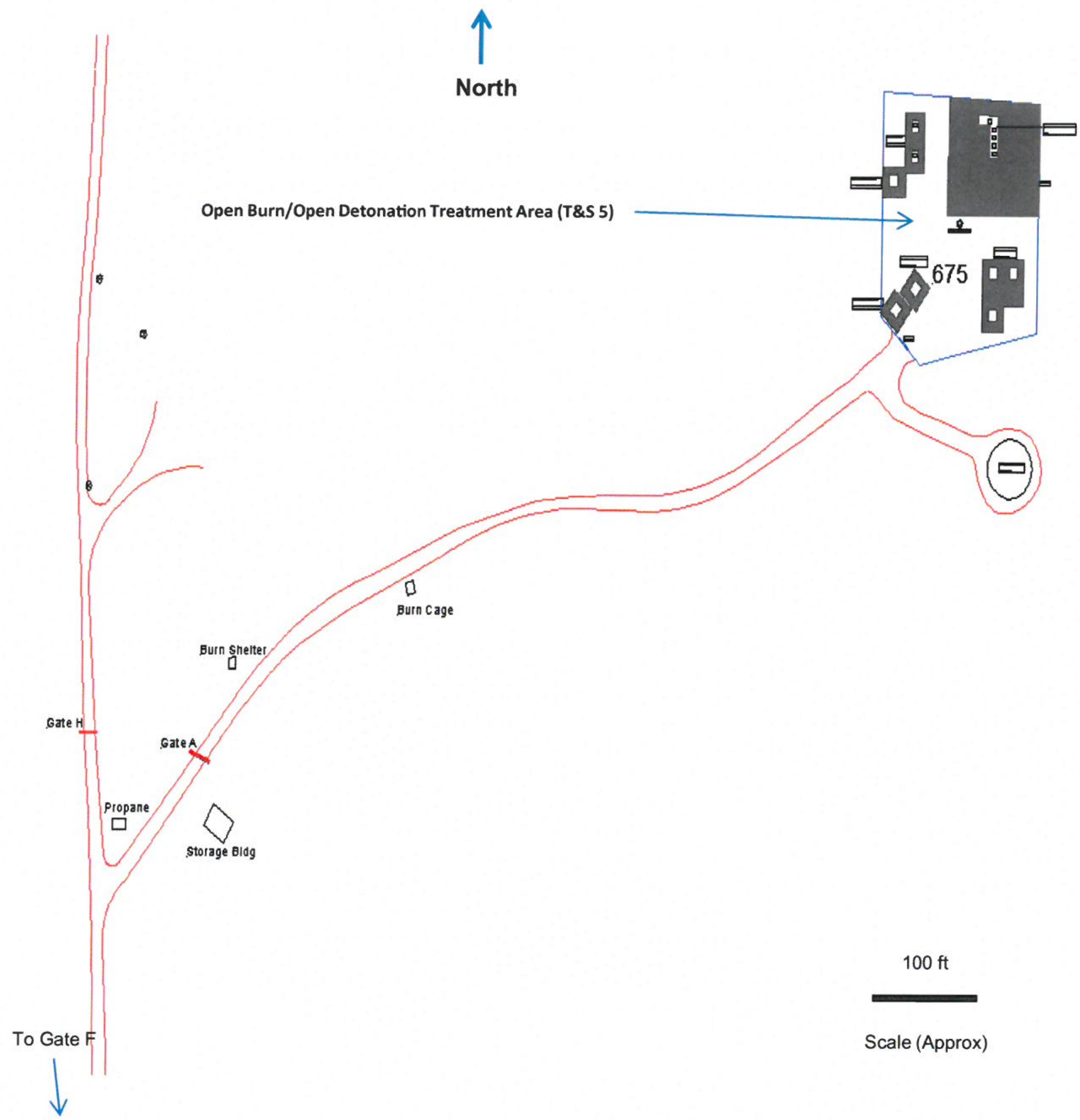
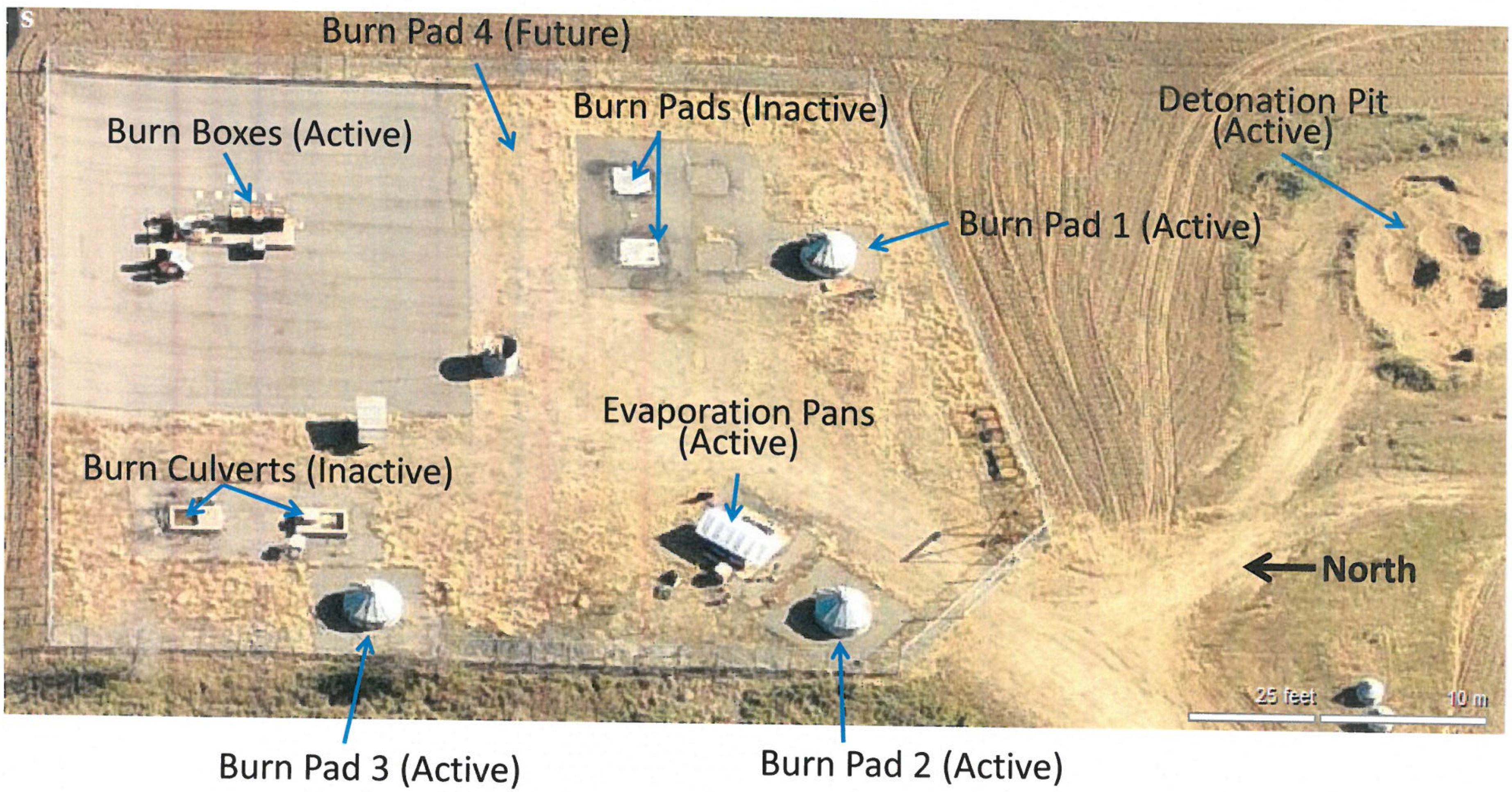


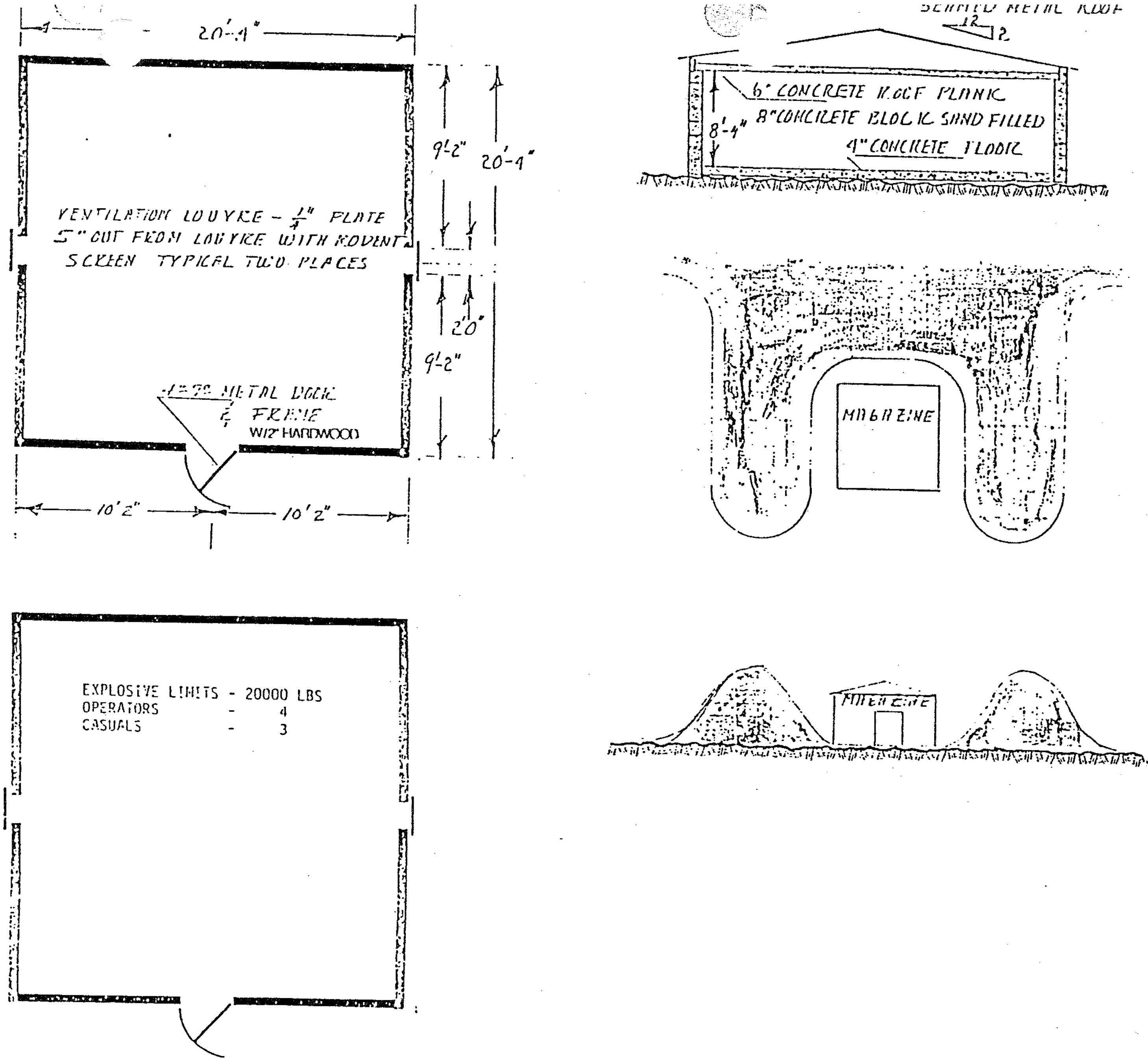
Figure 3.8 Open Burn/Open Detonation Treatment Area Subunits (T&S 5)
(Page 1 of 2)

Figure 3.8 (p2)

Open Burn/Open Detonation Treatment Area Subunits

T&S 5 – Site 675





Rebars
6X6-10X10 Floor Mesh

Shields
N/A

Barricades
Earth 1 ' High

Floor Finish
Finished Concrete

Electrical System
Class I Div I C&D-Explosion Proof
Underground Electrical Feed

Ventilation
Thermal-Exhause High, Intake Low

Sumps
N/A

Lighning Protection
Per UL96A Building Code
STATIC GROUND

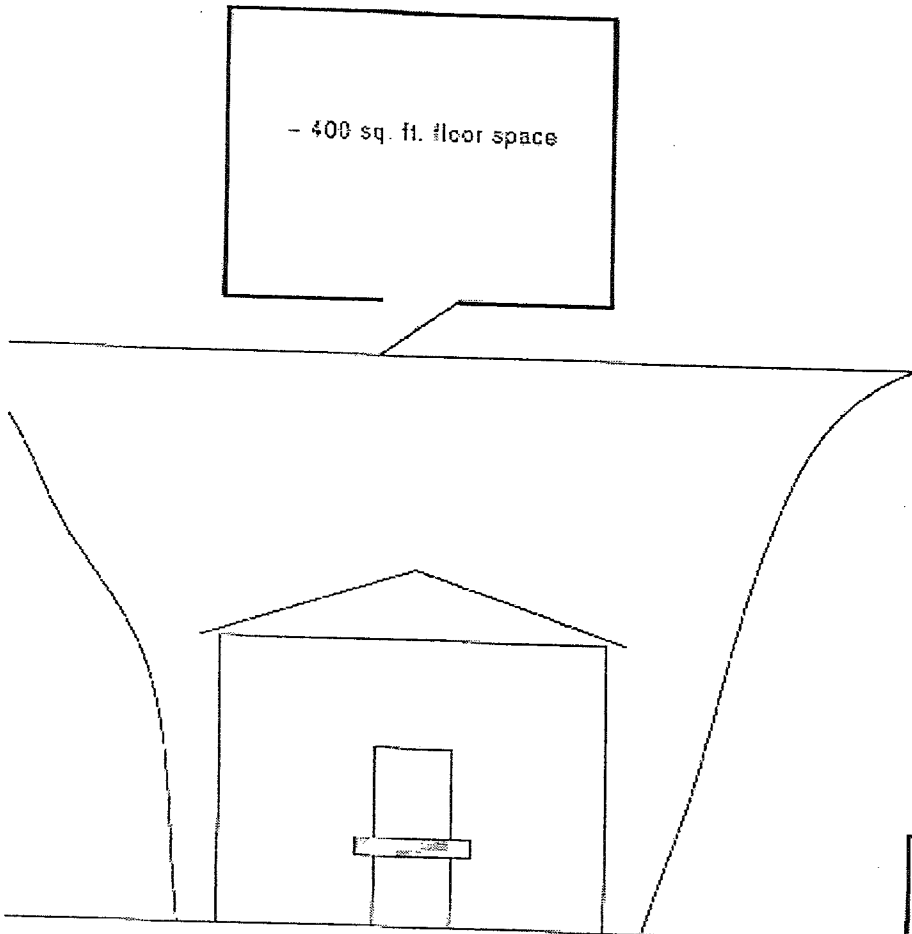
BUILDING LIMITS
EXPLOSIVES 20000 LBS
OPERATORS 4
CASUALS 3

ALLIANT TECHSYSTEMS
PROVING GROUNDS
PLANT ENGINEERING DEPARTMENT

MAGAZINE #6

SCALE 1/8"=8"
SHEET 1 of 1
DRAWING NUMBER SSP-#44

FIGURE 3.17 EXPLOSIVE WASTE STORAGE MAGAZINE 6 (T&S6) SITE 680 (PAGE 1 of 3)



CONSTRUCTION

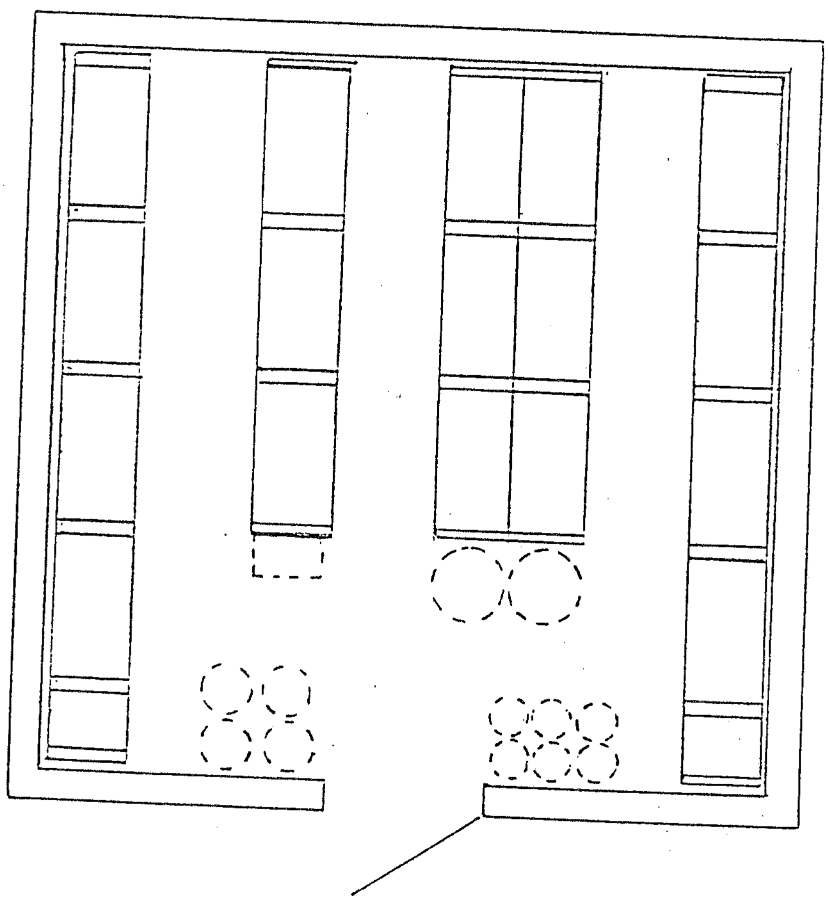
WALLS -- sand filled 8 " concrete block.
ROOF -- seamed metal over 6" concrete plank beneath wood rafters and shingles
FLOOR -- concrete 6x6 10ga. mesh
DOOR -- steel w/ 2" hard wood inner face.
LIGHTNING PROTECTION -- building code UL96A
GROUNDING SYSTEM -- independent earth grounding plate at the entrance.
BARRICADE -- 17' high earth berm on three sides
SECURITY -- door locked w/ key operated bolt & mortise system plus a hinged steel bar and security pad lock.

EXPLOSIVE LIMIT - 2000 lbs. 1.1
PERSONNEL LIMIT - 7

ALLIANT TECHSYSTEMS INC.

STORAGE SITE 680-6

FIGURE 3.17 EXPLOSIVE WASTE STORAGE MAGAZINE 6 (T&S6) SITE 680 (PAGE 2 of 3)



MAGAZINE #6

Example of a Typical Layout

FIGURE 3.17 EXPLOSIVE WASTE STORAGE MAGAZINE 6 (T&S6) SITE 680 (PAGE 3 of 3)

NOTE: DOT package size, shipment size, shipment date, and shipment contents may result in various layouts all of which will comply with the operating procedure for the magazines.

FIGURE 3.9 TYPICAL PROPELLANT BURN PAD (T&S 5)

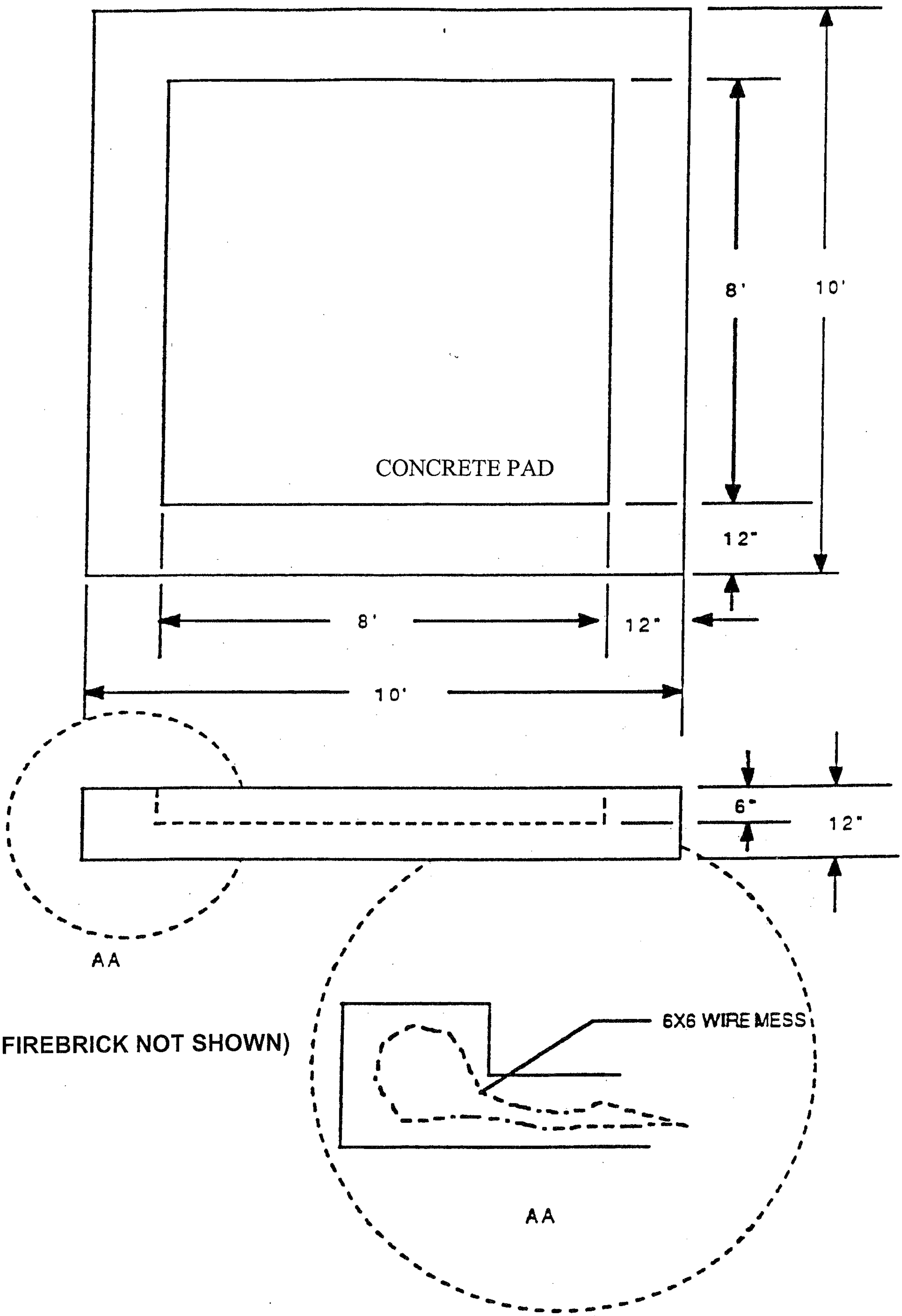
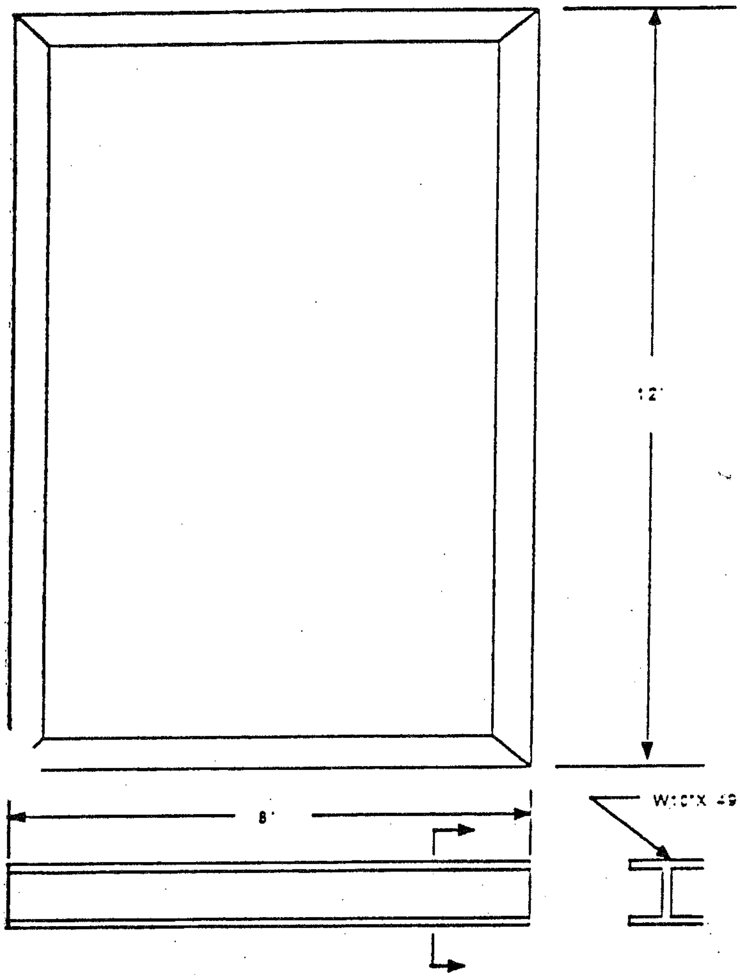
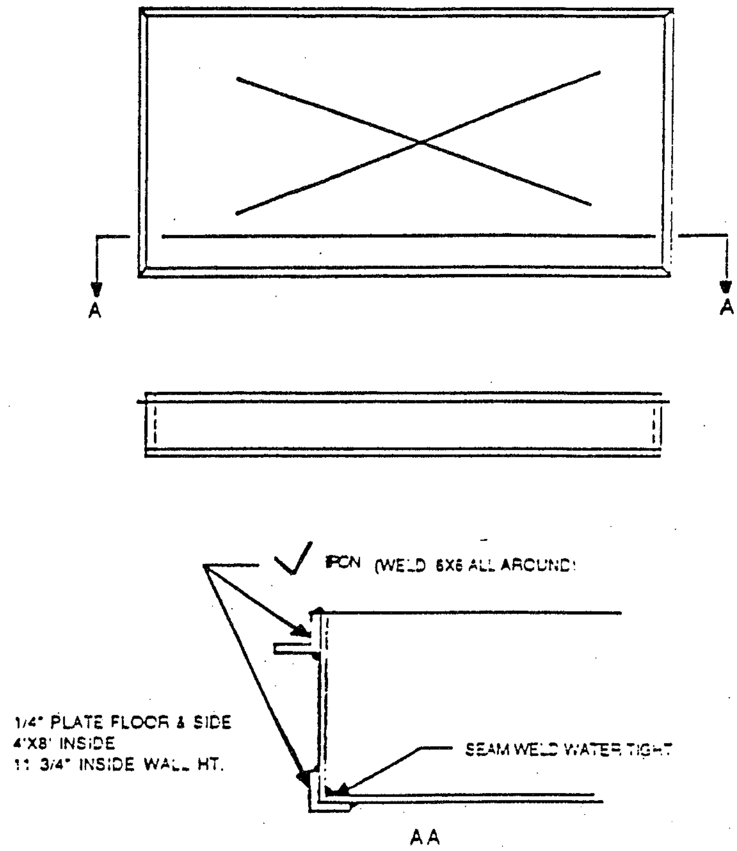


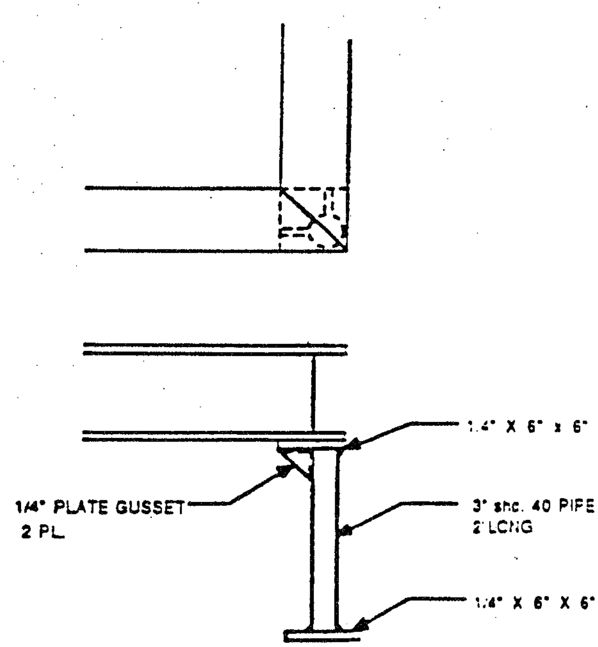
FIGURE 3.11 TYPICAL EVAPORATION PAN (T&S 5)



WATER EVAPORATION PAN
(3 PER FRAME)

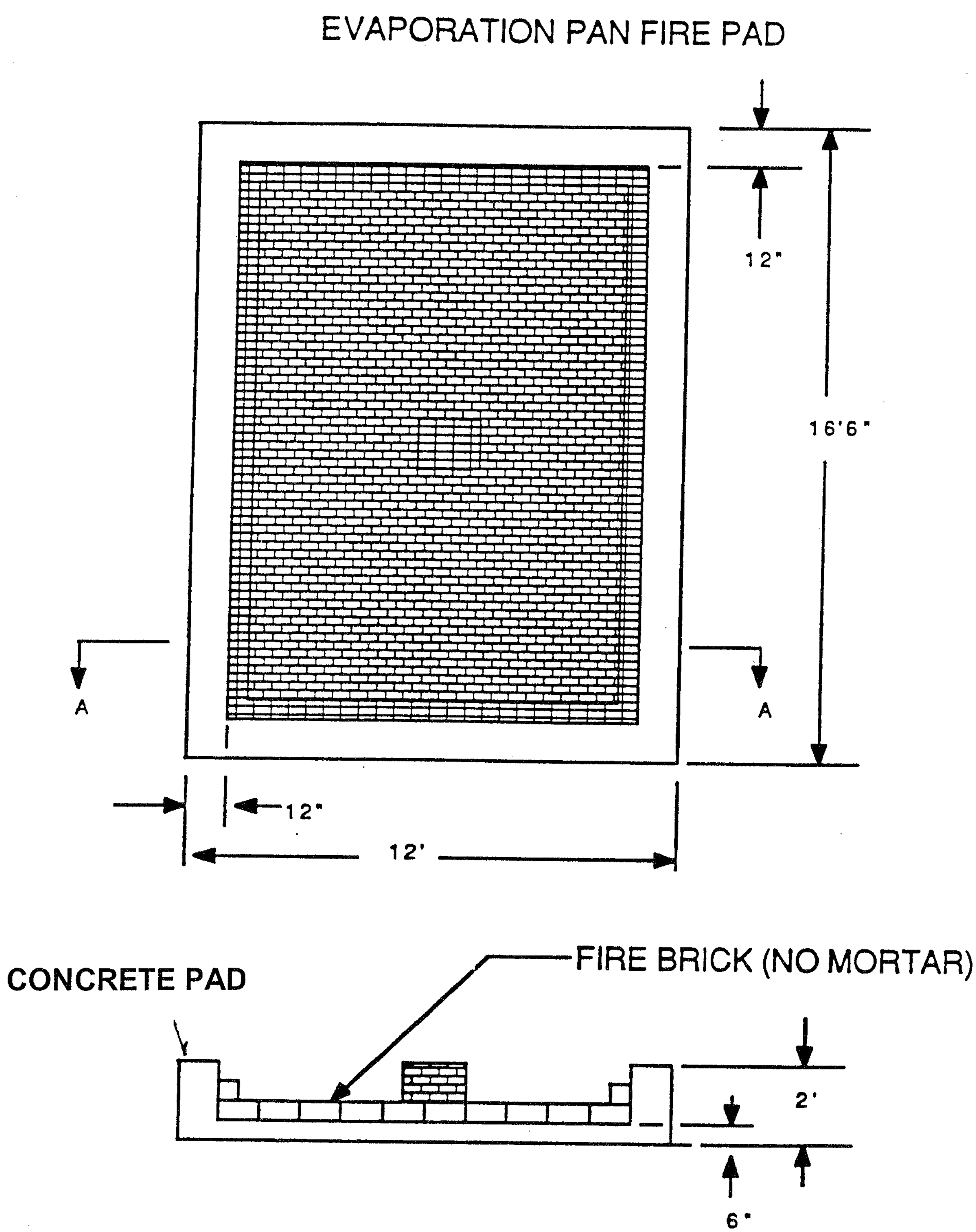


FRAME



FRAME SUPPORT
(6 PER FRAME)

FIGURE 3.12 TYPICAL EVAPORATION PAN CONCRETE PAD DESIGN (T&S 5)



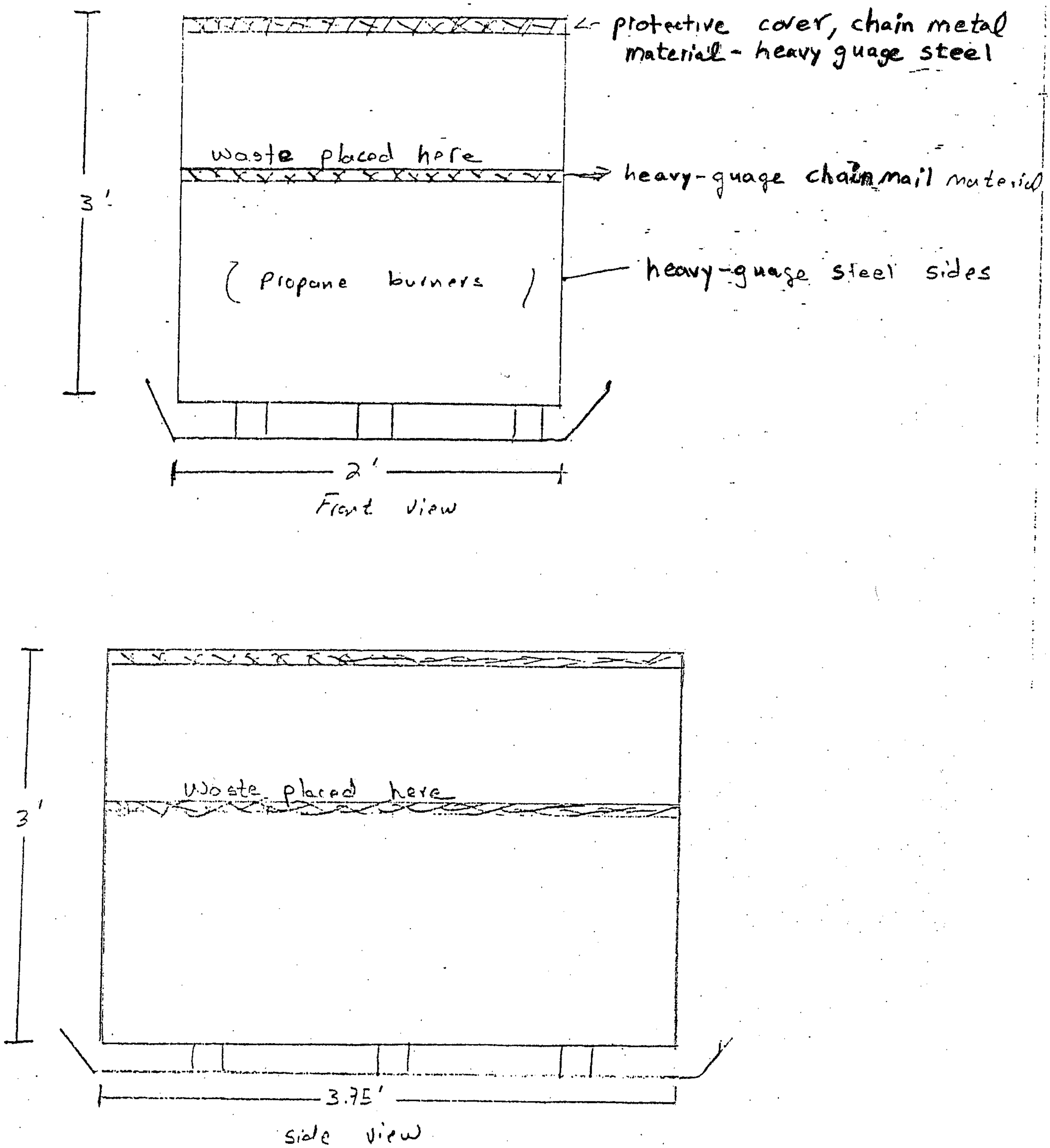
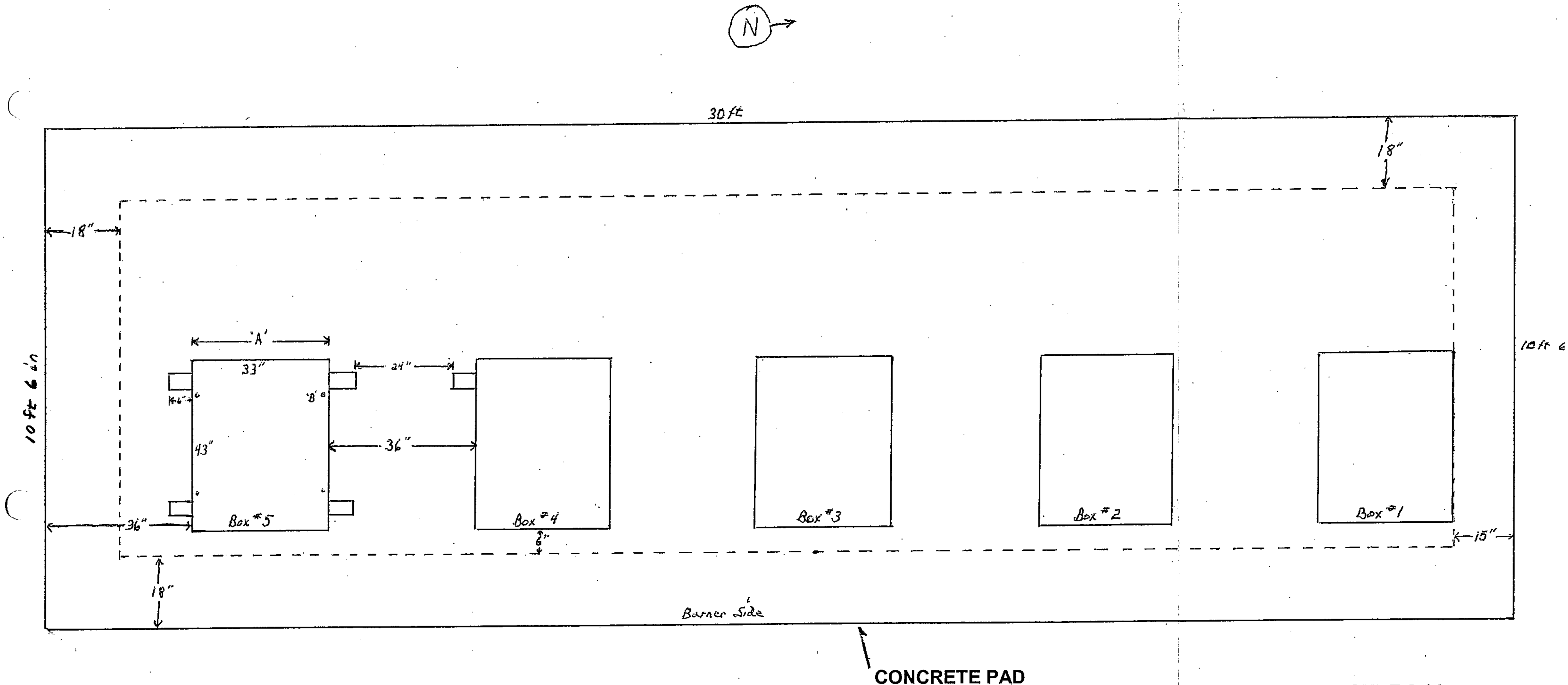


FIGURE 3.13 TYPICAL STEEL BURN BOX DESIGN (T&S 5)



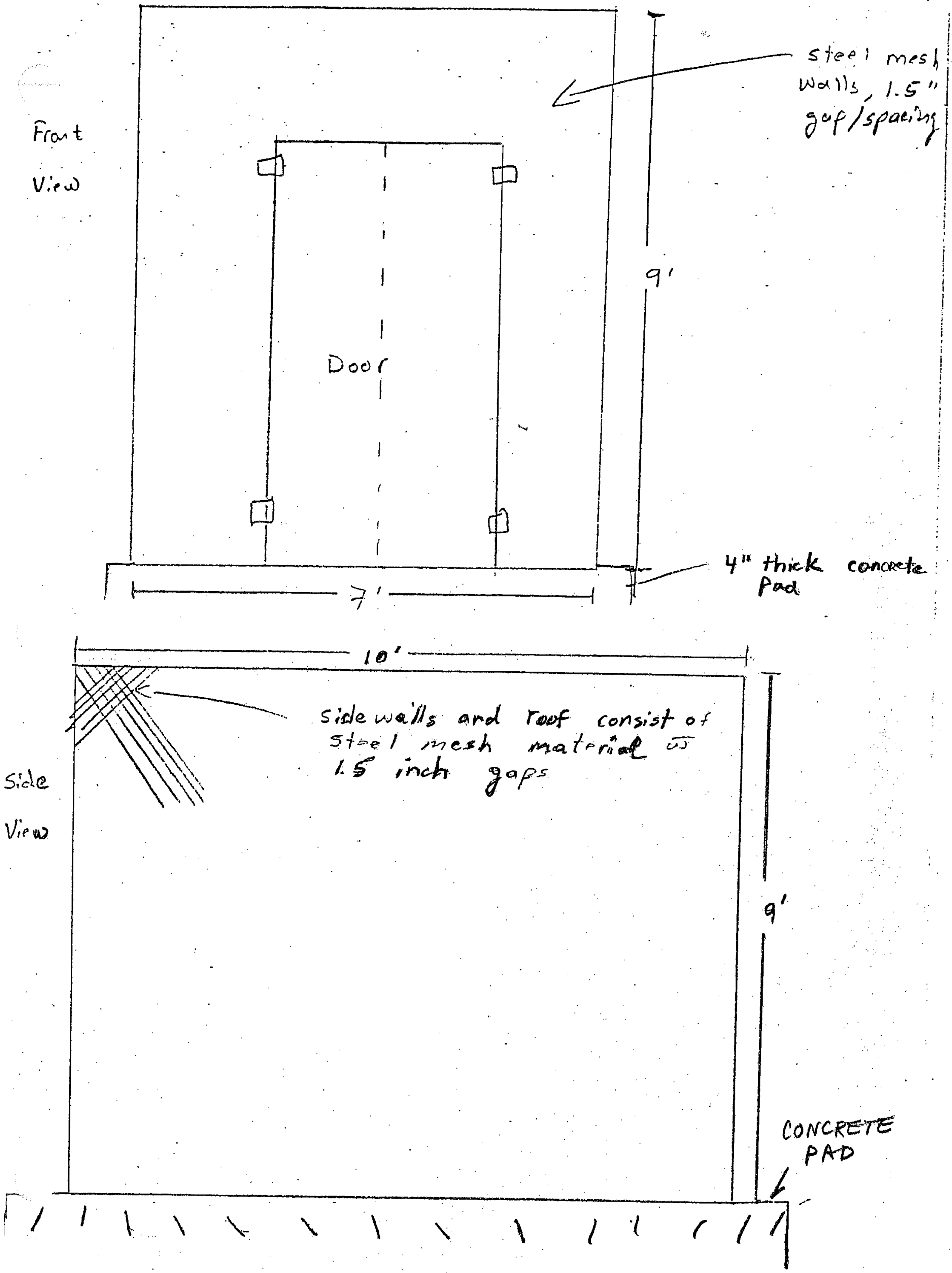
Scale: 1/8" = 3 inches
1" = 2 ft.
Measurements: Vary slightly so readings are approximations.

FIGURE 3.14

TYPICAL STEEL BURN BOX SUBUNIT LAYOUT (T&S 5)

'A' – Outside edge of I-Beam base
'B' – Set 3/4" to 1" Anchor Pins. Drill holes in I-Beams to fit over pins

FIGURE 3.15 TYPICAL BURN CAGE DESIGN (T&S 5)



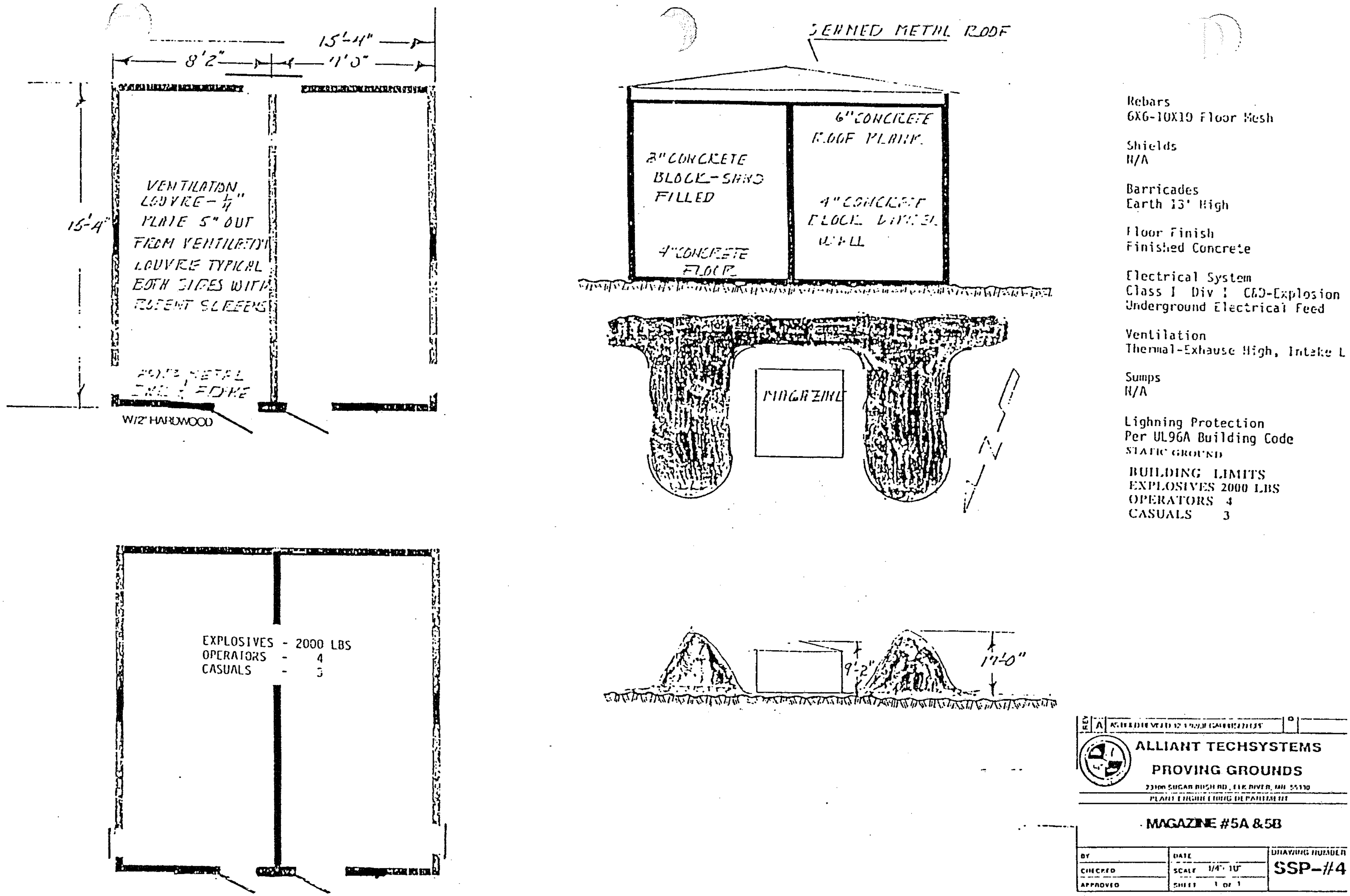
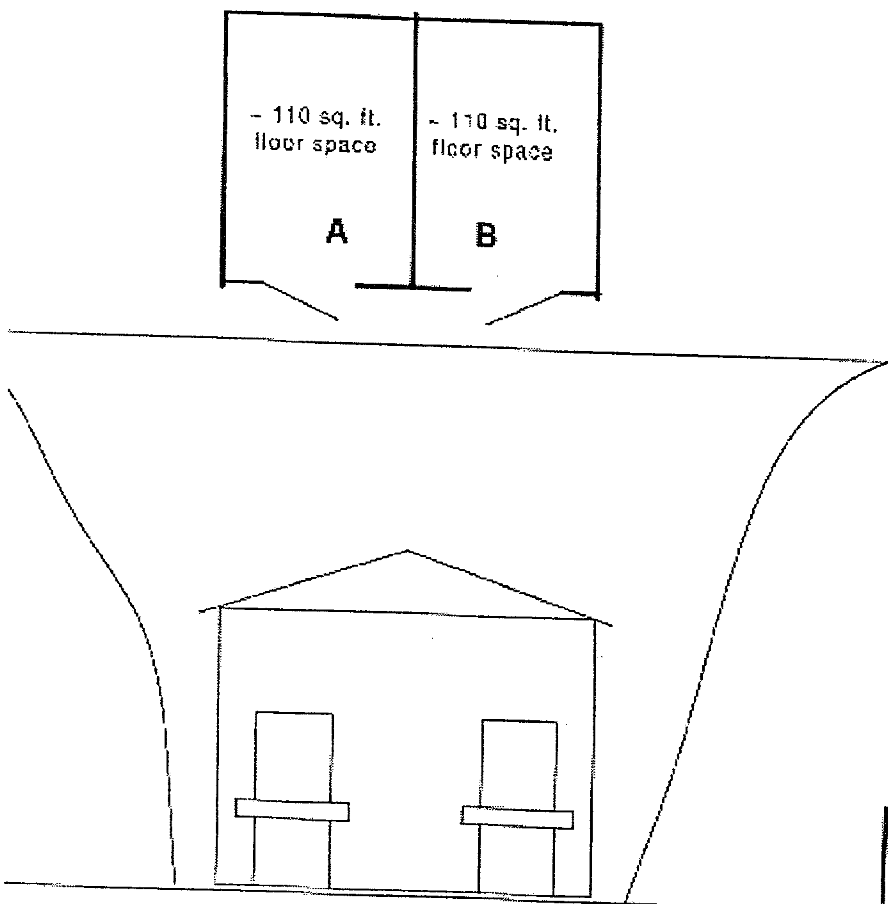


FIGURE 3.16 **EXPLOSIVE WASTE STORAGE MAGAZINES 5A & 5B (T&S6)** **SITE 680** **(PAGE 1 of 3)**



CONSTRUCTION

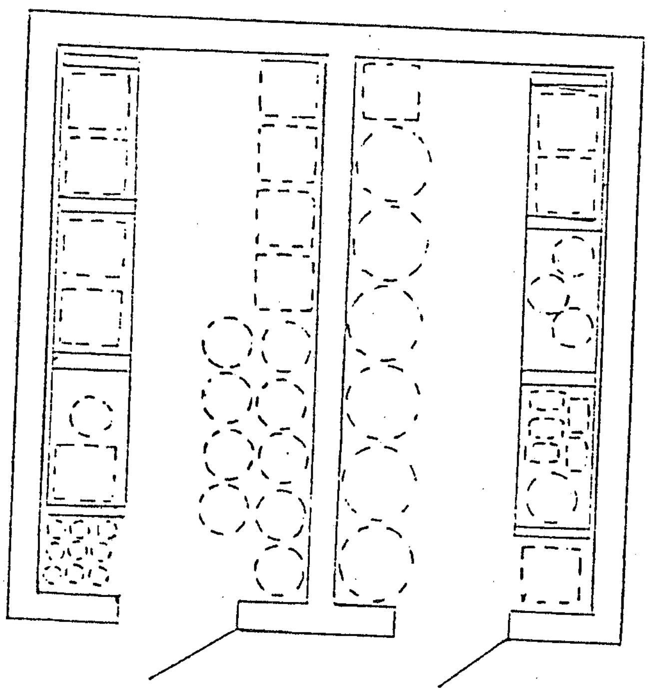
WALLS -- sand filled 8 " concrete block exterior and dividing wall.
ROOF -- seamed metal over 6" concrete plank beneath wood rafters and shingles.
FLOOR -- concrete 6x6 10ga. mesh
DOORS -- steel w/ 2" hard wood inner face.
LIGHTNING PROTECTION -- building code UL96A
GROUNDING SYSTEM -- independent earth grounding plate at the entrance.
BARRICADE -- 17' high earth berm on three sides
SECURITY -- doors locked w/ key operated bolt & mortise system plus a hinged steel bar and security pad lock.

EXPLOSIVE LIMIT - 2000 lbs.
SIDE A -- HAZARD CLASS 1.1
SIDE B -- HAZARD CLASS 1.1
PERSONNEL LIMIT - 7

ALLIANT TECHSYSTEMS INC.

STORAGE SITE 680-5

FIGURE 3.16 EXPLOSIVE WASTE STORAGE MAGAZINES 5A & 5B (T&S6) SITE 680 (PAGE 2 of 3)

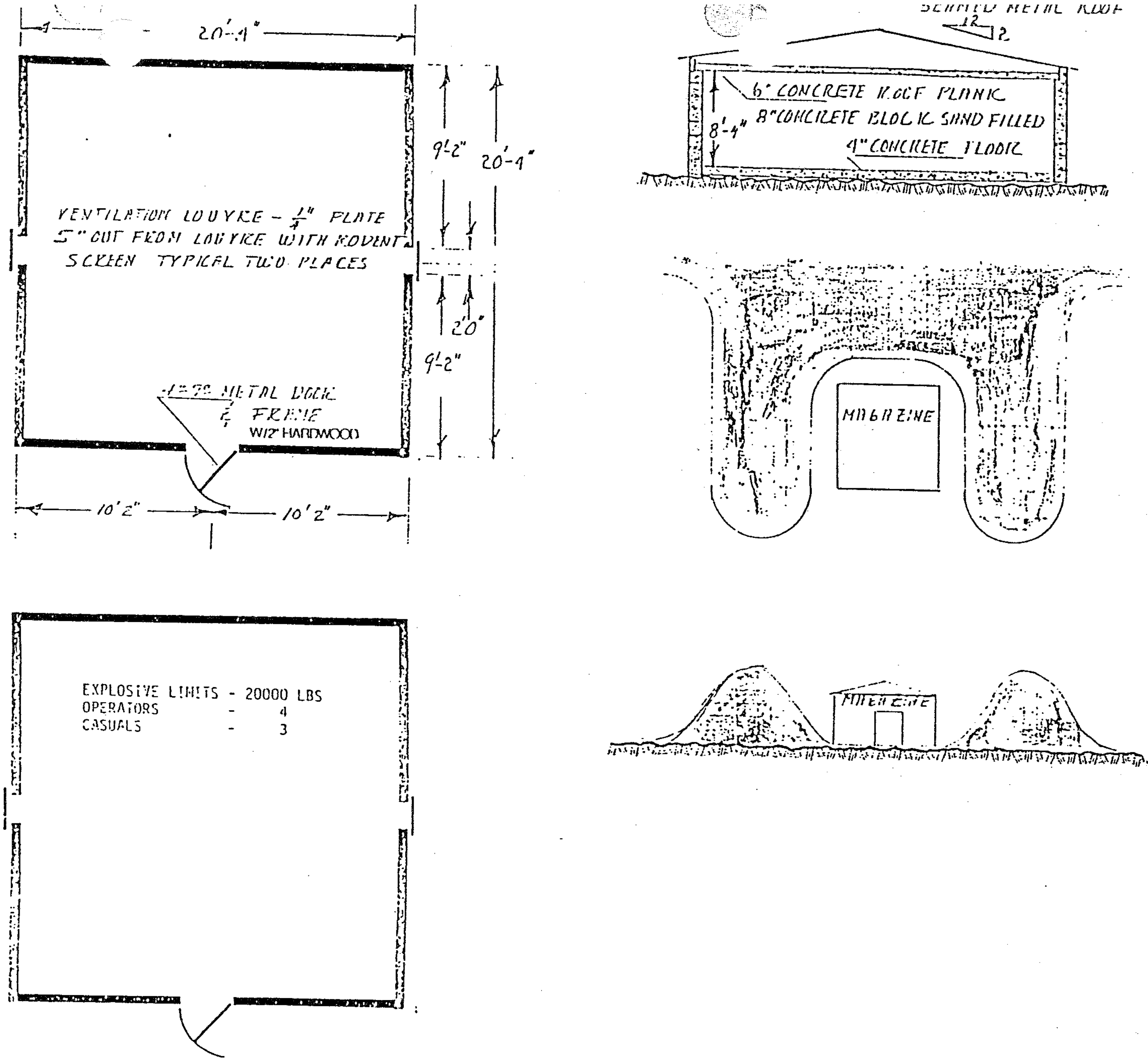


MAGAZINE 5A (LEFT SIDE) & 5B (RIGHT SIDE)

Example of a Typical Layout

NOTE: DOT package size, shipment size, shipment date, and shipment contents may result in various layouts all of which will comply with the operating procedure for the magazines.

FIGURE 3.16



Rebars
6X6-10X10 Floor Mesh

Shields
N/A

Barricades
Earth 1 ' High

Floor Finish
Finished Concrete

Electrical System
Class I Div I C&D-Explosion Proof
Underground Electrical Feed

Ventilation
Thermal-Exhause High, Intake Low

Sumps
N/A

Lighning Protection
Per UL96A Building Code
STATIC GROUND

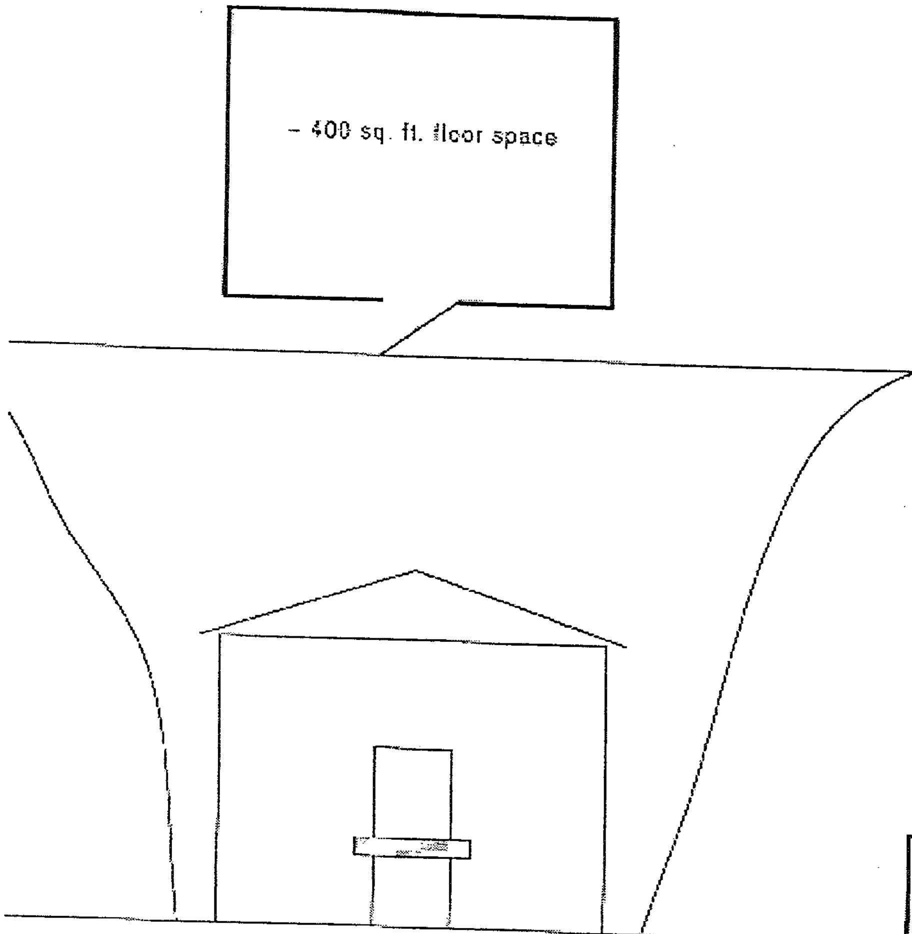
BUILDING LIMITS
EXPLOSIVES 20000 LBS
OPERATORS 4
CASUALS 3

ALLIANT TECHSYSTEMS
PROVING GROUNDS
PLANT ENGINEERING DEPARTMENT

MAGAZINE #6

BY	DATE	DRAWING NUMBER
CHECKED	SCALE 1/8"=1'	SSP-#44
APPROVED	SHEET 1 of 1	

FIGURE 3.17 EXPLOSIVE WASTE STORAGE MAGAZINE 6 (T&S6) SITE 680 (PAGE 1 of 3)



CONSTRUCTION

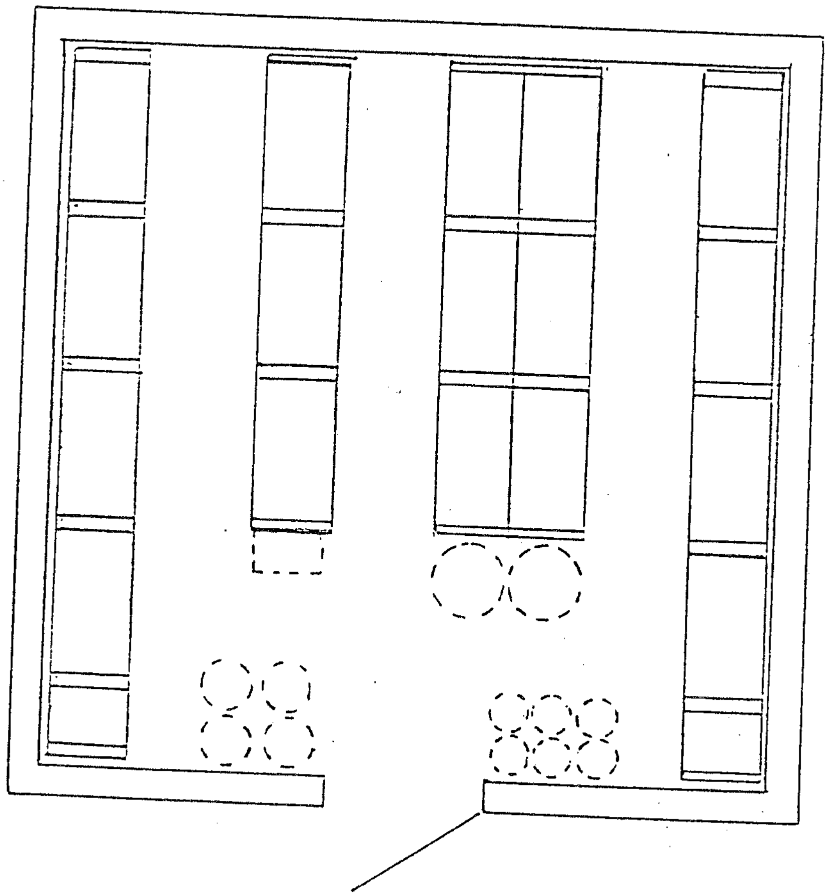
WALLS -- sand filled 8 " concrete block.
ROOF -- seamed metal over 6" concrete plank beneath wood rafters and shingles
FLOOR -- concrete 6x6 10ga. mesh
DOOR -- steel w/ 2" hard wood inner face.
LIGHTNING PROTECTION -- building code UL96A
GROUNDING SYSTEM -- independent earth grounding plate at the entrance.
BARRICADE -- 17' high earth berm on three sides
SECURITY -- door locked w/ key operated bolt & mortise system plus a hinged steel bar and security pad lock.

EXPLOSIVE LIMIT - 2000 lbs. 1.1
PERSONNEL LIMIT - 7

ALLIANT TECHSYSTEMS INC.

STORAGE SITE 680-6

FIGURE 3.17 EXPLOSIVE WASTE STORAGE MAGAZINE 6 (T&S6) SITE 680 (PAGE 2 of 3)

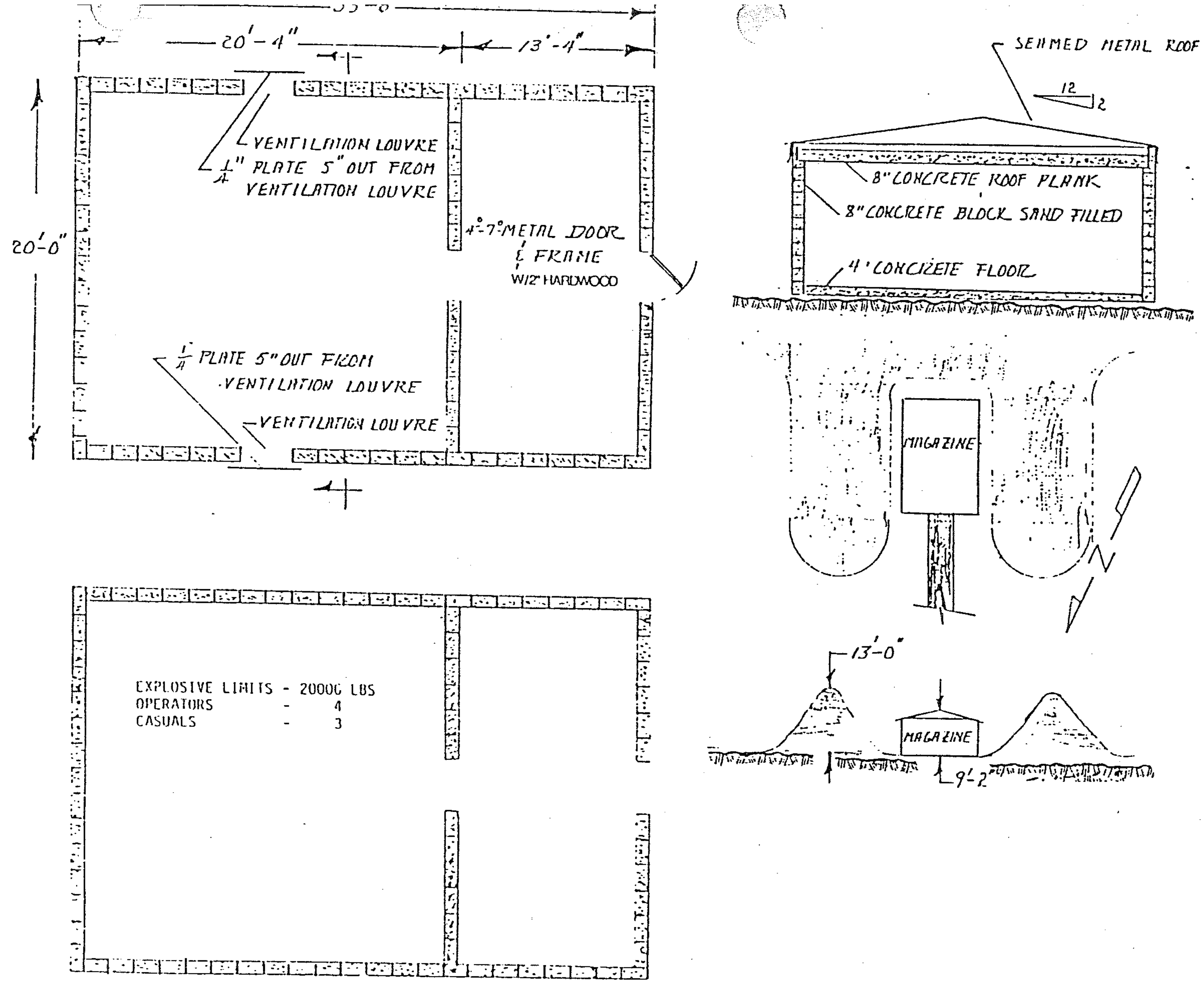


MAGAZINE #6

Example of a Typical Layout

FIGURE 3.17 EXPLOSIVE WASTE STORAGE MAGAZINE 6 (T&S6) SITE 680 (PAGE 3 of 3)

NOTE: DOT package size, shipment size, shipment date, and shipment contents may result in various layouts all of which will comply with the operating procedure for the magazines.



Rebars
6X6-10X10 Floor Mesh

Shields
N/A

Barricades
Earth 13' High

Floor Finish
Finished Concrete

Electrical System
Class I Div I C&D-Explosion Proof
Underground Electrical Feed

Ventilation
Thermal-Exhause High, Intake Low

Sumps
N/A

Lighning Protection
Per UL96A Building Code
STATIC GROUND

BUILDING LIMITS
EXPLOSIVES 20000 LBS
OPERATORS 4
CASUALS 3

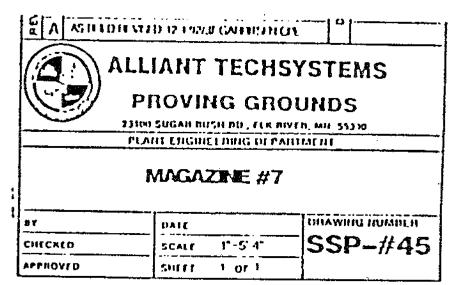
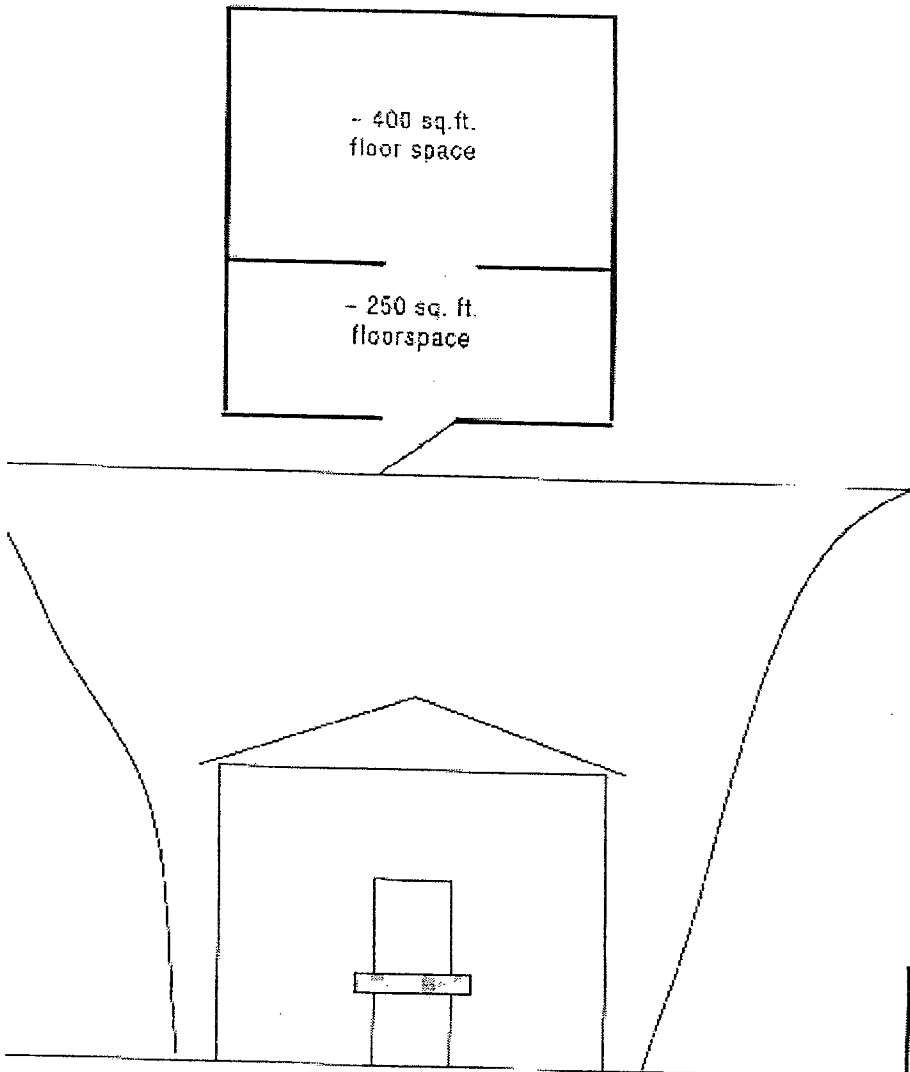


FIGURE 3.18 EXPLOSIVE WASTE STORAGE MAGAZINE 7 (T&S6) SITE 680 (PAGE 1 of 3)



CONSTRUCTION

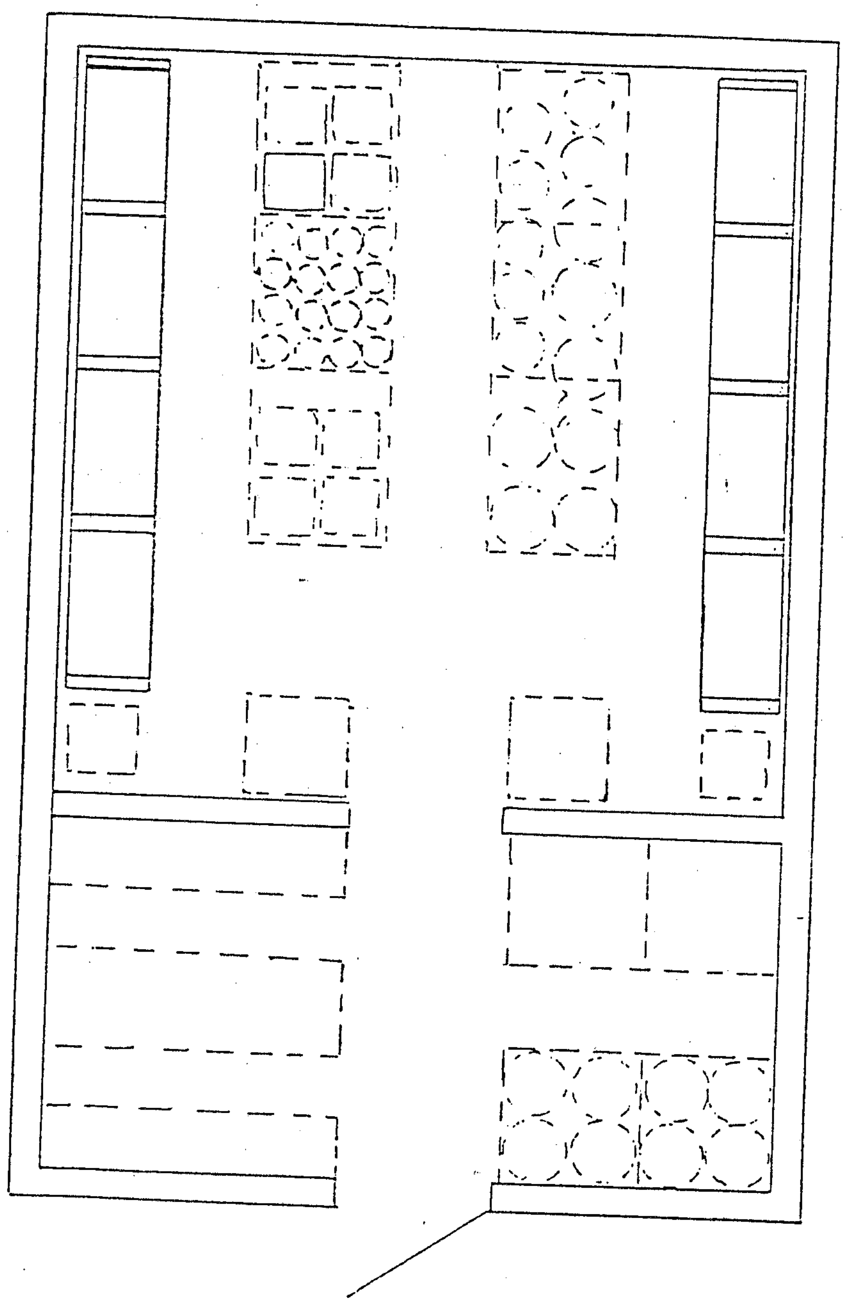
WALLS -- sand filled 8 ' concrete block.
ROOF -- seamed metal over 6' concrete plank beneath wood rafters and shingles.
FLOOR -- concrete 6x6 10ga. mesh
DOOR -- steel w/ 2' hard wood inner face.
LIGHTNING PROTECTION -- building code UL96A
GROUNDING SYSTEM -- independent earth grounding plate at the entrance.
BARRICADE -- 17' high earth berm on three sides
SECURITY -- door locked w/ key operated bolt & mortise system plus a hinged steel bar and security pad lock.

EXPLOSIVE LIMIT - 20,000 lbs. 1.1 C
PERSONNEL LIMIT - 7

ALLIANT TECHSYSTEMS INC.

STORAGE SITE 680-7

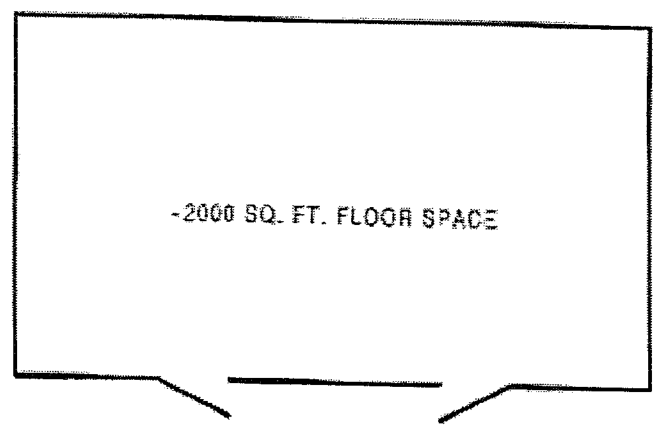
FIGURE 3.18 EXPLOSIVE WASTE STORAGE MAGAZINE 7 (T&S6) SITE 680 (PAGE 2 of 3)



MAGAZINE #7

FIGURE 3.18 EXPLOSIVE WASTE STORAGE MAGAZINE 7 (T&S6) SITE 680 (PAGE 3 of 3)

E: DOT package size, shipment size, shipment date, and shipment contents may result in various layouts all of which will comply with the operating procedure for the magazines.



GENERAL CONSTRUCTION

WALLS -- 8' sand filled concrete block,
ROOF -- seamed metal over 12" concrete planks
DOORS -- steel w/ 2" oak inner lining
FLOOR -- concrete 6x6 -10ga. mesh
ELECTRIC SERVICE -- underground feed
ELECTRICAL WIRING -- NEC for "explosion proof and dust proof" for hazardous locations".
LIGHTNING PROTECTION -- building code UL96A.
GROUNDING SYSTEM -- independent earth ground at the doors
BARRICADE -- 13 ft. high earth berm on three sides.
SECURITY -- doors secured with key operated mortise and bolt plus a steel bar, covered hasp and key operated pad lock.

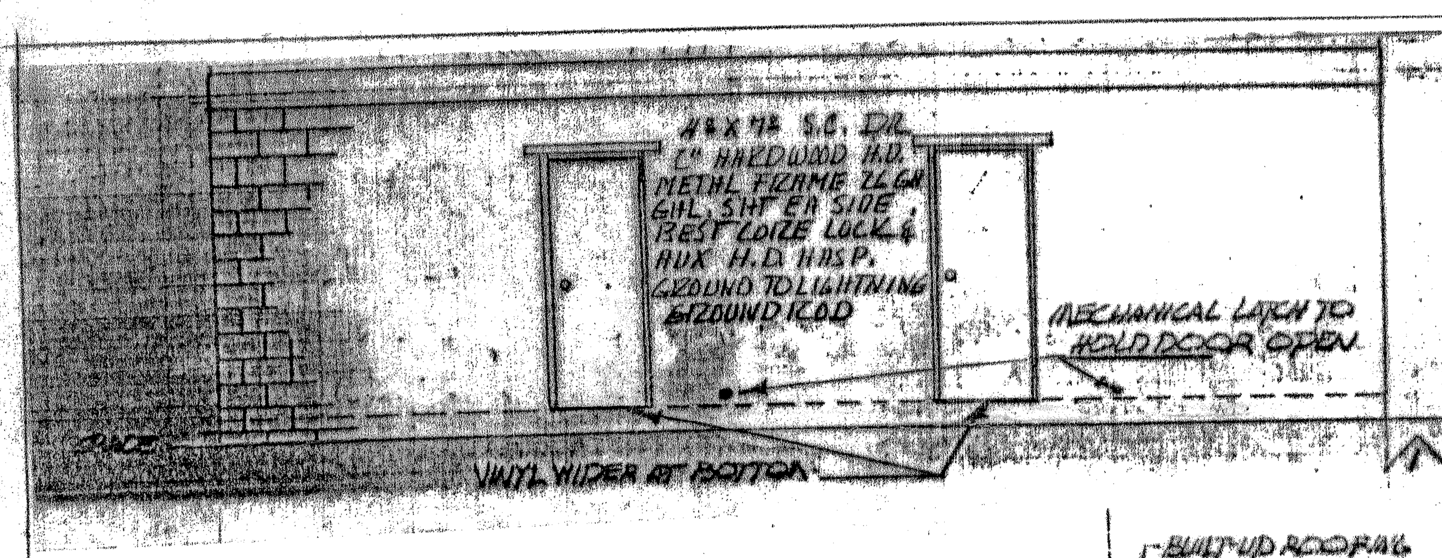
EXPLOSIVE LIMIT 200,000 lbs. 1.3
or
undefined limit of (08) 1.2

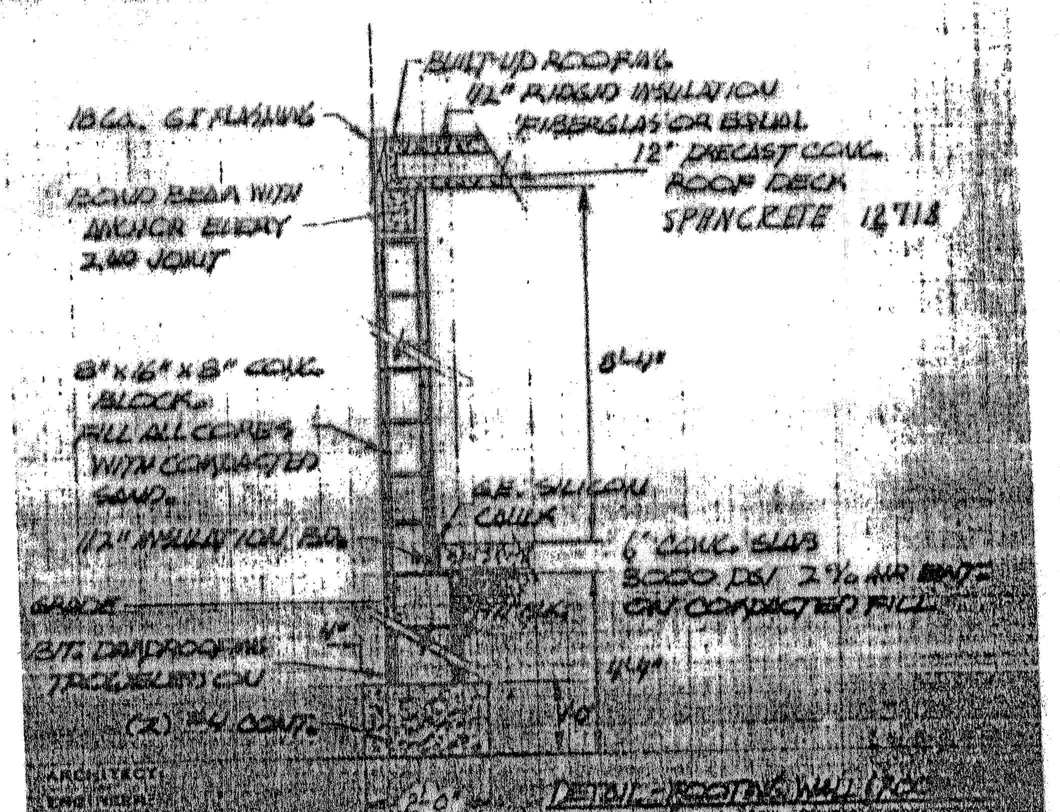
PERSONNEL LIMIT 7

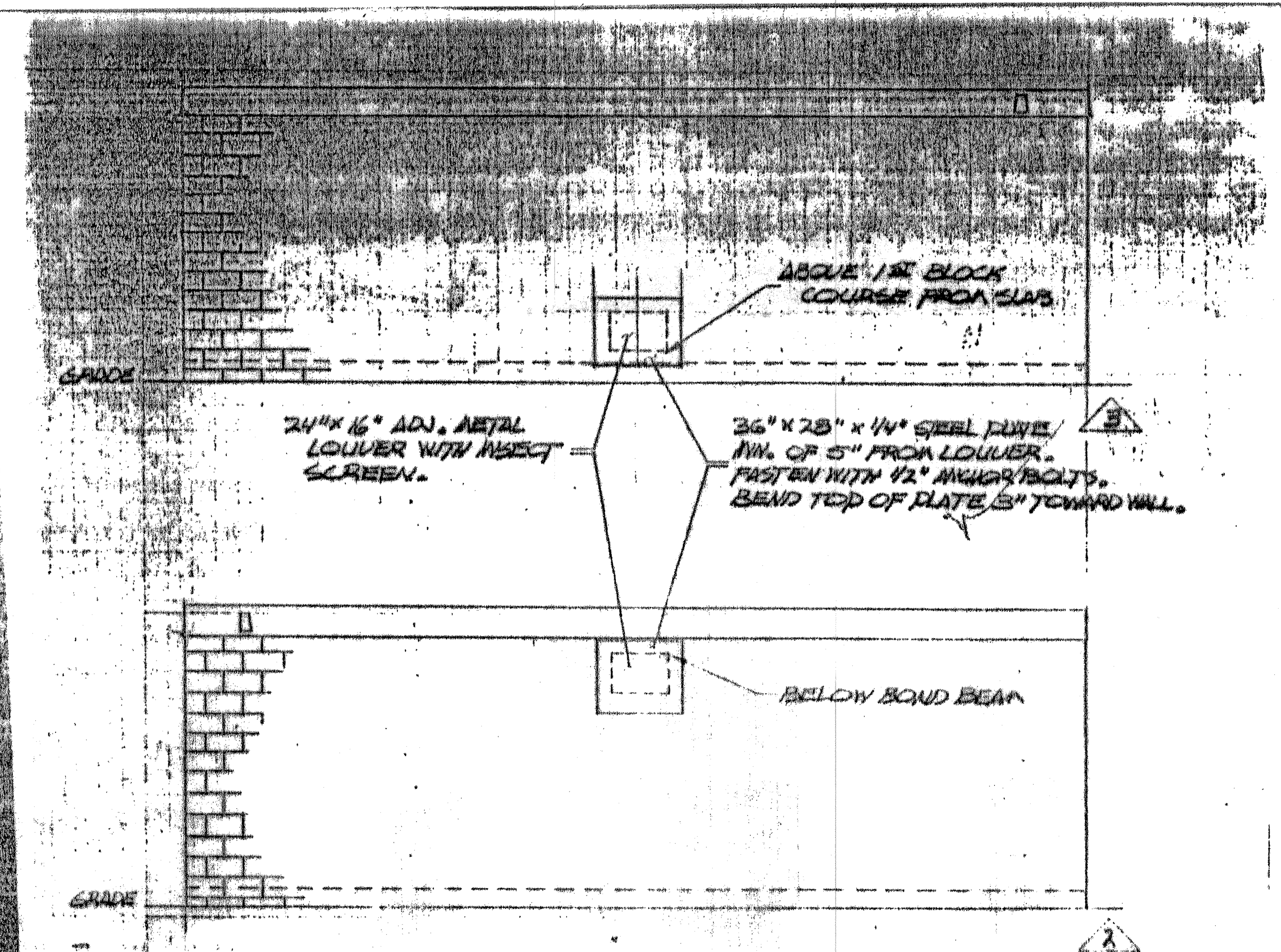
ALLIANT TECHSYSTEMS INC.

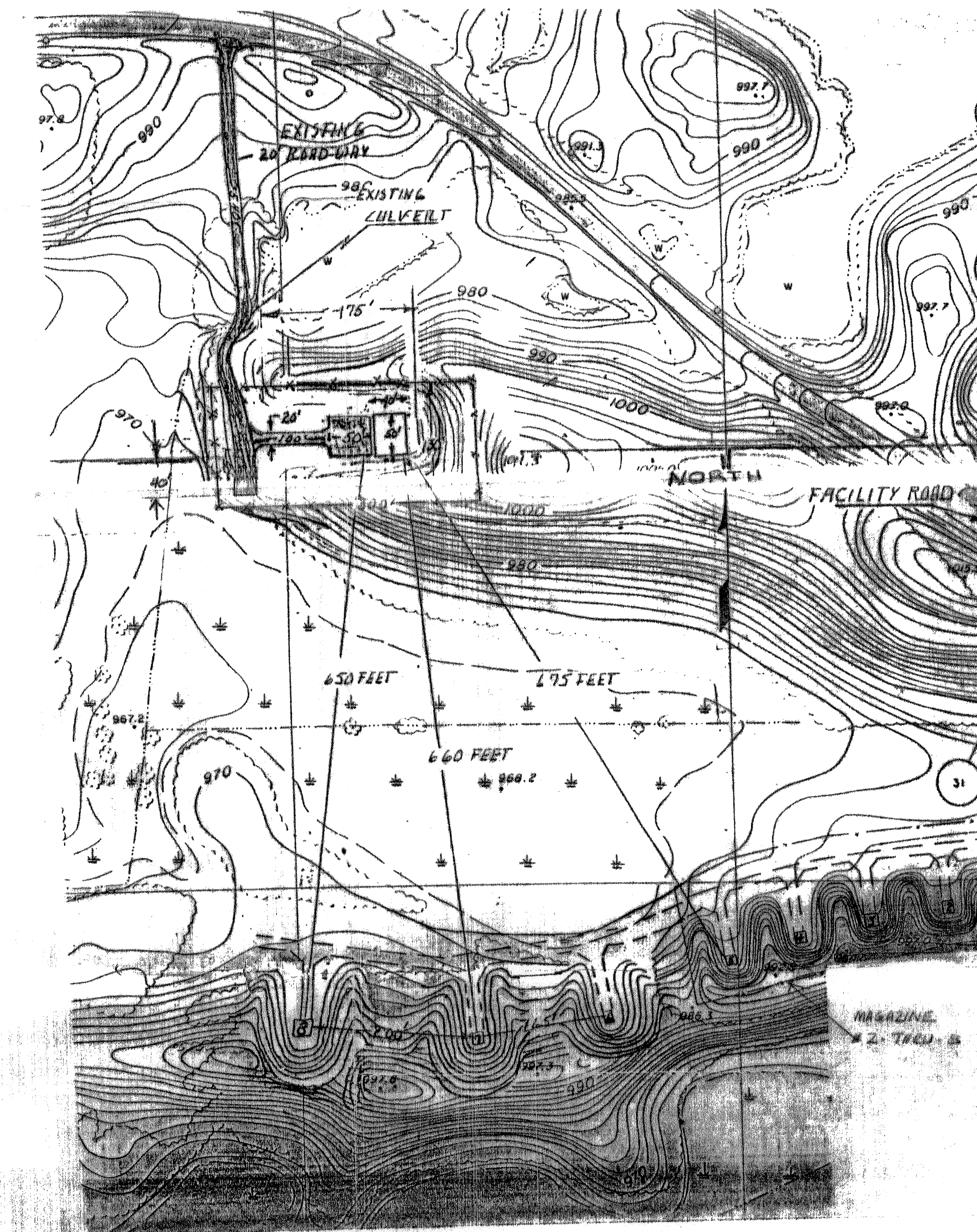
STORAGE SITE 683

FIGURE 3.19 EXPLOSIVE WASTE STORAGE MAGAZINE 14 (T&S6) SITE 683 (PAGE 1 of 2)

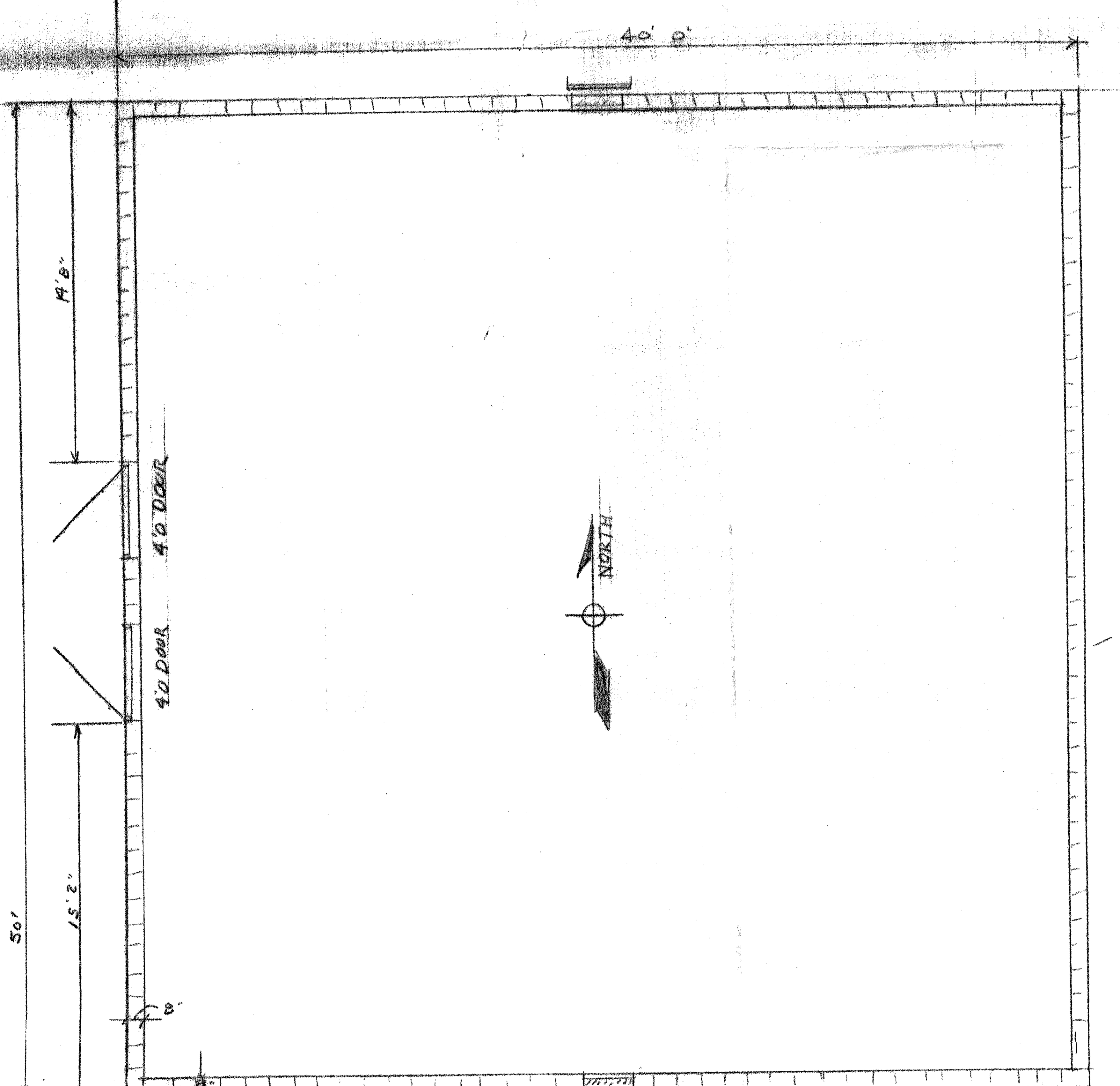








SITE PLAN FOR MAGAZINE #14 / NO SCALE



MAGAZINE #14 FLOOR PLAN SCALE 1/4"=1'0"

FIGURE 3.19

EXPLOSIVE WASTE STORAGE MAGAZINE 14 (T&S6)

(PAGE 2 of 2)

REVISION	SITE 683	DATE
C		
B		
A		

ALLIANT TECHSYSTEMS PROVING GROUNDS
23100 SUGAR BUSH RD., ELK RIVER, MN 55330
PLANT ENGINEERING DEPARTMENT

BLDG 683 - MAGAZINE #14
SITE PLAN & BUILDING FLOOR PLAN
COPY FROM ORIGINAL PLANS

BY ERW	DATE 6-6-2000	DRAWING NUMBER 00-535 D
CHECKED	SCALE AS NOTED	
APPROVED	SHEET 1 OF 1	

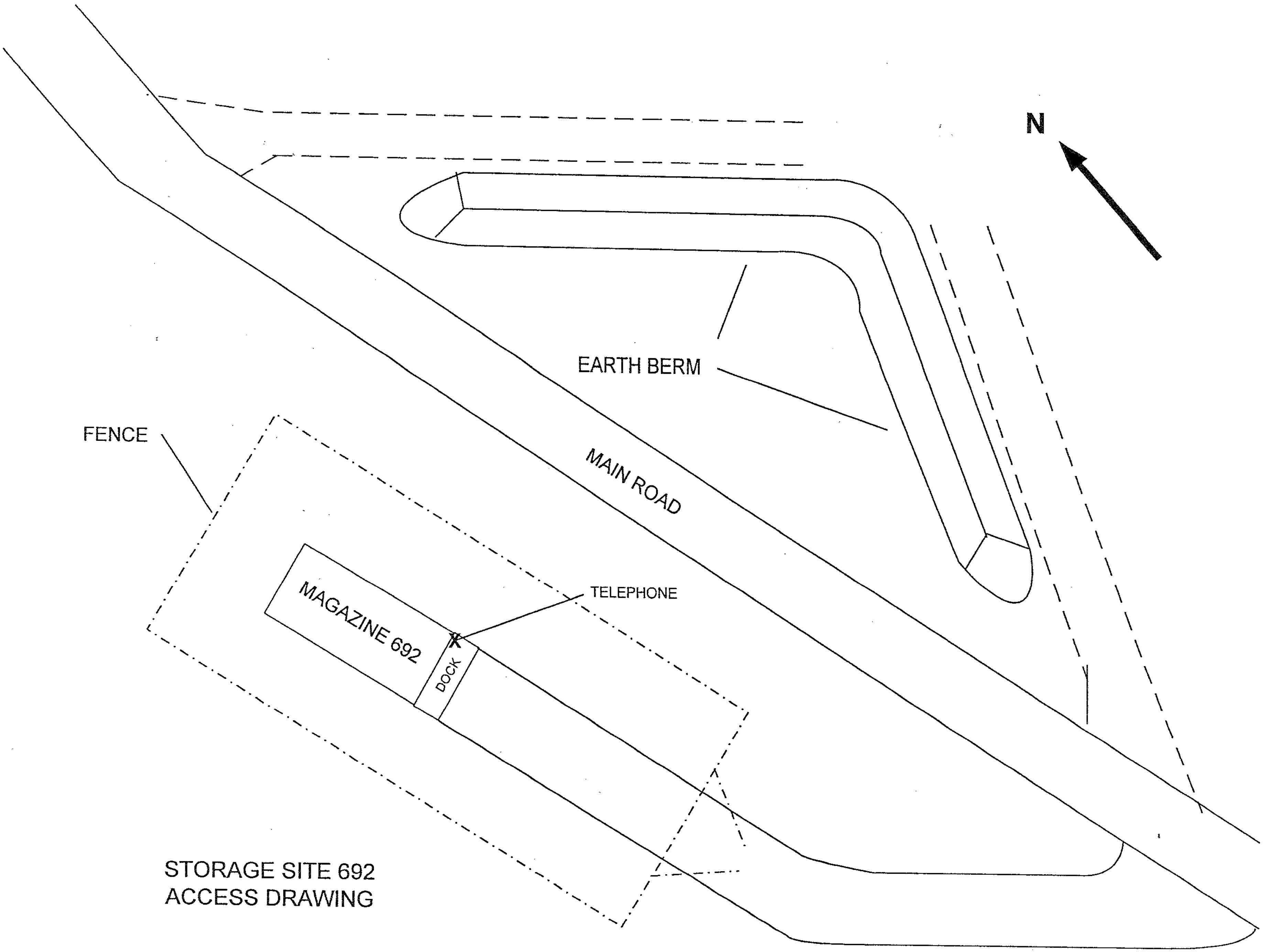
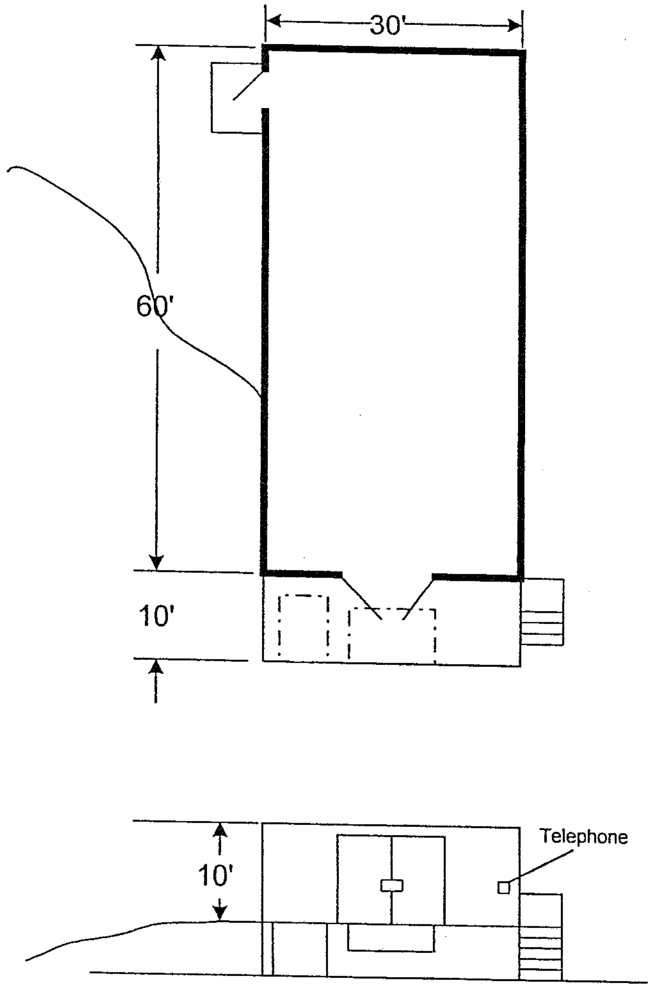


FIGURE 3.20 EXPLOSIVE WASTE STORAGE MAGAZINE 18 (T&S6) SITE 692 (PAGE 1 of 2)



CONSTRUCTION

WALLS--concrete filled 12 " block w/ #4 steel re-bar and heavy duty course reinforcement.

CEILING--pre cast " solid core planks

ROOF--Three layers of Bitument & felt topped w/gravel over a 3" layer of poured concrete w/ #4 steel reinforcement.

DOORS--One 3-0x7 ' escape door plus two 4-0x9 ' main enterance doors

GROUNDING--Grounding plate located adjacent to the entrance doors plus a #2 ground wire around the inside wall of the building. All three element are bonded to the building ground.

LIGHTNING PROTECTION--A primary and secondary ground loop bonded to roof mounted lightning rods

ELECTRIC SERVICE--underground feed 120/240 VAC 1PH 3W

LIGHTING--Ten internal ceiling mounted explosion proof 60W lights plus one internal mounted explosion proof 12W emergency light. Four external mounted 350W flood lights

SECURITY

FENCE--Six foot high security chain link topped w/ 3 strands of barbed wire surrounds the building at a minimum distance of 20' stand-off.

GATES--One 6 ' two section gate topped w/ 3 strands of barbed wire located at each end of the site.

DOOR SECURITY--Mil-H-439005B hasp and Mil-P-43607G lock on main enterance doors. The emergency exit door opens from the inside only. Fixed pin hinges on all doors.

IDS--Intrinsically safe vibration and motion detection scanner plus door movement detectors

ALLIANT TECHSYSTEM INC.

STORAGE SITE 692

FIGURE 3.20 EXPLOSIVE WASTE STORAGE MAGAZINE 18 (T&S6) SITE 692 (PAGE 2 of 2)

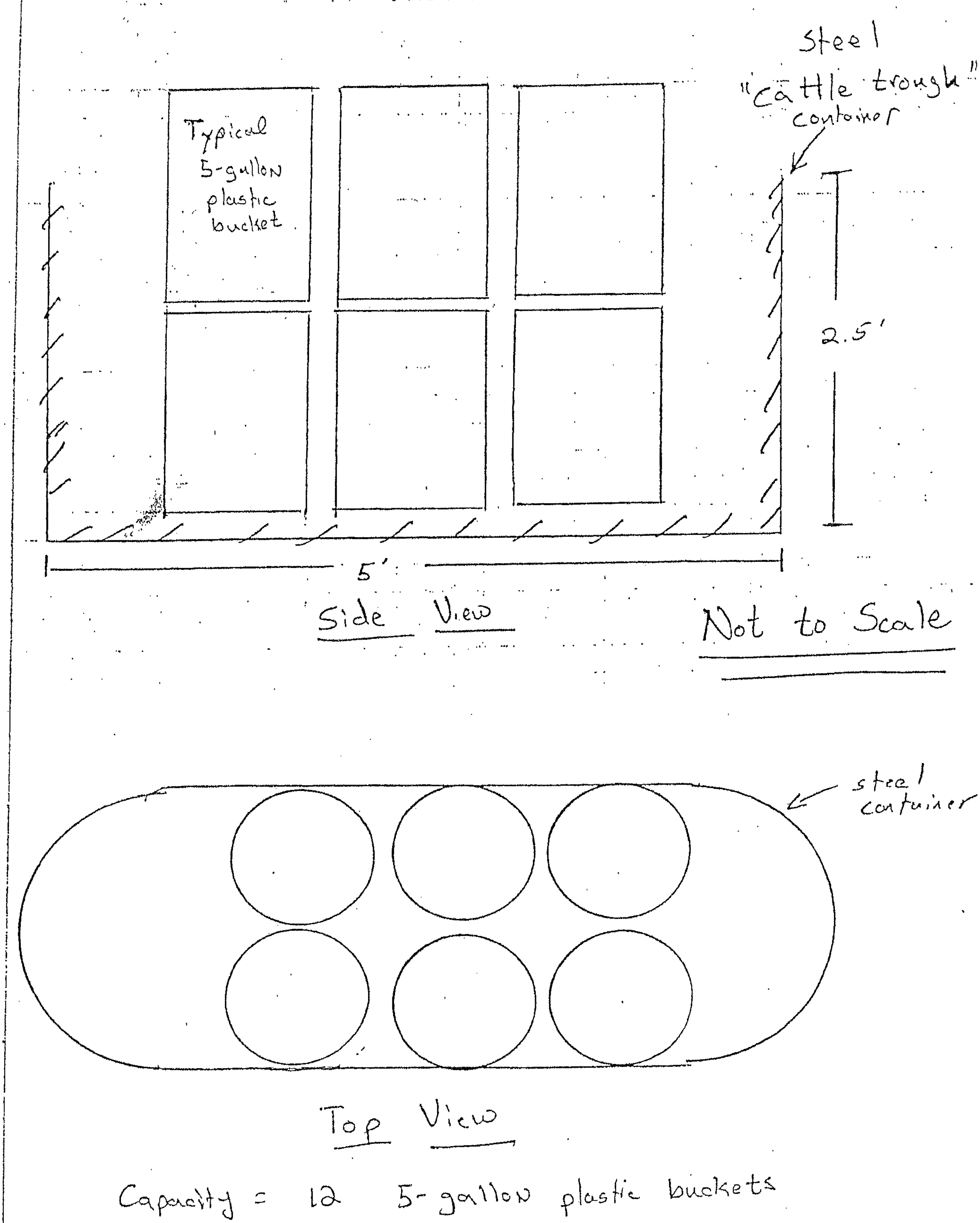


FIGURE 3.21 MINERAL OIL WETTED WASTE EXPLOSIVE SECONDARY CONTAINMENT SYSTEM (T&S 6) SITES 680, 683 & 692

SECONDARY CONTAINMENT CAPACITY CALCULATIONS FOR MINERAL OIL WETTED EXPLOSIVES (T&S 6)

1. Dimensions of a 5-gallon pail:

   12" Diameter x 15" Height = 1696 inches^3 (~ 1 cubic foot)

2. Secondary containment of cattle watering tank:
   - Main body of tank volume (i.e., exclusive of rounded ends)

     3' Length x 2.5' Height x 2.5' Wide = 18.75 feet^3

   - Volume of rounded tank ends (radius = 1') where both end placed together form a cylinder having a 2' diameter:

     (Pi) x $(2'/2)^2$ x 2.5' Height = 7.85 feet^3

   - Total volume of cattle watering tank:

     18.75 feet^3 + 7.85 feet^3 = 26.6 feet^3

3. Determine secondary containment volume remaining after twelve (12) 5-gallon pails have been placed into tank:

   - {26.6 feet^3 - (12 pails) x (1 foot^3/ pail)} x (7.48 gallon/feet^3} = 109 gallons

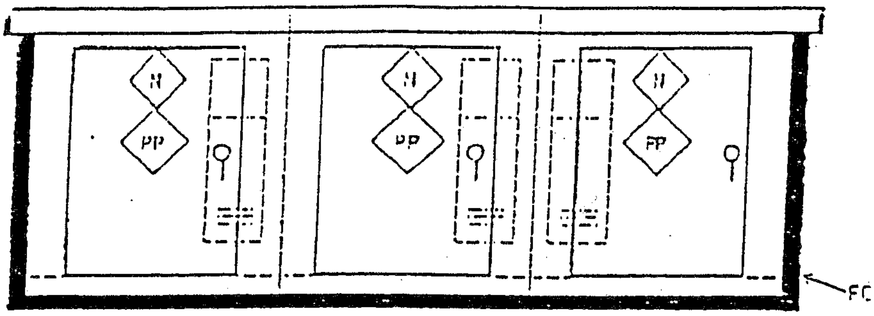
4. The 10% containment capacity required by regulations is met since only require six (6) gallons capacity where in fact 109 gallons secondary capacity is available in each cattle watering tank:

   - (12 pails) x (5 gallons/pail) x 0.1 = 6 gallons containment capacity required

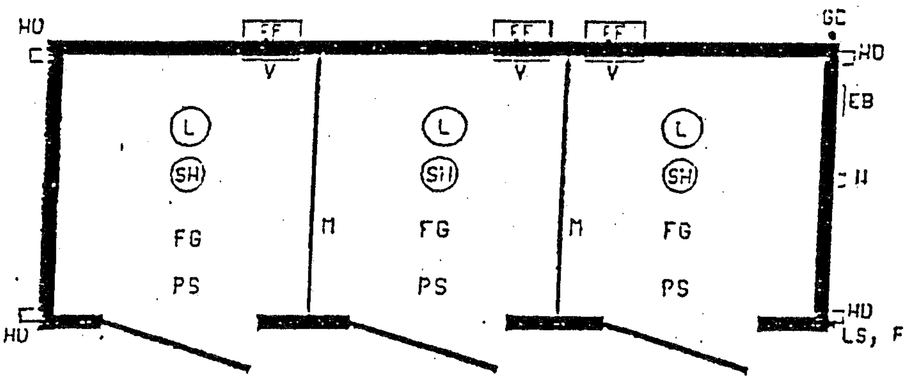
5. Excess containment capacity available:

   - (109 gallons - 6 gallons) = 103 gallons volume available above 10% requirement (~ 1800% containment capacity available per cattle watering tank)

FIGURE 3.21 MINERAL OIL WETTED WASTE EXPLOSIVE SECONDARY CONTAINMENT SYSTEM (T&S 6) SITES 680, 683 & 692



FRONT ELEVATION



PLAN VIEW

LEGEND

EB: ELECTRICAL BREAKER
EF: EXHAUST FAN (12")
FG: FIBERGLASS FLOOR GRATING
FS: FAN SWITCH
GC: GROUNDING CONNECTION
HD: HOLD-DOWN BRACKET
L: EXPLOSION PROOF LIGHT
LS: LIGHT SWITCH
M: METAL SEPARATION WALL
N: NFPA 704M RATING SIGN
PP: PERMANENT D.O.T. PLACARD
PS: POLYURETHANE SUMP COATING
SH: WATER SPRINKLER SPRAY HEAD
V: VENT
W: WATER SPRINKLER HOOKUP:

SPECIFICATION SHEET

SECONDARY CONTAINMENT:	APPLICABLE CODES
* Built-In 7-Inch Deep Secondary Containment Sump	UBC 902
* Sump Capacity (Gallons): 750 Gallons (25% of the Total Storage Capacity of the Building); 250 Gallons in Ea. Room	UFC 79.804 UFC 80.301 SFPC 904.5.3 OSHA 1910.106
* Three (3) Polypropylene Sump Liners (One Per Room)	

SECURITY:	
* Door Security Locks: Each Door is Equipped with a Three-Point Locking Mechanism with Inside Safety Release	UFC 79.406 UFC 80.301 NFPA 30, 4-8.4 OSHA 1910.106

FIGURE 3.22 EXPLOSIVE /NON-EXPLOSIVE LIQUID WASTE STORAGE (T&S 7) (PAGE 1 of 2)

(PROPOSED STORAGE UNIT)

SPECIFICATION SHEET

BASIC STRUCTURE: — **APPLICABLE CODES**

* Factory Mutual System (FM) Approved (1N7A8.AF)
* Relocatable Hazardous Materials Storage Unit
* Outside Dimensions (LxWxH): 22'6" x 9' x 8'7-1/2"
* Inside Dimensions (LxWxH): 21'11-3/4" x 8'-3/8" x 7'-1/2"
* Walls: 10-Gauge Steel (Thickness: 3.4MM)
* Floor: 10-Gauge Steel, Non-Combustible Construction.......................... UBC 902
* Floor Loading: 250 psf
* Roof: 12-Gauge Steel (Thickness: 2.7MM) on 10-Gauge Supports and Permanently Attached to the Building
* Roof Snow Loading: 40 psf.................... UBC 2305, BOCA 1111.0, SBC 1204
* Wind Loading: 30 psf (110 mph)................ UBC 2311, BOCA 1112.0, SBC 1205
* Seismic (Earthquake) Loading: Zone 4.......... UBC 2312, BOCA 1113.0, SBC 1206
* Three (3) Doors (Weatherstripped) Located at Front of Building
* Door Dimensions (WxH): 4'7-9/16" x 6'10-1/2"
* Door Opening Dimensions (WxH): 4'6" x 6'9-3/4"
* Square Footage: 176 sq. ft.
* Pultruded Corrosive Resistant Fiberglass Floor Grating
* Interior Finish: Chemical-Resistant Epoxy
* Exterior Finish: Gloss-White Polyurethane
* Four (4) Hold-Down Brackets.................. UBC 2303, UBC 2311, UBC 2312, BOCA 1112.0, BOCA 1113.0, SBC 1205, SBC 1206
* Static Grounding System
* 55-Gallon Drum Storage Capacity (Single Level): 36 Drums
* Storage Capacity (Weight): 44,000 lbs.
* Signage: Three (3) Permanent D.O.T. Placards
* Signage: Three (3) Pressure Sensitive NFPA 704 Hazard Rating Signs
* Forklift Pockets
* Tare Weight: 10,500 lbs.

CHEMICAL SEPARATION:

* Two (2) Interior Chemical Separation Walls (Metal).......... UFC 80.301, UFC 80.401

FIGURE 3.22 EXPLOSIVE /NON-EXPLOSIVE LIQUID WASTE STORAGE (T&S 7) (PAGE 2 of 2)

(PROPOSED STORAGE UNIT)

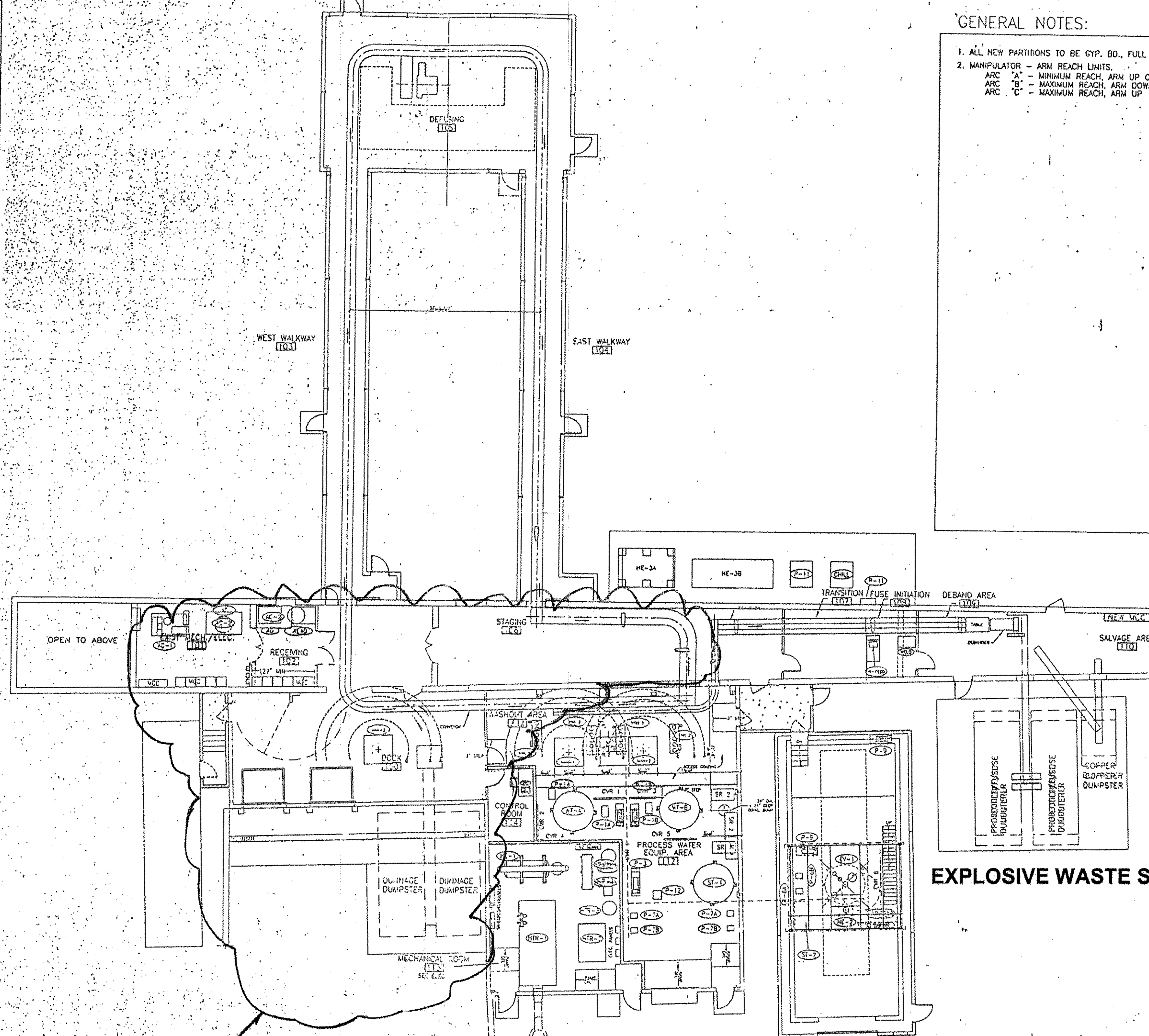
ALL CONTRACTORS AND SUB-CONTRACTORS SHALL VERIFY ALL DIMENSIONS BY MEASUREMENT AT THE BUILDING AND/OR SITE

EQUIPMENT LEGEND

LOCATION	EQUIP. #	EQUIPMENT NAME	MODEL
101	AC	EXISTING AIR COMPRESSOR	75 HP
101	AC-2	AIR COMPRESSOR	ESP 60 – 20 HP
101	AD	AIR DRYER	MODEL DXR 750
101	AT	EXISTING AIR TANK	
106	WELD	WELDER	MILLER DIMENSION 652
108	W-FEED	WIRE FEED WELDER	MILLER S-60
111	MAN-1	MANIPULATOR	CONCO MA5646-100
111	MAN-2	MANIPULATOR	CONCO MA5646-100
111	MAN-3	MANIPULATOR	CONCO MA5646-100
111	WT-A1	WASHOUT STATION	
111	WT-A2	WASHOUT STATION	
111	WTB-1	WASHOUT STATION	
111	WTB-2	WASHOUT STATION	
112	CVR-1	CONTROL VALVE RACK	
112	[illegible]	NITROGEN BLANKET SYSTEM	
112	[illegible]	WASHWATER RECIRCULATION PUMP	ARO DIAPHRAGM PUMP
112	P-1B	WASHWATER RECIRCULATION PUMP	ARO DIAPHRAGM PUMP
112	P-7A	SURGETANK RECYCLE PUMP A	M4 WILDEN
112	P-7B	SURGETANK RECYCLE PUMP B	M4 WILDEN
112	P-2A	WASHWATER FEED PUMP	HOC2
112	P-2B	WASHWATER FEED PUMP	HOC2
112	P-3	WASHWATER BOOSTER PUMP	
112	ST-1	SURGE TANK	
112	SR-1	EXISTING SCRUBBER	WHIRL/WET 5H
112	SR-2	WHIRL/WET DUST COLLECTOR	WHIRL/WET 10H
112	WT-A	WASHWATER STORAGE TANK	MK 96-446A
112	WT-B	WASHWATER STORAGE TANK	MK 96-446B
113	HE-1	HOT OIL HEAT EXCHANGER	
113	HTR-1	OIL HEATER (FURNACE SECTION)	OH 15/40
113	[illegible]	PUMP SKID FOR OIL HEATER	
113	HTR-2	HEATER (RELOCATED EXISTING)	
113	HTR-3	FRESHWATER HEATER	
114	PC	PERSONAL COMPUTER	
EXTERIOR	CHILL	CHILLER	AC-8A THERMO-DYNE
EXTERIOR	HE-3A	EXISTING FIN FAN	THERMO-DYNE MODEL 161D
EXTERIOR	HE-3B	NEW FIN FAN	THERMO-DYNE MODEL 282B
EXTERIOR	P-11	CHILLER PUMP	
TANKER BLDG.	EV-1	EVAPORATOR-SETTLING TANK	
TANKER BLDG.	HE-2	CONDENSER	
TANKER BLDG.	MX-1	EVAPORATOR MIXER	LIGHTNIN MODEL V5S75A
TANKER BLDG.	P-9	FIN FAN PUMP	HOC2
TANKER BLDG.	P-6A	EVAPORATOR DRAIN PUMP A	M4 WILDEN
TANKER BLDG.	P-6B	EVAPORATOR DRAIN PUMP B	M4 WILDEN
TANKER BLDG.	P-10	VACUUM PUMP SKID	SIHI PUMPS TRC-503
TANKER BLDG.	ST-2	CONDENSATE STORAGE TANK	MK 96-446c

GENERAL NOTES:

1. ALL NEW PARTITIONS TO BE GYP. BD., FULL HEIGHT.
2. MANIPULATOR – ARM REACH LIMITS.
   ARC "A" – MINIMUM REACH, ARM UP OR DOWN
   ARC "B" – MAXIMUM REACH, ARM DOWN
   ARC "C" – MAXIMUM REACH, ARM UP



RECEIVING / LOADING DOCK & SEMI-TRAILER (2 TRAILERS) AREA

FIGURE 3.23

EXPLOSIVE WASTE STORAGE (T&S 10B) SITE 626

(PAGE 1 of 2)

NOTE: DRAWINGS FOR COORDINATION ONLY. LAYOUT AND PIPING DESIGN BY OWNER.

0 8' 16' 32'
SCALE IN FEET

N

PRINTED

1/P-1 PROCESS EQUIPMENT FLOOR PLAN
1/8"=1'-0"

NO.	DATE	BY	DESCRIPTION OF REVISIONS
2	5/16/97	DKS	RECORD DRAWING BASED ON FIELD RED-MARKS
1	12/20/96	WFF	REVISED EQUIPMENT LAYOUT

DESIGNED DAJ/WFF
DRAWN WFF
CHECKED DAJ

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MINNESOTA

DATE December 20, 1996 REG. NO. [illegible]

TKDA
ENGINEERS • ARCHITECTS • PLANNERS
TOLTZ, KING, DUVALL, ANDERSON AND ASSOCIATES, INCORPORATED
SAINT PAUL, MINNESOTA

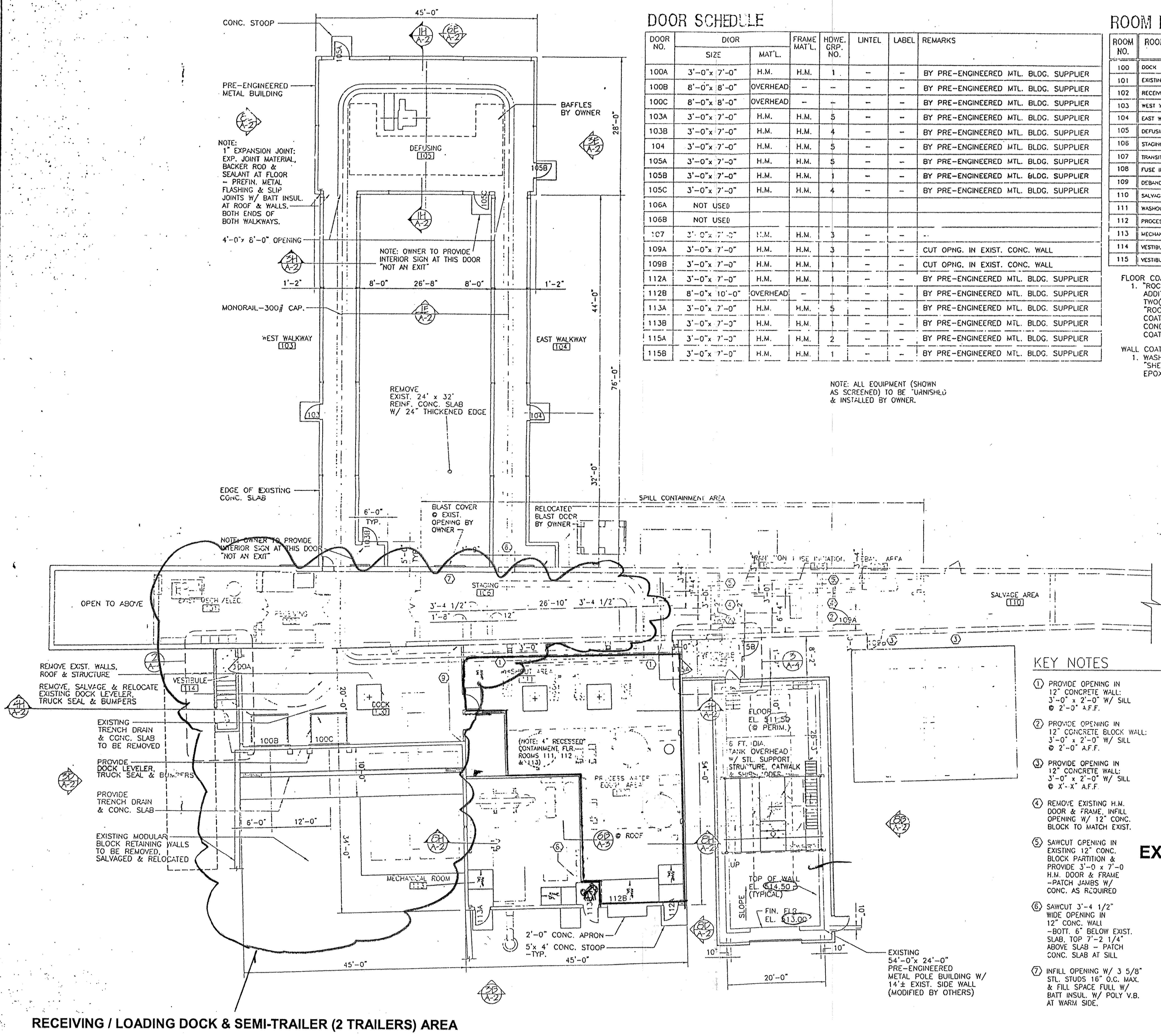
ALLIANT TECHSYSTEMS

Alliant Techsystems Inc.
23100 Sugar Bush Rd. N.W.
Elk River, Minnesota 55330

COMM. NO. 11201
REV. NO.
DRAWING NO. P-1

PRINTED DATE: 5/16/97

ALL CONTRACTORS AND SUB-CONTRACTORS SHALL VERIFY ALL DIMENSIONS BY MEASUREMENT AT THE BUILDING AND/OR SITE



RECEIVING / LOADING DOCK & SEMI-TRAILER (2 TRAILERS) AREA

DOOR SCHEDULE

DOOR NO.	DOOR SIZE	DOOR MAT'L.	FRAME MAT'L.	HDWE. GRP. NO.	LINTEL	LABEL	REMARKS
100A	3'-0"x 7'-0"	H.M.	H.M.	1	–	–	BY PRE-ENGINEERED MTL. BLDG. SUPPLIER
100B	8'-0"x 8'-0"	OVERHEAD	–	–	–	–	BY PRE-ENGINEERED MTL. BLDG. SUPPLIER
100C	8'-0"x 8'-0"	OVERHEAD	–	–	–	–	BY PRE-ENGINEERED MTL. BLDG. SUPPLIER
103A	3'-0"x 7'-0"	H.M.	H.M.	5	–	–	BY PRE-ENGINEERED MTL. BLDG. SUPPLIER
103B	3'-0"x 7'-0"	H.M.	H.M.	4	–	–	BY PRE-ENGINEERED MTL. BLDG. SUPPLIER
104	3'-0"x 7'-0"	H.M.	H.M.	5	–	–	BY PRE-ENGINEERED MTL. BLDG. SUPPLIER
105A	3'-0"x 7'-0"	H.M.	H.M.	5	–	–	BY PRE-ENGINEERED MTL. BLDG. SUPPLIER
105B	3'-0"x 7'-0"	H.M.	H.M.	1	–	–	BY PRE-ENGINEERED MTL. BLDG. SUPPLIER
105C	3'-0"x 7'-0"	H.M.	H.M.	4	–	–	BY PRE-ENGINEERED MTL. BLDG. SUPPLIER
106A	NOT USED						
106B	NOT USED						
107	3'-0"x 7'-0"	H.M.	H.M.	3	–	–	–
109A	3'-0"x 7'-0"	H.M.	H.M.	3	–	–	CUT OPNG. IN EXIST. CONC. WALL
109B	3'-0"x 7'-0"	H.M.	H.M.	1	–	–	CUT OPNG. IN EXIST. CONC. WALL
112A	3'-0"x 7'-0"	H.M.	H.M.	1	–	–	BY PRE-ENGINEERED MTL. BLDG. SUPPLIER
112B	8'-0"x 10'-0"	OVERHEAD	–	–	–	–	BY PRE-ENGINEERED MTL. BLDG. SUPPLIER
113A	3'-0"x 7'-0"	H.M.	H.M.	5	–	–	BY PRE-ENGINEERED MTL. BLDG. SUPPLIER
113B	3'-0"x 7'-0"	H.M.	H.M.	1	–	–	BY PRE-ENGINEERED MTL. BLDG. SUPPLIER
115A	3'-0"x 7'-0"	H.M.	H.M.	2	–	–	BY PRE-ENGINEERED MTL. BLDG. SUPPLIER
115B	3'-0"x 7'-0"	H.M.	H.M.	1	–	–	BY PRE-ENGINEERED MTL. BLDG. SUPPLIER

NOTE: ALL EQUIPMENT (SHOWN AS SCREENED) TO BE FURNISHED & INSTALLED BY OWNER.

ROOM FINISH SCHEDULE

ROOM NO.	ROOM NAME	FLOOR	BASE	WALL MATERIAL	WALL FINISH	CEILING MATERIAL	CEILING FINISH	CEILING HEIGHT	REMARKS
100	DOCK	EXIST./ CONC.	–	MTL. LINER PANEL/EX. CONC.	*	EXIST. CONC.	*	–	* PAINT EXIST.
101	EXISTING MECH. / ELEC.	EXIST.	–	–	–	–	–	–	–
102	RECEIVING	EXIST.	–	EXIST. GYP. BD./ CONC. BLOCK	PAINT	EXIST. CONC.	PAINT	–	–
103	WEST WALKWAY	EXIST.	–	MTL. LINER PNL./ EXIST. CONC.	*	MTL. LINER PANEL	–	–	* PAINT EXIST.
104	EAST WALKWAY	CONC./1.	–	MTL. LINER PNL./ EXIST. CONC.	*	MTL. LINER PANEL	–	–	* PAINT EXIST.
105	DEFUSING	CONC./1.	–	MTL. LINER PANEL	–	MTL. LINER PANEL	–	–	–
106	STAGING	CONC./1.	–	EXIST. GYP. BD./ CONC. BLOCK	PAINT	EXIST. CONC.	PAINT	–	–
107	TRANSITION	EXIST.	–	EXIST. GYP. BD./ CONC. BLOCK	PAINT	EXIST. CONC.	PAINT	–	–
108	FUSE INITIATION	EXIST.	–	EXIST. GYP. BD./ CONC. BLOCK	PAINT	EXIST. CONC.	PAINT	–	–
109	DEBAND AREA	EXIST.	–	EXIST. GYP. BD./ CONC. BLOCK	PAINT	EXIST. CONC.	PAINT	–	–
110	SALVAGE AREA	EXIST.	–	EXIST. GYP. BD./ CONC. BLOCK	PAINT	EXIST. CONC.	PAINT	–	–
111	WASHOUT AREA	CONC./ 1.	CONC./ 1.	MTL. LINER PNL./ CONC./GYP. BD.	* 1.	MTL. LINER PANEL	–	–	* PAINT GYP. BD. & CONC.
112	PROCESS WATER EQUIP. AREA	CONC./ 1.	CONC./ 1.	MTL. LINER PNL./ GYP. BD.	* 1.	MTL. LINER PANEL	–	–	* PAINT GYP. BD.
113	MECHANICAL	CONC.	–	MTL. LINER PNL./ GYP. BD.	*	MTL. LINER PANEL	–	–	* PAINT GYP. BD.
114	VESTIBULE	CONC.	–	MTL. LINER PNL./ GYP. BD.	–	MTL. LINER PANEL	–	–	–
115	VESTIBULE	CONC.	–	MTL. LINER PNL./ GYP. BD.	–	MTL. LINER PANEL	–	–	–

FLOOR COATINGS:
1. "ROCK TRED" NOVO-POXI DRESSING W/CONDUCTIVE ADDITIVE FOR 250,000 OHM RESISTANCE OR LESS, TWO(2) COAT APPLICATION. "ROCK TRED" CONDUROC STATIC CONDUCTIVE COATING SYSTEM (LAMINATED HEAVY DUTY EPOXY) CONDUCTIVE PRIMER 100% SOLID INTERMEDIATE COAT, COLORS CONDUCTIVE TOP COAT.

WALL COATING:
1. WASHOUT/PROCESS AREA "SHERWIN WILLIAMS" HI-SOLIDS CATALYZED EPOXY (WHITE).

KEY NOTES

1. PROVIDE OPENING IN 12" CONCRETE WALL: 3'-0" x 2'-0" W/ SILL @ 2'-0" A.F.F.
2. PROVIDE OPENING IN 12" CONCRETE BLOCK WALL: 3'-0" x 2'-0" W/ SILL @ 2'-0" A.F.F.
3. PROVIDE OPENING IN 12" CONCRETE WALL: 3'-0" x 2'-0" W/ SILL @ X'-X" A.F.F.
4. REMOVE EXISTING H.M. DOOR & FRAME, INFILL OPENING W/ 12" CONC. BLOCK TO MATCH EXIST.
5. SAWCUT OPENING IN EXISTING 12" CONC. BLOCK PARTITION & PROVIDE 3'-0 x 7'-0 H.M. DOOR & FRAME -PATCH JAMBS W/ CONC. AS REQUIRED
6. SAWCUT 3'-4 1/2" WIDE OPENING IN 12" CONC. WALL -BOTT. 6" BELOW EXIST. SLAB. TOP 7'-2 1/4" ABOVE SLAB - PATCH CONC. SLAB AT SILL
7. INFILL OPENING W/ 3 5/8" STL. STUDS 16" O.C. MAX. & FILL SPACE FULL W/ BATT INSUL. W/ POLY V.B. AT WARM SIDE.
8. 3 5/8", 20 GA. STL. STUDS @ 16" O.C. W/ 2 LAYERS 5/8" TYPE "X" GYP. BD. EACH SIDE TO ROOF. PROVIDE HALF HIGH 6" CONC. BLOCK BASE W/ #4 DOWELS TO FLOOR @ 48" O.C., FILL ALL CORES W/ CONC. (2 HOUR FIRE RATED PARTITION)
9. 3 5/8", 20 GA. STL. STUDS @ 16" O.C. W/ 5/8" TYPE "X" GYP. BD. EACH SIDE TO ROOF & 3/4" FIRE RETARDANT TREATED PLYWOOD ON DOCK SIDE OF WALL FROM FLOOR TO 4'-0" ABOVE FLOOR.

FIGURE 3.23

EXPLOSIVE WASTE STORAGE (T&S 10B) SITE 626

(PAGE 2 of 2)

0 8' 16' 32'
SCALE IN FEET

5E/A-1 FLOOR PLAN 1/8"=1'-0"

NO.	DATE	BY	DESCRIPTION OF REVISIONS
2	5/16/97	BKS	RECORD DRAWING BASED ON FIELD RED-MARKS
1	10/18/96	WFF	REVISED EQUIP. LAYOUT

DESIGNED DAJ/WFF
DRAWN WFF
CHECKED DAJ

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ARCHITECT UNDER THE LAWS OF THE STATE OF MINNESOTA
DATE October 2, 1996 REG. NO.

TKDA
TOLTZ, KING, DUVALL, ANDERSON AND ASSOCIATES, INCORPORATED
ENGINEERS • ARCHITECTS • PLANNERS
SAINT PAUL, MINNESOTA

ALLIANT TECHSYSTEMS

Alliant Techsystems Inc.
23100 Sugar Bush Rd. N.W.
Elk River, Minnesota 55330

COMM. NO. 11201
REV. NO.
DRAWING NO. A-1

PRINTED DATE: 5/16/97

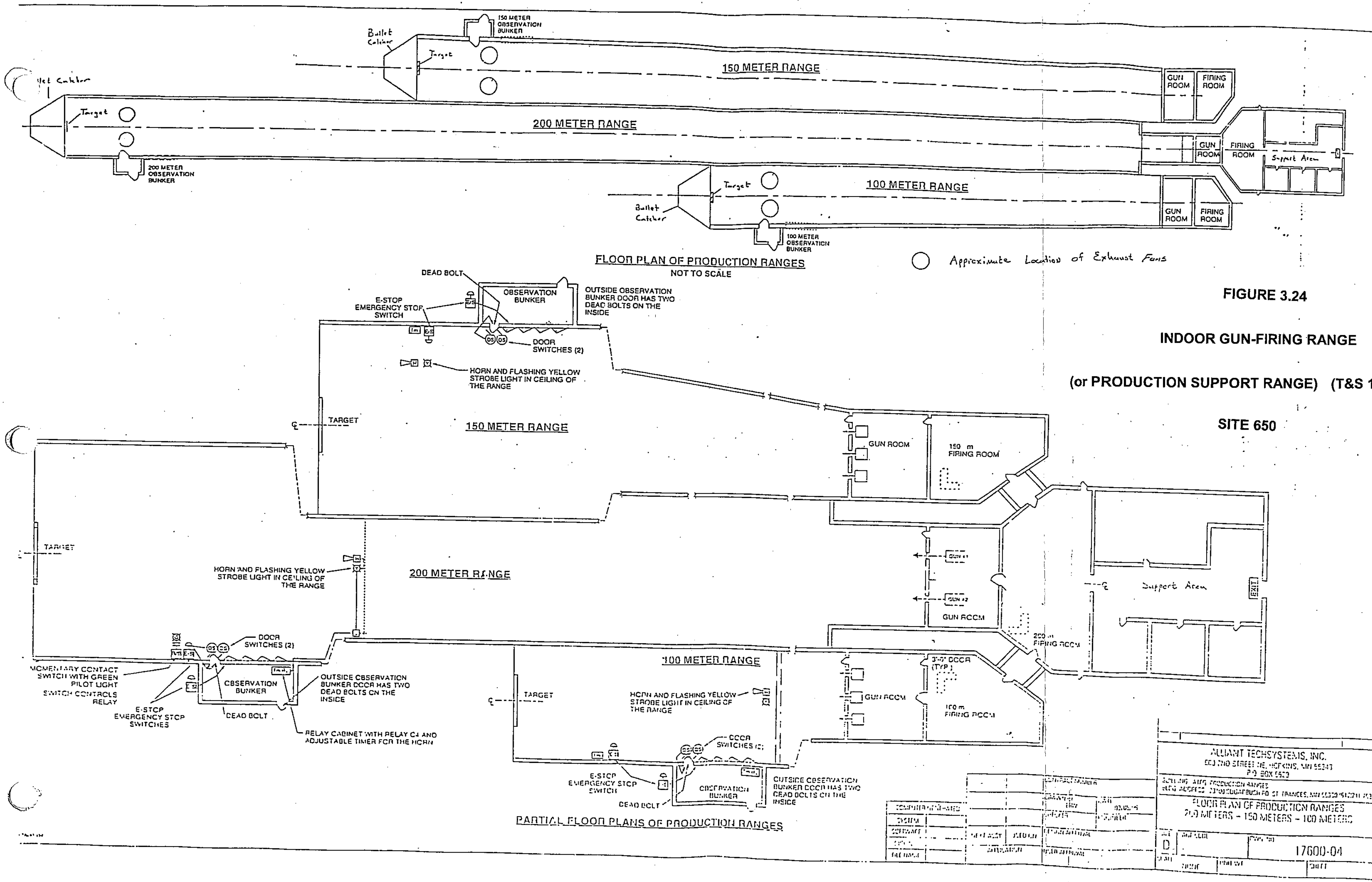


FIGURE 3.24

INDOOR GUN-FIRING RANGE

(or PRODUCTION SUPPORT RANGE) (T&S 12)

SITE 650

Figure 4.1 Example General Treatment and Storage (T&S) Unit Weekly Inspection Log

Container Storage Area Inspection Log Sheet

T&S Unit ____________________

Site ____________________

✓ = OK D = Defect (All defects must be explained in observation section and repairs noted)

			Building					Containers							Containment						
Inspector (Full Name)	Date	Time	Warning Signs	Security	Structural	Floor	Refuse	Grounding	Aisle Space	Sealing	Labeling	Corrosion	Leakage	Structural Defects	Other*	Containment	Corrosion	Liquid	Floor Dry	Observations	Date and Nature of Repairs/Remedial Action

* Describe in Observations Column

Figure 4.2 Example Open Burn Treatment Area (T&S 5) Weekly Inspection Log

Open Burn Treatment Area (T/S 5) Inspection Log Sheet **Site 675**

✓ = OK D = Defect (All defects must be explained in observation section and repairs noted)

			Area					Burn Pads					Treatment Structures*			Detonation Pit			
Inspector (Full Name)	Date	Time	Warning Signs	Gate	Fire Breaks	Debris	Other**	Water	Debris	Cracks	Evaporation Pans	Other**	Structure	Capacity	Other**	Debris	Other**	Observations	Date and Nature of Repairs/Remedial Action (Including Unit Replacement)

*Includes Evaporation Pans and Burn Boxes

**Describe in observations column.

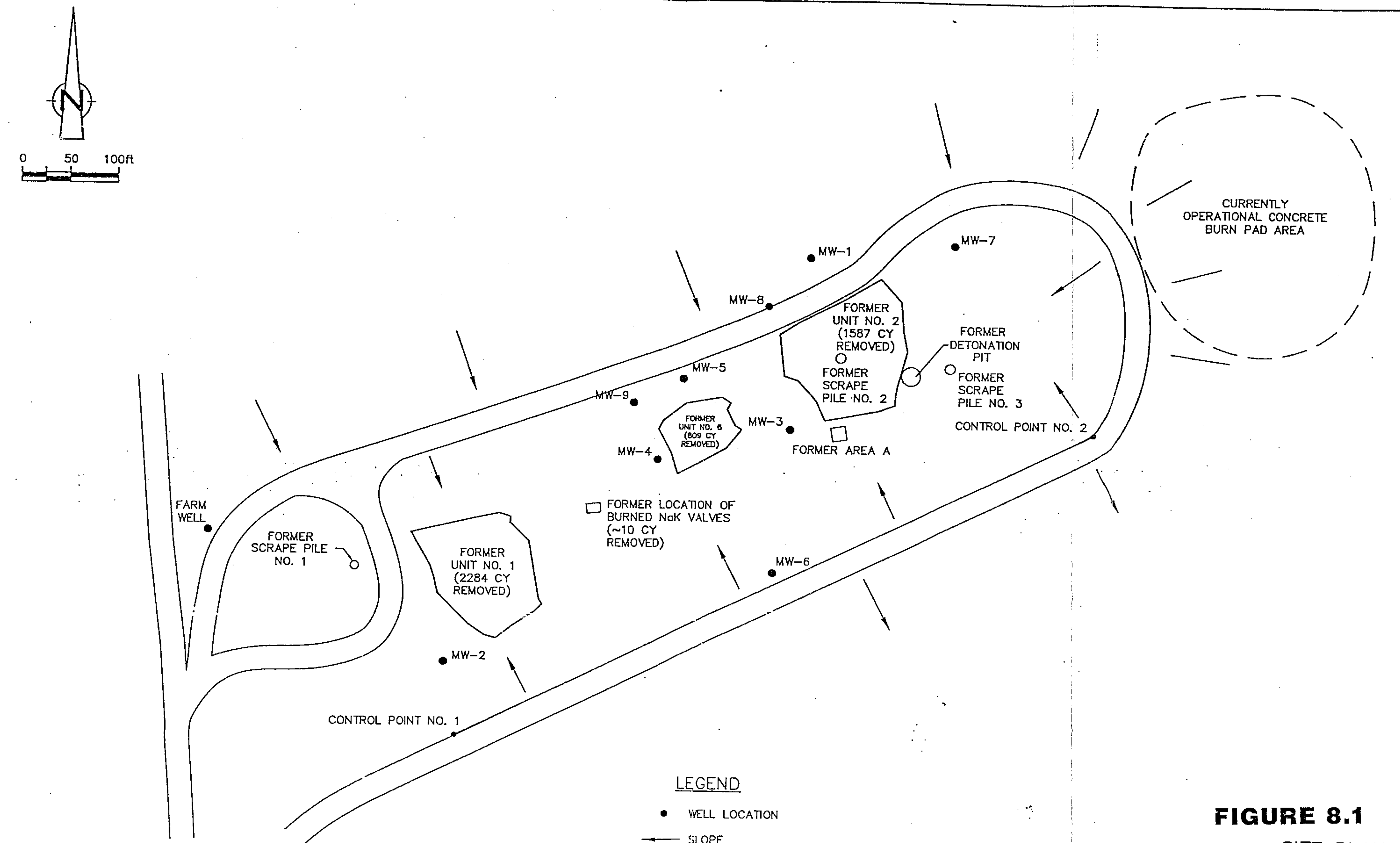


FIGURE 8.1

SITE PLAN
MONITORING WELLS AND SWMU 7 WASTE AREA LOCATIONS
ALLIANT TECHSYSTEMS PROVING GROUND
Elk River, Minnesota

CRA

4227(L)-SEPT. 9/96-REV.0 (M-06)(MN)

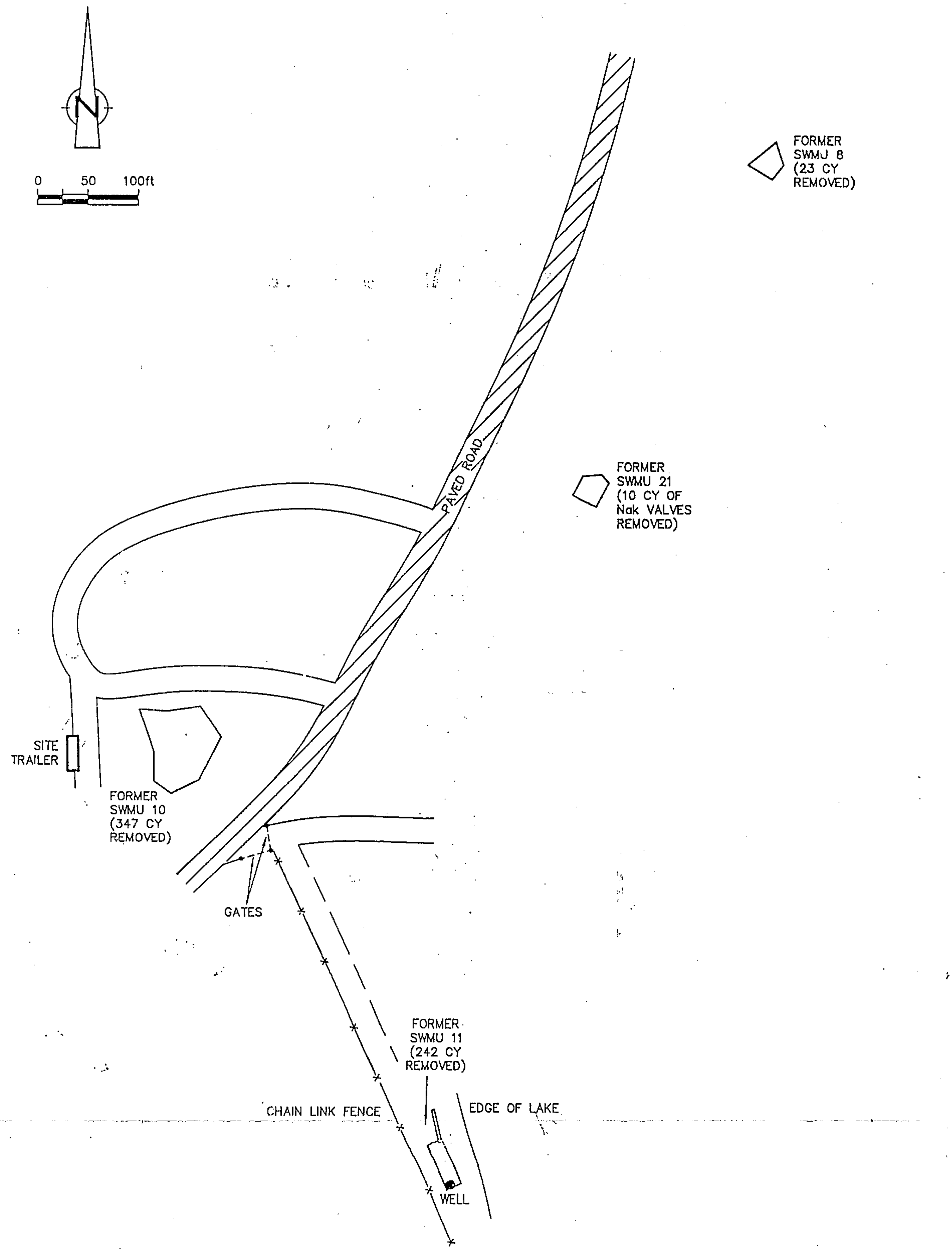


FIGURE 8.2

SITE PLAN
SWMUs 8,10,11 AND 21 WASTE AREA LOCATIONS
ALLIANT TECHSYSTEMS PROVING GROUND
Elk River, Minnesota

CRA

4227(L)-SEPT. 9/96-REV.0 (M-07)(MN)

Appendix A

RCRA Part A Application

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

1. Reason for Submittal MARK ALL BOX(ES) THAT APPLY	**Reason for Submittal:** ☐ To provide an Initial Notification (first time submitting site identification information / to obtain an EPA ID number for this location) ☒ To provide a Subsequent Notification (to update site identification information for this location) ☐ As a component of a First RCRA Hazardous Waste Part A Permit Application ☒ As a component of a Revised RCRA Hazardous Waste Part A Permit Application (Amendment #_________) ☐ As a component of the Hazardous Waste Report (If marked, see sub-bullet below) ☐ Site was a TSD facility and/or generator of >1,000 kg of hazardous waste, >1 kg of acute hazardous waste, or >100 kg of acute hazardous waste spill cleanup in one or more months of the report year (or State equivalent LQG regulations)
2. Site EPA ID Number	**EPA ID Number** M N D 0 8 1 1 3 8 6 0 4
3. Site Name	**Name:** Alliant Techsystems Operations LLC - The Proving Grounds (TPG)
4. Site Location Information	**Street Address:** 23100 Sugarbush Road NW **City, Town, or Village:** Elk River — **County:** **State:** MN — **Country:** USA — **Zip Code:** 55330
5. Site Land Type	☑ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other
6. NAICS Code(s) for the Site (at least 5-digit codes)	**A.** 3 3 2 9 9 3 — **C.** **B.** 3 3 2 9 9 5 — **D.**
7. Site Mailing Address	**Street or P.O. Box:** 23100 Sugarbush Road NW **City, Town, or Village:** Elk River **State:** MN — **Country:** USA — **Zip Code:** 55330
8. Site Contact Person	**First Name:** Steven — **MI:** G — **Last:** Rauschendorfer **Title:** Environmental Engineer **Street or P.O. Box:** 23100 Sugarbush Road NW **City, Town or Village:** Elk River **State:** MN — **Country:** US — **Zip Code:** 55330 **Email:** Steven.Rauschendorfer@orbitalatk.com **Phone:** 763-744-5594 — **Ext.:** — **Fax:** 763-241-7500
9. Legal Owner and Operator of the Site	**A. Name of Site's Legal Owner:** Orbital ATK, Inc. — **Date Became Owner:** 9/30/1990 **Owner Type:** ☑ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other **Street or P.O. Box:** 45101 Warp Drive **City, Town, or Village:** Dulles — **Phone:** 703-406-5000 **State:** VA — **Country:** USA — **Zip Code:** 20166 **B. Name of Site's Operator:** Alliant Techsystems Operations LLC — **Date Became Operator:** 9/30/1990 **Operator Type:** ☑ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other

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

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

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

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

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

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

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

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

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

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

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

☐ a. Transporter

☐ b. Transfer Facility (at your site)

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

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

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

☐ a. Small Quantity On-site Burner Exemption

☐ b. Smelting, Melting, and Refining Furnace Exemption

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

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

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

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

a. Batteries ☐

b. Pesticides ☐

c. Mercury containing equipment ☐

d. Lamps ☐

e. Other (specify) ______________ ☐

f. Other (specify) ______________ ☐

g. Other (specify) ______________ ☐

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

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

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

☐ a. Transporter

☐ b. Transfer Facility (at your site)

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

☐ a. Processor

☐ b. Re-refiner

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

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

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

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

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

❖ You can ONLY Opt into Subpart K if:

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

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

☐ **a. College or University**

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

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

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

11. Description of Hazardous Waste

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

D001	D002	D003	D004	D005	D006	D007
D008	D009	D010	D011	D018	D030	D035
D036	D038	D039	D040	F001	F002	F003
F005	F007	F008	F009	U002	U019	U041
U056	U068	U079	U080	U151	U154	U159
U161	U165	U169	U196	U211	U213	U220
U223	U225	U226	U227	U228	U239	U210
K044	K045	K046	K047	P009	P081	

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

MN01	MN02	MN03				

EPA ID Number | M | N | D | 0 | 8 | 1 | 1 | 3 | 8 | 6 | 0 | 4 |

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

12. Notification of Hazardous Secondary Material (HSM) Activity

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

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

13. Comments

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

Signature of legal owner, operator, or an authorized representative	Name and Official Title (type or print)	Date Signed (mm/dd/yyyy)
[signature]	Dan Olson	02/23/2016
	General Manager	

EPA ID Number | M | N | D | 0 | 8 | 1 | 1 | 3 | 8 | 6 | 0 | 4 |

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

United States Environmental Protection Agency

HAZARDOUS WASTE PERMIT INFORMATION FORM

1. Facility Permit Contact

First Name: Steven **MI:** G **Last Name:** Rauschendorfer

Contact Title: Environmental Engineer

Phone: 763-744-5594 **Ext.:** **Email:** Steven.Rauschendorfer@orbitalatk.com

2. Facility Permit Contact Mailing Address

Street or P.O. Box: 23100 Sugarbush Road NW

City, Town, or Village: Elk River

State: MN

Country: USA **Zip Code:** 55330

3. Operator Mailing Address and Telephone Number

Street or P.O. Box: 23100 Sugarbush Road NW

City, Town, or Village: Elk River

State: MN **Phone:** 763-744-5594

Country: USA **Zip Code:** 55330

4. Facility Existence Date

Facility Existence Date (mm/dd/yyyy): 7/26/1966

5. Other Environmental Permits

A. Facility Type (Enter code)	B. Permit Number													C. Description
N	M	N	R	0	5	0	0	0	0					Industrial Stormwater Mutli-Sector General Permit
R	M	N	D	0	8	1	1	3	8	6	0	4		Federal Hazardous Waste Permit - EPA ID Number
R	M	N	D	0	8	1	1	3	8	6	0	4		State Hazardous Waste Permit - EPA ID Number
R	P	T	0	0	0	2	7	3	9					Anoka County Hazardous Waste License
P	0	0	3	0	0	0	7	0	-	0	0	5		Air Emissions Permit- Option D Registration Permit

6. Nature of Business: Operations primarily involve the development, manufacture, assembly, storage, testing and demilitarization of various armament.

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

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

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

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

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

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

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

Unit of Measure	Unit of Measure Code	Unit of Measure	Unit of Measure Code	Unit of Measure	Unit of Measure Code
Gallons	G	Short Tons Per Hour	D	Cubic Yards	Y
Gallons Per Hour	E	Short Tons Per Day	N	Cubic Meters	C
Gallons Per Day	U	Metric Tons Per Hour	W	Acres	B
Liters	L	Metric Tons Per Day	S	Acre-feet	A
Liters Per Hour	H	Pounds Per Hour	J	Hectares	Q
Liters Per Day	V	Kilograms Per Hour	X	Hectare-meter	F
		Million BTU Per Hour	X	BTU Per Hour	I

7. Process Codes and Design Capacities (Continued)

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

Line Number		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	(2) Unit of Measure	C. Process Total Number of Units	For Official Use Only
X	1	S	0	2	533.788	G	001	
	1	S	0	1	5,500	G	001	
	2	S	0	1	550	G	001	
	3	S	0	1	50	G	001	
	4	S	0	1	1,000	G	001	
	5	S	0	1	10,000	G	001	
	6	S	0	1	20,000	G	001	
	7	S	0	1	50,000	G	001	
	8	S	0	1	30,000	G	001	
	9	S	0	1	550	G	001	
1	0	S	0	1	40,000	G	001	
1	1							
1	2							
1	3							

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

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

Line Number (Enter #s in sequence with Item 7)		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	(2) Unit of Measure	C. Process Total Number of Units	For Official Use Only
X	2	T	0	4	100.00	U	001	
1	1	X	9	9	500	J	001	

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

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

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

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

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

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

D. **PROCESSES**

1. **PROCESS CODES:**

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

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

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

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

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

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

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

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

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

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

Line Number	A. EPA Hazardous Waste No. (Enter code)	B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter Code)	D. PROCESSES (2) PROCESS DESCRIPTION (If code is not entered in 9.D(1))
1	D001	5500	P	S01	
2	D002	5500	P	S01	
3	D003	100	P	S01 X01	
4	D004	10,000	P	S01	
5	D005	10,000	P	S01	
6	D006	10,000	P	S01	
7	D007	10,000	P	S01	
8	D008	20,000	P	S01	
9	D009	10,000	P	S01	
10	D010	10,000	P	S01	
11	D011	10,000	P	S01	
12	D018	10,000	P	S01	
13	D030	30,000	P	S01	
14	D035	5,500	P	S01	
15	D036	5,500	P	S01	
16	D038	5,500	P	S01	
17	D039	5,500	P	S01	
18	D040	5,500	P	S01	
19	F001	5,500	P	S01	
20	F002	5,500	P	S01	
21	F005	5,500	P	S01	
22	F007	5,500	P	S01	
23	F008	5,500	P	S01	
24	F009	5,500	P	S01	
25	U002	1,100	P	S01	
26	U019	1,100	P	S01	
27	U041	1,100	P	S01	
28	U056	1,100	P	S01	
29	U068	1,100	P	S01	
30	U079	1,100	P	S01	
31	U080	1,100	P	S01	
32	U151	1,100	P	S01	
33	U154	1,100	P	S01	
34	U159	1,100	P	S01	
35	U161	1,100	P	S01	
36	U165	1,100	P	S01	

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

Line Number	A. EPA Hazardous Waste No. (Enter code)	B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter Code)	D. PROCESSES (2) PROCESS DESCRIPTION (If code is not entered in 9.D.1)
37	U169	1,100	P	S01	
38	U210	1,100	P	S01	
39	U211	1,100	P	S01	
40	U213	1,100	P	S01	
41	U220	1,100	P	S01	
42	U225	1,100	P	S01	
43	U226	1,100	P	S01	
44	U227	1,100	P	S01	
45	U228	1,100	P	S01	
46	U239	1,100	P	S01	
47	D001	100	T	S01 X01	
	D003				Included With Above
	D005				Included With Above
	D006				Included With Above
	D007				Included With Above
	D008				Included With Above
	D030				Included With Above
48	D001	100	T	S01 X01	
	D003				Included With Above
49	D001	100	T	S01	
	D003				Included With Above
	D005				Included With Above
	D007				Included With Above
	D008				Included With Above
50	D001	25	T	S01	
	D002				Included With Above
	D003				Included With Above
	D006				Included With Above
	D007				Included With Above
	D008				Included With Above
	D011				Included With Above

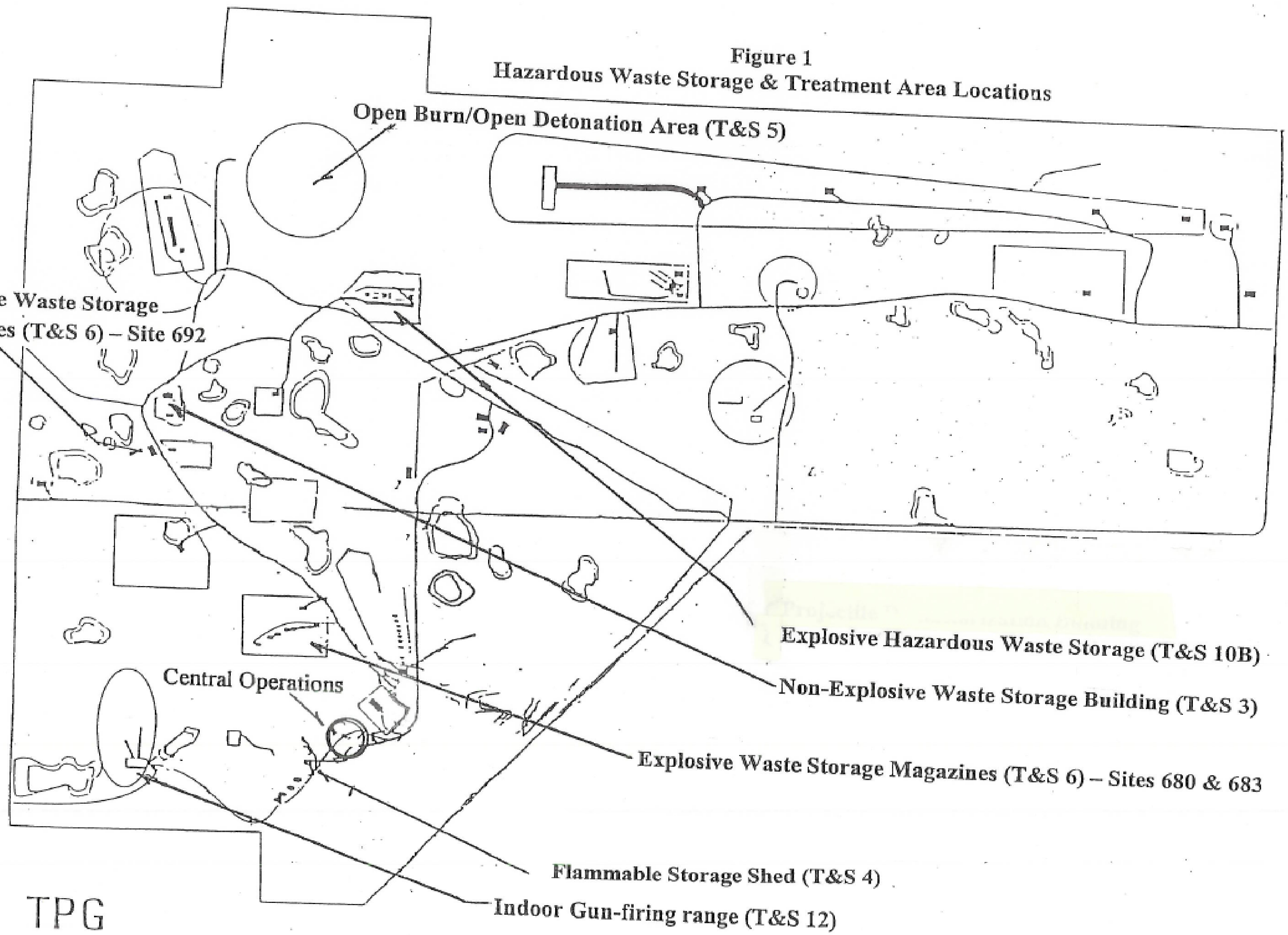
9. Description of Hazardous Wastes ***(Continued. Use additional sheet(s) as necessary; number pages as 5a, etc.)***

Line Number	A. EPA Hazardous Waste No. (Enter code)	B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter Code)	D. PROCESSES (2) PROCESS DESCRIPTION (If code is not entered in 9.D.1)
5 1	D 0 0 3	100	T	S 0 1 X 0 1	
	D 0 0 5				Included With Above
	D 0 0 6				Included With Above
	D 0 0 7				Included With Above
	D 0 0 8				Included With Above
	D 0 3 0				Included With Above
5 2	D 0 0 3	100	T	S 0 1 X 0 1	
	D 0 0 6				Included With Above
	D 0 0 8				Included With Above
5 3	D 0 0 3	100	T	S 0 1 X 0 1	
	D 0 0 8				Included With Above
5 4	D 0 0 3	100	T	S 0 1 X 0 1	
	K 0 4 4				Included With Above
5 5	D 0 0 3	100	T	S 0 1 X 0 1	
	K 0 4 5				Included With Above
5 6	D 0 0 3	100	T	S 0 1 X 0 1	
	K 0 4 6				Included With Above
5 7	D 0 0 3	100	T	S 0 1 X 0 1	
	K 0 4 7				Included With Above
5 8	D 0 0 3	100	T	S 0 1 X 0 1	
	P 0 0 9				Included With Above
5 9	D 0 0 3	100	T	S 0 1 X 0 1	
	P 0 8 1				Included With Above

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

Section 7 "Process Codes and Design Capabilities" - Note that line numbers 3 through 8 and 10 are for Explosive Storage Magazines whose permitted Storage Capabilities are in Pounds Net Explosive Weight (NEW). It has been assumed that since "pounds" is not a unit of measure that is allowed that one (1) pound NEW equals one (1) gallon volume.

Figure 1
Hazardous Waste Storage & Treatment Area Locations



T&S 3 NON-EXPLOSIVE WASTE STORAGE BUILDING –SITE 673 (S01) – Sec. 8 Line No. 1

T&S 4 Flammable WASTE STORAGE BUILDING (S01) – Sec. 8 Line No. 2

T&S 5 OPEN BURN/OPEN DETONATION TREATMENT AREA – PROPELLANT BURN PADS (3 TOTAL) - SITE 675 (X01, X99) – Sec. 8 Line No. 11

T&S 5 OPEN BURN/OPEN DETONATION TREATMENT AREA – DETONATION PIT (1 TOTAL) - SITE 675 (X01) - Sec. 8 Line No. 12

T&S 5 OPEN BURN/OPEN DETONATION TREATMENT AREA – EVAPORATION PANS (3 TOTAL) - SITE 675 (X01) - Sec. 8 Line No. 12

T&S 5 OPEN BURN/OPEN DETONATION TREATMENT AREA – BURN BOXES (5 TOTAL) - SITE 675 (X01) – Sec. 8 Line No. 14

T&S 5 OPEN BURN/OPEN DETONATION TREATMENT AREA – BURN CAGE (1 TOTAL) - SITE 675 (X01) - Sec. 8 Line No. 13

T&S 6 EXPLOSIVE WASTE STORAGE MAGAZINE – MAGAZINES 5A & 5B - SITE 680 (S01) – Sec. 8 Line No. 4

T&S 6 EXPLOSIVE WASTE STORAGE MAGAZINE – MAGAZINE 6 – SITE 680 (S01) – Sec. 8 Line No. 5

T&S 6 EXPLOSIVE WASTE STORAGE MAGAZINE – MAGAZINE 7 – SITE 680 (S01) – Sec. 8 Line No. 6

T&S 6 EXPLOSIVE WASTE STORAGE MAGAZINE – MAGAZINE 14 – SITE 683 (S01) – Sec. 8 Line No. 7

ATTACHMENT III
RCRA PART A APPLICATION – ITEM 13. FACILITY PHOTOGRAPHS
ALLIANT TECHSYSTEMS OPERATIONS – THE PROVING GROUNDS (TPG) (EPA ID No. MND 081 138 604)
Feb 2016

T&S 6 EXPLOSIVE WASTE STORAGE MAGAZINE – MAGAZINE 18 – SITE 692 (S01) – Sec. 8 Line No. 8

T&S 10B EXPLOSIVE WASTE STORAGE - SITE 626 (S01) OUTDOOR SEMI-TRAILER STALLS (2 TOTAL) – Sec. 8 Line No. 10

T&S 10B EXPLOSIVE WASTE STORAGE - SITE 626 (S01) - INDOOR LOADING DOCK & RECEIVING AREA – Sec. 8 Line No. 10

T&S 12 INDOOR GUN-FIRING RANGE (EXTERIOR) – SITE 650 (X99) – Sec. 8 Line No. 16

Appendix B

Waste Characterization – Example Explosive Waste Streams

EXPLOSIVE COMPOUND DATA SHEET

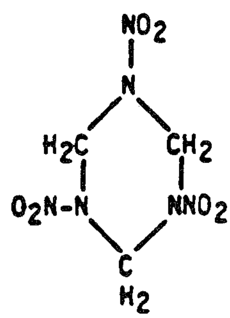
Compound: RDX (cyclonite)

Use: Explosive

Molecular formula: $C_3H_6N_6O_6$

Molecular weight: 222

Structural formula:



Moisture (% by weight): <.02

Ash (% by weight): Not applicable

Heating value: 4125.6 BTU/lb (2.29 kcal/gm)

Density: 1.82 gm/cc (113.5 lb/ft^3 at 70° F)

Viscosity: Solid at 70° F

PCB (ppm): None

Flash point: Decomposes at 500° F (260° C)

<u>Ultimate Analysis</u>:

% carbon:	16.3
% hydrogen:	2.7
% nitrogen:	37.8
% oxygen:	43.2

EXPLOSIVE COMPOUND DATA SHEET

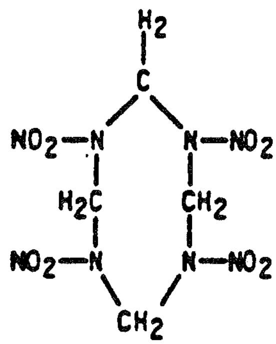
Compound: HMX

Use: Explosive

Molecular formula: $C_4H_8N_8O_8$

Molecular weight: 296

Structural formula:



Moisture (% by weight): 0.0

Ash (% by weight): --

Heating value: 2.362 kcal/gm

Density (70° F): 1.90 g/cc

Viscosity (70° F): Crystals

PCB (ppm): None

Flash point: --

<u>Ultimate Analysis:</u>

% carbon:	16.2
% hydrogen:	2.7
% nitrogen:	37.9
% oxygen:	43.2

EXPLOSIVE COMPOUND DATA SHEET

Compound: PBXN-5 - Type I, Class 2

Use: Explosive

Molecular formula: See HMX description

Moisture (% by weight): 0.15 (max)

Melting point: 277° C (min)

Flash point: auto-ignition at 225° C

Ultimate Analysis: % HMX: 95± 0.5
% Viton: 5± 0.5

Viton consists primarily of: vinilydine fluoride/hexafluoropropylene copolymer

Insolubles:	Acetone	0.15 (max)
	Inorganic	0.03 (max)
	Acidity as Acetic Acid	0.02 (max)
	RDX	2 (max)

EXPLOSIVE COMPOUND DATA SHEET

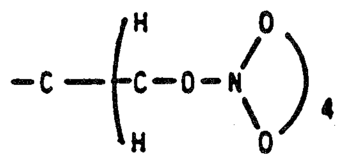
Compound: · PETN (pentaerythritol tetranitrate)

Use: Primer mixture

Molecular formula: $C_5H_8N_4O_{12}$

Molecular weight: 316

Structural formula:



Moisture (% by weight): 0.0

Ash (% by weight): --

Heating value: 3531 (1.96 kcal/gm)

Density (lb/ft^3 at 70° F): 110.4 (1.77 gm/cc)

Viscosity (70° F): White crystals

PCB (ppm): --

Flash point: Decomposes 225° C (437° F)

Ultimate Analysis:

% carbon:	19.0
% hydrogen:	2.5
% nitrogen:	17.7
% oxygen:	60.8

EXPLOSIVE COMPOUND DATA SHEET

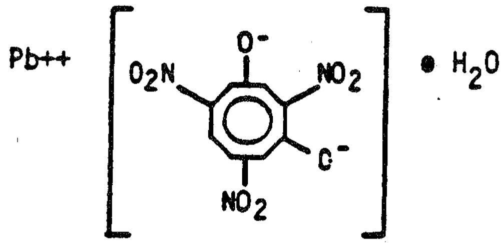
Compound: Lead styphnate

Use: Primer

Molecular formula: $PbC_6H_3N_3O_9$

Molecular weight: 468 hydrated

Structural formula:



Moisture (% by weight): <0.05

Ash (% by weight): --

Heating value: 1.251 kcal/gm (2253.8 BTU/lb)

Density (lb/ft^3 at 70° F): 3.02 gm/cc (188.35)

Viscosity (70° F): Crystal

PCB (ppm): None

Flash point: Explodes (260-310° C) (500-590° C)

Ultimate Analysis:

% carbon:	15.4
% hydrogen:	0.6
% nitrogen:	9.0
% oxygen:	30.8
% lead:	44.2

EXPLOSIVE COMPOUND DATA SHEET

Compound: Lead azide

Use: Explosive

Molecular formula: $Pb(N_3)_2$

Structural formula:

$$N \equiv N = N - Pb - N = N \equiv N$$

pH	5-7.5
Purity	(98.5 min)
Nitric Acid Insoluble	0.05 (max)
Lead CMC Content	0.9$\pm$ 3
Iron Content	Trace

EXPLOSIVE COMPOUND DATA SHEET

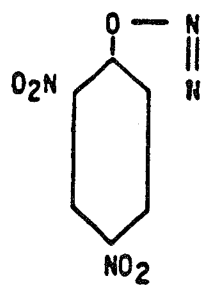
Compound: DDNP (diazodinitrophenol)

Use: Explosive

Molecular formula: $NH_2(NO_2)_2C_6H_2OH$

Molecular weight: 210.108

Structural formula:



Crystal density: 1.63
0.5 to 0.9 apparent density (loose form)
1.2 (when compressed to 3000 psi)

Flashpoint: Explodes at 180° C

EXPLOSIVE COMPOUND DATA SHEET

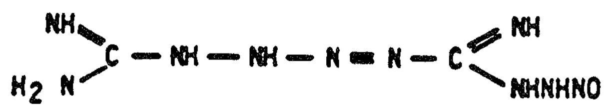
Compound: Tetrazene (4-guanyl-1-(nitrosoamino guanyl)-1-tetrazene)

Use: Primer

Molecular formula: $C_2H_8N_{10}O$

Molecular weight: 188.16

Structural formula:



Moisture (% by weight): <0.8

Ash (% by weight): --

Heating value: Heat of explosion is 0.658 kcal/gm

Density (lb/ft^3 at 70° F): 28.1 (0.45 gm/cc)

Viscosity (70° F): Crystals

PCB (ppm): --

Flash point: Explodes 160° C (320° F)

Ultimate Analysis:

% carbon:	12.8
% hydrogen:	4.3
% nitrogen:	74.4
% oxygen:	8.5

CALCULATIONS

Atomic Wts.

C = 12   N = 14

O = 16   Pb = 207

H = 1

Molecular Weights of Explosives

TNT = $(NO_2)_3C_6H_2CH_3$ = 227

RDX = $C_3H_6N_6O_6$ = 222

HMX = $C_4H_8N_8O_8$ = 296

PETN = $C_5H_8N_4O_{12}$ = 316

Tetryl = $C_7H_5N_5O_8$ = 287

Nitroglycerine = $C_3H_5N_3O_9$ = 227

Nitrocellulose = $[C_6H_7N_3O_{11}]n$ = 297 n

Lead Azide = PbN_6 = 291

Molecular Weights of Reaction Products

C = 12	N_2 = 28	H_2O = 18
CO = 28	NO = 30	
CO_2 = 44	NO_2 = 46	
	N_2O_4 = 92	

ITEM	CHEMICAL FORMULA	BYPRODUCTS
TNT	trinitrotoluene	CO, CO_2, N_2, H_2O, NO, NO_2, N_2O_4, C
ROX	cyclotrimethylene-trinitramine	CO, CO_2, N_2, H_2O, NO, NO_2, N_2O_4, C
HMX	cyclotetramethylene-tetranitramine	CO, CO_2, N_2, H_2O, NO, NO_2, N_2O_4, C
PETN	pentaerythritol-tetranitrate	CO, CO_2, N_2, H_2O, NO, NO_2, N_2O_4, C
Tetryl	2,4,6 trinitrophenyl-methylinitramine	CO, CO_2, N_2, H_2O, NO, NO_2, N_2O_4, C
Nitro-glycerine	glyceryltrinitrate	CO, CO_2, N_2, H_2O, NO, NO_2, N_2O_4, C
Nitrocel-lulose	cellulose nitrate	CO, CO_2, N_2, H_2O, NO, NO_2, N_2O_4, C
Lead Azide	$Pb(N_3)_2$	N_2, Pb

Appendix C

Example Detailed Operating Procedures (DOPs) Treatment Subunits T&S 5 and T&S 12

ATPG DETAILED OPERATING PROCEDURE

DOP #H4841 REV. M Expiration Date: 6-1-2016

TITLE: Destruction of Explosive Contaminated Waste by Burning in Burn Cage

REVIEW PANEL APPROVALS:

OPERATOR	SIGNATURE	DATE
Jake Kindseth	*Signature on File*	6-1-15

ENGINEER	SIGNATURE	DATE
Drew Gordon	*Signature on File*	6-1-15

MANAGEMENT	SIGNATURE	DATE
Greg Filo	*Signature on File*	6-1-15

SAFETY	SIGNATURE	DATE
Erick Monsos	*Signature on File*	6-1-15

SAFETY TRAINING REQUIREMENTS

OPERATION	SAFETY OBSERVER	SAFETY SECOND
Burn the cage contents	1,2,12	1,2,12

WORK AUTHORIZATION

SAFETY OBSERVER SIGNATURE	RESTRICTIONS	TIME PERIOD	MANAGEMENT/DELEGATE
		/	
		/	
		/	
		/	

SAFETY SECOND SIGNATURE	RESTRICTIONS	TIME PERIOD	MANAGEMENT/DELEGATE
		/	
		/	
		/	
		/	

1.0 SUPPORTING DOCUMENTS

1.1 Support site SOP # 675

1.2 Safety Checklist, (Attachment 3)

1.3 Site Map, (Figure 1)

1.4 ATPG SOP 600

2.0 DEVICE DESCRIPTION

2.1 The burn cage consists of a locked enclosure constructed of expanded metal walls and roof mounted on a concrete slab.

2.2 The material to be burned in this enclosure is limited to paper, wood, plastic, cardboard and rags which have been lightly contaminated with explosives.

2.3 The ignition device is a small plastic bag with a small amount of fine #000 steel wool with approximately 10 grams of flake propellant (ie. Red Dot) mixed in.

Note: The term "lightly contaminated" is meant to describe containers that have been emptied of their contents but which may still carry a trace of material and/or a few hidden grains material; or rags that have been used to wipe up surfaces in areas where explosives have been present.

NOTE:
The following are absolute maximum quantities allowed by our hazardous waste treatment permit, there are more strict (smaller) operational limitations driven by safety considerations and listed in section 3

2.4 Hazardous Waste Permit Conditions

2.4.1 The Hazardous Waste Storage/Treatment Facility Permit limits burn cage operation as follows:

2.4.1.1 Thirty-five (35) cubic yards per burn

2.4.1.2 Two (2) burns per day.

3.0 EXPLOSIVE CONTENT:

ITEM DESCRIPTION	PART NO.	QTY. EA	N.E.W EA	MATERIAL
Lightly contaminated materials.	**NA**	**NA**	**Trace**	**NA**

This item contains primary explosive.

WORK SITE AND SAFETY EQUIPMENT

OPERATION	SITE	SITE NO.	MAX N.E.W.
burning materials in burn cage	**burn cage**	**675**	**Trace**

PERSONAL PROTECTIVE EQUIPMENT

FOOTWEAR		BODY WEAR		FACE WEAR		HEAD/EAR WEAR		HAND WEAR	
Steel Toe	**x**	Coverall	**x**	Glasses/shield	**x**	Plugs		Heat Reflective	
Conductive		Cotton (under)		Goggles		Muff		Cut resistant	
Boots (rubber)		Smock		Full face		Hard hat		Canvas	
		Special		Respirator		Dust Cap		Leather	
				Half mask				Latex/Vinyl	
				Full face					

SPECIALIZED SAFETY EQUIPMENT

Conductive Wrist Strap		Non Sparking Tools		Fall Protection	
Bench Shield		Ground Fault Interrupter		EED approved meter	x
Aluminized Suit		Paint Hood		Water tank & pump*	**x**

***= "**Indian Pump"**.**

5.0 PROCEDURE SAFETY

5.1 Initial Startup

5.1.1 This operation **will not** be conducted when any of the following weather conditions are present:

A. The wind velocity exceeds 15 MPH.
B. There is a lightning alert in effect.
C. There is restricted visibility (fog, blowing snow, sand and dust).

5.1.2 Area Inspection

5.1.2.1 Verify that the telephone or an alternate form of communication is operational. DO NOT proceed without a communication link to operations.

5.1.2.2 Determine that no unauthorized personnel are in the area. The area shall be secured by driving to the burn pad area and verifying that no one is there. Close and lock gate D. Drive to gate A (or Gates F & H) and close it, ensuring that no one is in the vicinity.

5.1.3 Materials slated for burning are collected from the various user sites and brought to the burn cage over a period of time.

NOTE: Items that contain measurable quantities of explosives are **NOT** allowed to be treated in this fixture. They require the filling out of a "Burn Ticket (Attachment 1)" and an "ATPG Waste Explosive Tracking Form (Attachment 2)" for alternate disposal treatment.

5.2 Normal Operations

5.2.1 The Safety Checklist located in Attachment 3 to this DOP, shall be filled out and initialed by both the Safety Observer and Safety Second for all Burn Cage operations.

5.2.2 Pick up the material to be burned from the requesting work site or meet the transporter at the burn cage.

5.2.3 Transfer the material into the cage and bar the door.

5.2.5 Run an ignition cable from the burn cage to the burn shelter (~ 170 feet).

5.2.6 Check the circuit.

5.2.6.1 The safety observer shall verify the integrity of the ignition cable from the control point to the end of the ignition cable by checking the line for open- or short-circuit conditions. With an operator at each end of the ignition line, use an EED meter to check the integrity of the cable.

5.2.6.2 **To check for opens,** Test first for breaks (opens) in cable by twisting the lines at one end and checking to ensure there IS continuity at the other end.

5.2.6.3 **To check for shorts**, Test between the lines by untwisting the ends of the cable and checking to be sure there is NO continuity (open circuit).

5.2.6.4 If both conditions (open check & short check) are not detected discontinue the operation until repairs have been made and these checks have been successfully conducted.

5.2.6 Ignition

NOTE: When a burn is to be conducted unlock the door and splash a small amount of fuel oil or kerosene (~1 gal.) over the pile, if required.

5.2.7.1 Place shorted firing line in a dual key lock box, Safety Observer and Safety Second will each retain a key to the lock box. One operator at the burn shelter shall guard the shorted ends of the ignition cable.

5.2.7.2 Verify that the firing line is shorted before connecting the ignition device to the firing line.

<u>WARNING:</u> Stand more than 10 feet away from the burn cage during this step to avoid accidental ignition of the explosive.

5.2.7.3 The safety observer will then connect the ignition device (a small amount of #000 fine steel wool) onto the firing line.

5.2.7.4 The safety observer will insert the ignition device into a plastic bag containing 10 grams of single base flake propellant and tape it closed.

5.2.7.5 The ignition device is then positioned within the cage under a portion of the fuel soaked material. The Safety Observer locks the cage and returns to the burn shelter.

5.2.7.6 Safety Observer and Safety Second will unlock lock box and the ends of the ignition cable are un-shorted and attached to the ignition line. The line is then momentarily energized and ignition is verified.

5.2.7.7 Both operators (and any observers) will remain in the burn shelter to observe the burn until the risk of a secondary grass or brush fire has abated.

5.3 Normal Shutdown

5.3.2 Clean the cage as needed by moving the ash into a labeled collection drum. This should be done no sooner than 24 hrs after the burn.

5.3.3 Inspect the burn cage for signs of damage or fatigue and report needed repairs to the maintenance manager.

6.0 MALFUNCTION PROCEDURE

6.1 Emergency Shutdown/Operations

6.1.1 Report any secondary grass fire to the security desk as soon as it is detected.

6.1.2 If an explosion occurs all personnel are to remain in the burn shelter until all evidence of fire has subsided and then leave the area locking the gate behind them

WARNING: DO NOT REENTER THE AREA UNTIL AFTER AN INCIDENT INVESTIGATION PLAN HAS BEEN WRITTEN AND APPROVED.

6.2 Restart After Emergency

6.2.1 Following any remediation an on site review by management and the safety engineer is required before resuming operations, to verify that the area is returned to its normal operating condition.

6.3 Contingency Failures

6.3.1 Should the fire fail to ignite, wait a minimum of ten minutes and then examine the ignition system and make needed repairs before returning to step 5.2.7.

H4841 EXPLOSIVE CONTAMINATED WASTE BY CAGE BURN

Date: ____________ Comments: ____

1. Determine that the area is clear by following procedure in 5.1.2.2.		
2. Close Gate A (or Gates F & H) and raise flag at gate F.		
3. Check ignition cable with galvanometer or other EED meter, for opens and shorts.		
4. Verify firing line is shorted, put shorted line into dual key lock box. Safety Observer and Safety Second will each retain a key.		
5. The Safety Observer shall re-verify that the above ground ignition cable is shorted prior to connecting the ignition device to the line.		
6. The Safety Observer places the ignition device on the desired ignition point insuring the integrity of the device.		
7. The Safety Observer returns to burn shelter.		
8. After a final visual inspection of area, Safety Observer and Safety Second will unlock box and the ends of the ignition cable are un shorted and attached to the ignition source then momentarily energize circuit to activate the ignition device.		
9.		
10.		

Attachment 3

Site Map

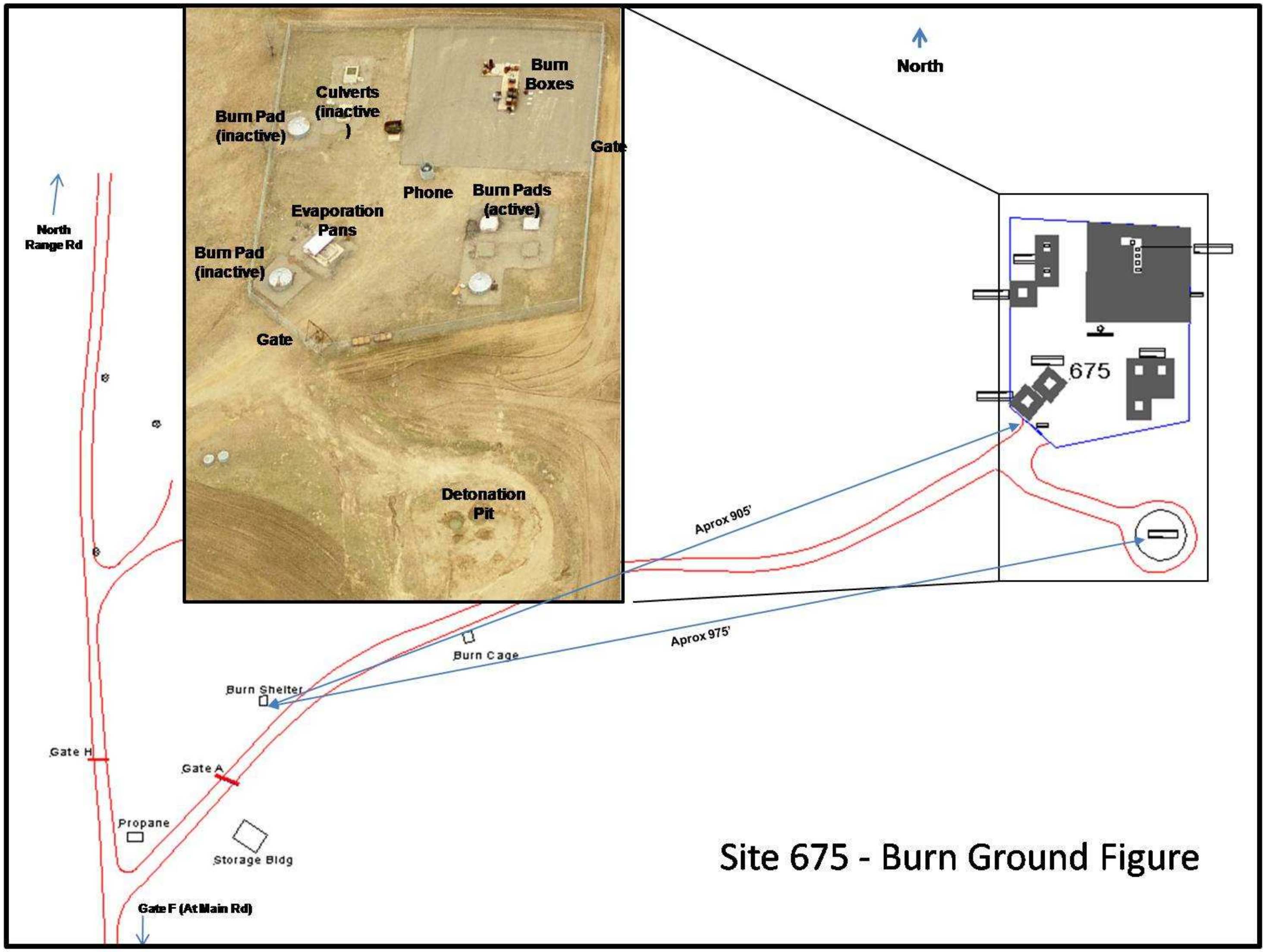


Figure 1

ATPG DETAILED OPERATING PROCEDURE

DOP # H4842 **REV. U** **Expiration Date:2-17-16**

TITLE: **Destruction of Explosives by Pad Burning**

REVIEW PANEL APPROVALS:

OPERATOR	SIGNATURE	DATE
Jake Kindseth	SIGNATURE ON FILE	2-17-15

ENGINEER	SIGNATURE	DATE
Mike Cypher	SIGNATURE ON FILE	2-17-15

MANAGEMENT	SIGNATURE	DATE
Wayne Nelson	SIGNATURE ON FILE	2-17-15

SAFETY	SIGNATURE	DATE
Erik Monsos	SIGNATURE ON FILE	2-17-15

SAFETY TRAINING REQUIREMENTS

OPERATION	SAFETY OBSERVER	SAFETY SECOND
Set up and burning on an open pad	1,2,12	1,2,12
Weather cover removal and replacement	Qualified forklift operator	

WORK AUTHORIZATION

SAFETY OBSERVER SIGNATURE	RESTRICTIONS	TIME PERIOD	MANAGEMENT/DELEGATE
		/	
		/	
		/	
		/	

SAFETY SECOND SIGNATURE	RESTRICTIONS	TIME PERIOD	MANAGEMENT/DELEGATE
		/	
		/	
		/	
		/	

1.0 SUPPORTING DOCUMENTS

1.2 Burn Ticket (Attachment 1)

1.3 ATPG Waste Explosive Tracking Form (Attachment 2)

1.4 Safety Check List (Attachment 3)

1.5 Site Map (Figure 1)

1.6 SOP 675 – Burn ground

2.0 DEVICE DESCRIPTION

2.1 Burn Pad as it applies here is a concrete tub with a fire brick floor.

2.2 Materials to be disposed of in this manner are bulk secondary high explosive, bulk pyrotechnic powders, bulk propellant, bare billets of secondary high explosive and bare sections of solid propellant. Trace amounts of explosives on hardware may also be burned for decontamination purposes. An Addendum will be written to give the specific instruction for any material to be burned.

2.3 The ignition device is a small plastic bag with a small amount of fine #000 steel wool with approximately 10 grams of flake propellant (ie. Red Dot) mixed in.

NOTE:
The following are absolute maximum quantities allowed by our hazardous waste treatment permit, there are more strict (smaller) operational limitations driven by safety considerations and listed in section 3

2.4 Hazardous Waste Permit Conditions

2.4.1 The maximum treatment capacity is 1,000 pounds NEW of waste explosives/ propellants <u>per burn</u> as specified in MN Rules 7045.0542, Subpart 9. Simultaneous burns may occur at various treatment units; however, the combined explosive/propellant treatment limit of 1,000 pounds within 1,250 feet from the property line <u>must not be exceeded</u>.

2.4.2 The Hazardous Waste Storage/Treatment Facility Permit limits burn pad operation as follows:

2.4.2.1 One thousand (1,000) pounds NEW per burn combined across all pads being used at one time

2.4.2.2 Three (3) burns per day per pad (for safety this is limited to one (1) burn per day

2.4.2.3 Yields nine thousand (9,000) pounds NEW treated per day total for three (3) pads.

NOTE: This device description purposely excludes items containing metal components, except when decontaminating miscellaneous hardware.

3.0 EXPLOSIVE LIMITS PER PAD:

ITEM DESCRIPTION	PART NO.	QTY. EA	N.E.W EA*	MATERIAL
bulk secondary H.E.	**NA**	**NA**	**1000 lbs.**	**NA**
bulk propellant	**NA**	**NA**	**1000 lbs.**	**NA**
bare solid propellant	**NA**	**1**	**6 lbs**	**NA**
pyrotechnic powder dry	**NA**	**NA**	**5 lbs.**	**NA**
pyrotechnic powder, mineral oil soaked**	**NA**	**NA**	**150lbs**	**NA**
Decon hardware * **	**NA**	**NA**	**Trace**	**NA**

* Per pad, a total of three pads may be burned in non simultaneous ignitions

** Mineral oil or water soaked materials may be combined with wood pellets on a one volume of sludge to three volumes of wood pellets basis. Total bed depth must not exceed 3 inches.

*** Decontamination will take place on a bed of wood and pallets of wood pellets and wood. Quantity as required to reach decontamination requirements.

4.0 WORK SITE AND SAFETY EQUIPMENT

OPERATION	SITE	SITE NO.	MAX N.E.W.
OB/OD BURNING	**BURN GROUND**	**675**	**3000 LBS.**

PERSONAL PROTECTIVE EQUIPMENT

FOOTWEAR		BODY WEAR		FACE WEAR		HEAD/EAR WEAR		HAND WEAR	
Steel Toe	**X**	Coverall	**X**	Glasses/shield	**X**	Plugs		Heat Reflective	
Conductive		Cotton (under)		Goggles		Muff		Cut resistant	
Boots (rubber)		Smock		Full face		Hard hat		Canvas	
		Special		Respirator		Dust Mask	X	Leather	**X**
		Back Belt	*	Half mask				Latex/Vinyl	
				Full face					

* As defined in Step 5.2.3.3

SPECIALIZED SAFETY EQUIPMENT

Conductive Wrist Strap		Non Sparking Tools	X	Other (specify)	X
Bench Shield		Ground Fault Interrupter		Blasting Galvanometer (or)	X
Aluminized Suit		Paint Hood		EED approved meter	X

5.0 PROCEDURE SAFETY

Note: If this operation is performed in conjunction with burn box or water pan operations, the propellant pads will be lit first per this DOP. After the pad fire is well established the burn box will be lit per the appropriate DOP and after the burn box fire is well established the water pan will be lit per the appropriate DOP.

5.1 Initial Startup

This operation **will not** be conducted when any of the following weather conditions are present:

A- The wind velocity exceeds 15 MPH
B- There is a lightning alert in effect.
C- There is restricted visibility (fog, blowing snow, sand or dust).

5.1.1 A specific addendum will be written to describe the specific instructions for the destruction of each material or device or device to be sterilized. The addendum will be signed off by the DOP review committee and will include specifics on quantities, and fuel if needed.

5.1.2 Area Inspection

5.1.2.1 The Safety Checklist attached to this DOP shall be filled out and initialed by both the Safety Observer and Safety Second for all Burn Pad operations. Any equipment used for operations covered by this DOP must be checked out functionally. Any equipment found defective shall be physically removed from the operation setup and returned to the lab for repair prior to use.

5.1.2.2 Verify that the telephone or an alternate form of communication is operational. DO NOT proceed without a communication link to operations.

5.1.2.3 Determine that no potential ignition source exists at any of the other work sites in the OB/OD area. Any and all fires shall have been completely extinguished at the other burn sites.

5.1.2.4 Remove the weather protector from over the pad(s). This step may require the services of a qualified forklift operator.

5.1.2.5 Determine that no unauthorized personnel are in the area. The area shall be secured by driving the full length of the North Range Road and verifying that no one is there. Then close Gate H. Drive up to the burn boxes and see that no one is present, then drive to Gate F and close it verifying that no one is anywhere in the vicinity. See Figure 1. Gate D shall be locked whenever the Burn Ground is unattended.

5.2 Normal Operations

Note: The Safety Observer and the Safety Second shall each have in their possession a firing line lock-out key. Except for firing circuit check out no operator shall have control of both keys since both keys are required to activate the firing line. The safety observer shall have and control the key to safety lock switch #2 and the safety second shall have and control the key to safety lock switch #1.

5.2.1 Ignition cable

5.2.1.1 An underground ignition cable runs from the burn shelter to a junction box centrally located in the burn area.

5.2.1.2 An above ground ignition cable is laid between the open burn pad and the junction box.

5.2.2 Circuit check

5.2.2.1 The safety observer with the assistance of the safety second shall verify the integrity/continuity of the ignition cable from the control point to the opposite end of the ignition cable at the burn pad by checking the line for open or short-circuit conditions.

5.2.2.3 **To check the firing line for continuity.** **<u>For this step only</u>**, both keys shall be in the possession of one of the operators. Using hand held radios and a DVM one operator locates in the control shelter, the other at the burn pad end of the firing line. With the above ground firing cable connected to the underground firing cable connect the DVM to the furthest end (initiator end)of the line. Set the DVM to the ohms scale. First check the line with both keys inserted and in the off position. The line should read shorted (15 to 50 ohms). Next, check the line with both keys on. The line should read open (1 megohm or higher). Next, check the line for voltage with both keys off. The line should read zero volts. Finally check for fire voltage by turning both keys on and depressing the fire button. The meter should read approximately 120 vac. Upon satisfaction of the condition of the firing system turn both keys off and give one key to each operator.

5.2.2.4 If the firing system/lines are found to be faulty discontinue the operation until repairs have been made and these checks have been successfully conducted.

5.2.3 Pad Preparation-

WARNING: Ensure test pad has not been used previously today as it requires a 24 hour cool down period between burns.

5.2.3.1 Inspect the pad(s) surface and remove any foreign material (rocks, metal etc.) and place it in the proper waste disposal container.

5.2.3.2 Sweep and shovel any and all material from the floor of the pad(s) and place it in the proper waste disposal container.

WARNING: Tracer and igniter compositions are extremely sensitive to initiation by friction. Always wear leather gloves when handling the material. Always be careful not to walk on any material as it is being spread out on the pad.

5.2.3.3 Containers weighing up to 50 lbs. recommend the operator to wear a back belt (optional). If the containers are over 50 lbs. and under 100 lbs., then two operators are required to lift them. If the containers before being emptied weigh less than 50 lbs. each, then the safety second will remain at the control point while the operator empties the container. If the containers weigh more than 50 lbs., then a third person will be required for the operation. He will remain at the control point and be instructed to call 7777 in the event of a mishap.

WARNING: Do not bring any vehicles closer than 50 feet from the burn pads when there is energetic material exposed. Hot exhaust system on the vehicle may ignite the material and cause serious injury or death. Unload containers off truck then move vehicle beyond the 50 ft safe zone prior to opening any of the containers on the pad.

5.2.3.4 Place the fuel (if required) and the material(s) to be destroyed as described in the specific addendum for the material.

WARNING: Spread the material across the surface of the pad(s) to obtain a layer thickness of not more than three inches (stick propellants may be spread in an even layer as thick as required to the 1000 lb. per pad burn limit). Exceeding the limit may cause a extremely violent reaction when burning and may cause damage to the pad.

5.2.4 Ignition

5.2.4.1 The Safety Observer and safety second shall lock both safe/arm switches to the "safe" position and keep the key on his/her person for the duration of the operation.

5.2.4.2

5.2.4.3 With the above ground ignition cable still connected to the underground firing line using the DVM verify the ignition line is shorted and read zero volts before connecting the ignition device (steel wool element) to the firing line.

WARNING: Stand more than 10 feet away from the burn pad during this step to avoid accidental ignition of the explosive.

5.2.4.4 The safety observer will then connect the ignition device (steel wool element) to the firing line. Using a small plastic bag partially filled with a single base propellant insert the ignition element into the bag If multiple pads are to be burned simultaneously, the lines will be wired in parallel. In this case, wire the ignition devices on last after all wiring is completed. Use tape or wire nuts to insulate the joints. This will avoid inadvertent shorts.

5.2.4.5 If using a fuel driven fire for sterilization fuel oil/ kerosene may be spread to help the fire ignition.

5.2.4.6 The safety observer will insert the ignition device(s) in direct contact with the material to be burned. If more than one pad is used connect ignition devices in parallel. A powder wick may be added between pads if desired.

5.2.4.7

5.2.4.8 eturn to burn shelter. Close and lock gate D when leaving the burn pad area.

5.2.4.9 After a final visual inspection of the area, both operators shall insert their keys into the control panel and switch from the “SAFE” to the “ARM” position. The safety observer shall then activate the momentary “FIRE” switch to initiate the burn.

5.2.4.10 One operator will remain in the burn area to observe the burn and the surrounding area for a period of at least 20 minutes or until the fire has subsided when sterilizing equipment. If no signs of fire are observed after that time the personnel are free to leave. Any observers may leave the burn ground site thru Gate F after the initial event subsides.

5.3 Normal Shutdown

5.3.1 Area Control

5.3.1.1 After the burn is complete the OB/OD area will be locked and not reentered for two hours (if mineral oil or water wet explosive has been burned, the reenter time will be 4 hours) and the burn pads will not be reloaded for a period of 24 hours.

5.3.2 Administrative

5.3.2.1 Fill out the documents found in Attachments 1 & 2 and update the hazardous waste database.

5.3.3 Clean up / Clean out

5.3.3.1 After the two hour (4 hour if specified above) wait period (5.3.1.1), inspect the area looking for unburned material. Collect, place in properly labeled drum and store in magazine any such material for inclusion in the next burn.

5.3.3.2 Sweep the floor of the pad and place the debris in a hazardous waste disposal container. This is especially important after metal decontamination processes.

5.3.3.3 Replace the pad cover. This must be done by the end of day and prior to rain. Arrangements may be needed to have this done by a qualified forklift operator. This requirement may be superseded with written permission of site supervisor on a case-by-case basis.

6.0 MALFUNCTION PROCEDURE

6.1 Emergency Shutdown/Operations

6.1.1 Should an ignition failure occur, wait a minimum of 30 minutes and then conduct a system examination. Correct the problem and then return to step 5.2.4.

6.1.2 In the event of a detonation, continue surveillance of the area until the threat of grass or brush fires has passed. If a fire is observed report its general location to the security desk with instructions NOT TO ENTER THE BURN GROUND AREA.

6.1.3 Close the area and notify both management and the safety engineer. DO NOT REENTER THE AREA UNTIL AFTER AN INCIDENT INVESTIGATION PLAN HAS BEEN WRITTEN AND APPROVED.

6.2 Restart After Emergency

6.2.1 Following any incident requiring an emergency shutdown, an on-site review by management, the environmental engineer, and the safety engineer is required before resuming operations to verify that the area is returned to its normal operating condition.

6.3 Contingency Failures

6.3.1 In case of a hazardous waste spill refer to the ATPG Hazardous Waste Contingency Plan for instructions.

Burn Ticket

BurnID
Record Number
Quantity
Item
Storage location
State number
Generator name
Ticket Issue Date
Method name
Tally Number

Date destroyed
Operator
Witness

☐ **Government Witness Required ?**

Instruction name
Instruction

Fuel Used

Attachment 1

ATPG WASTE EXPLOSIVE TRACKING FORM

(including bulk explosive and scrap/waste explosive)

Today's Date: ______________________

Waste Description: ____

Generating Location: ____

Total No. of Containers: ____
(i.e. 2 bags)

Total No. of Units: ____
(i.e. 3,500 PGU noses, or "1" if waste is bulk mat'l)

Net Explosive Weight <u>per unit</u>: ________________________________
(in grams or kilograms)

Tally Number: ____

Program Name: ____

Storage Location: ____

Requestor: ___________________________ / ________________
Print Name **Initials**

<u>NOTE:</u> Any container holding hazardous waste MUST have the <u>waste name</u>, <u>the generation date</u>, <u>the generating location</u>, <u>the above ATPG S/N</u>, AND the words "<u>Hazardous Waste</u>" written on the container or on a <u>label</u> affixed to the container.

****If the above is not complete at the time of pick-up, then the material will not be picked up.****
Forward this form to Don Newman or Dave Rastetter when completed.

For HazWaste Team Only:

Attachment 2

Site Map

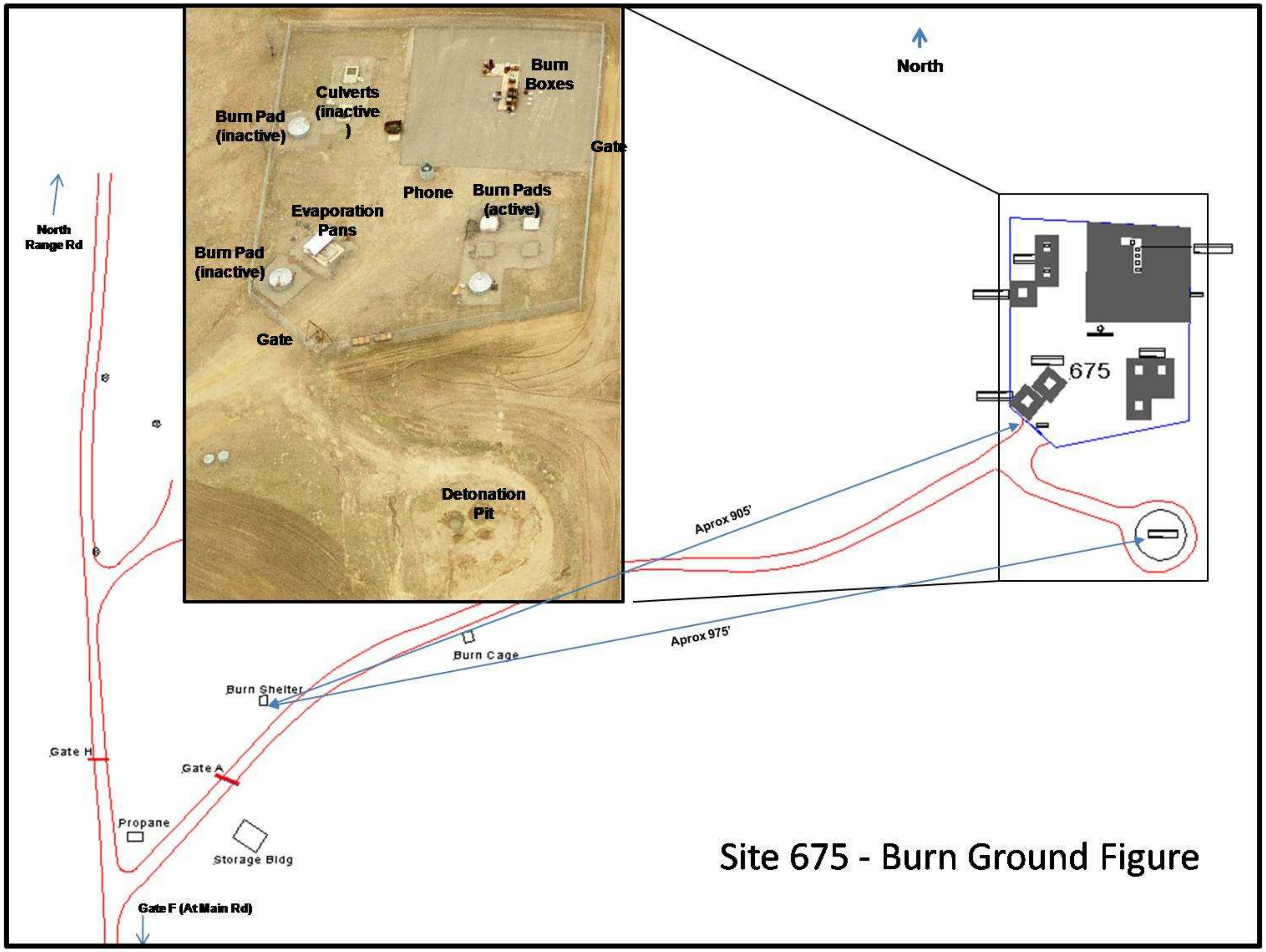


Figure 1

H4842 DESTRUCTION OF EXPLOSIVE BY PAD BURN

Date: ____________ **Comments:** ____

		Safety Observer	Safety Second
1.	Secure site and close gates H & F and raise flag.		
2.	Determine that all equipment checks out functional.		
3.	Check that phone or alternate form of communications is operational.		
4.	Check ignition cable with galvanometer or other EED meter, for opens, shorts, and voltage.		
5.	The Safety Observer and Safety Second each have a key for ignition circuit lockout in their possession.		
6.	The Safety Observer and Safety Second locks the “safe/arm” to the “safe” position and keeps key in possession for duration of the operation.		
7.	The Safety Observer shall re-verify that the above ground ignition cable is connected at the culvert prior to connecting the ignition device to the line.		
8.	The Safety Observer places the ignition device on the desired ignition point insuring the integrity of the device.		
10.	Both operators return to burn shelter.		
11.	After a final visual inspection of area, Safety Observer and Safety Second use keys to move switch from “safe” to “arm” position. Safety Observer then activates the Fire switch to initiate the burn.		

Attachment 3

ORBITAL ATK
TPG DETAILED OPERATING PROCEDURE

DOP #H4843 **REV. L** **Expiration Date:** 12-17-16

TITLE: DESTRUCTION OF SCRAP EXPLOSIVES BY DETONATION

REVIEW PANEL APPROVALS:

OPERATOR	SIGNATURE	DATE
Jake Kindseth	[signature]	12/17/15

ENGINEER	SIGNATURE	DATE
Drew Gordon	Drew Gordon	15 Dec 2015

MANAGEMENT	SIGNATURE	DATE
Greg Filo	[signature]	12/15/2015

MANAGEMENT	SIGNATURE	DATE
Erik Monsos	[signature]	12/15/15

SAFETY TRAINING REQUIREMENTS

OPERATION	SAFETY OBSERVER	SAFETY SECOND
Destruction of Explosives	1, 2, 5, 12	1, 2, 12

WORK AUTHORIZATION

SAFETY OBSERVER SIGNATURE	RESTRICTIONS	TIME PERIOD	MANAGEMENT/DELEGATE
		/	
		/	
		/	

SAFETY SECOND SIGNATURE	RESTRICTIONS	TIME PERIOD	MANAGEMENT/DELEGATE
		/	
		/	
		/	

1.0 SUPPORTING DOCUMENTS

1.1 TPG Facility SOP 600

1.2 TPG Site SOP 675

1.3 TPG Emergency Plan

1.4 Burn Ticket (Attachment 1)

1.5 TPG Waste Explosive Tracking Form (Attachment 2)

1.6 Safety Check List (Attachment 3)

2.0 DEVICE DESCRIPTION

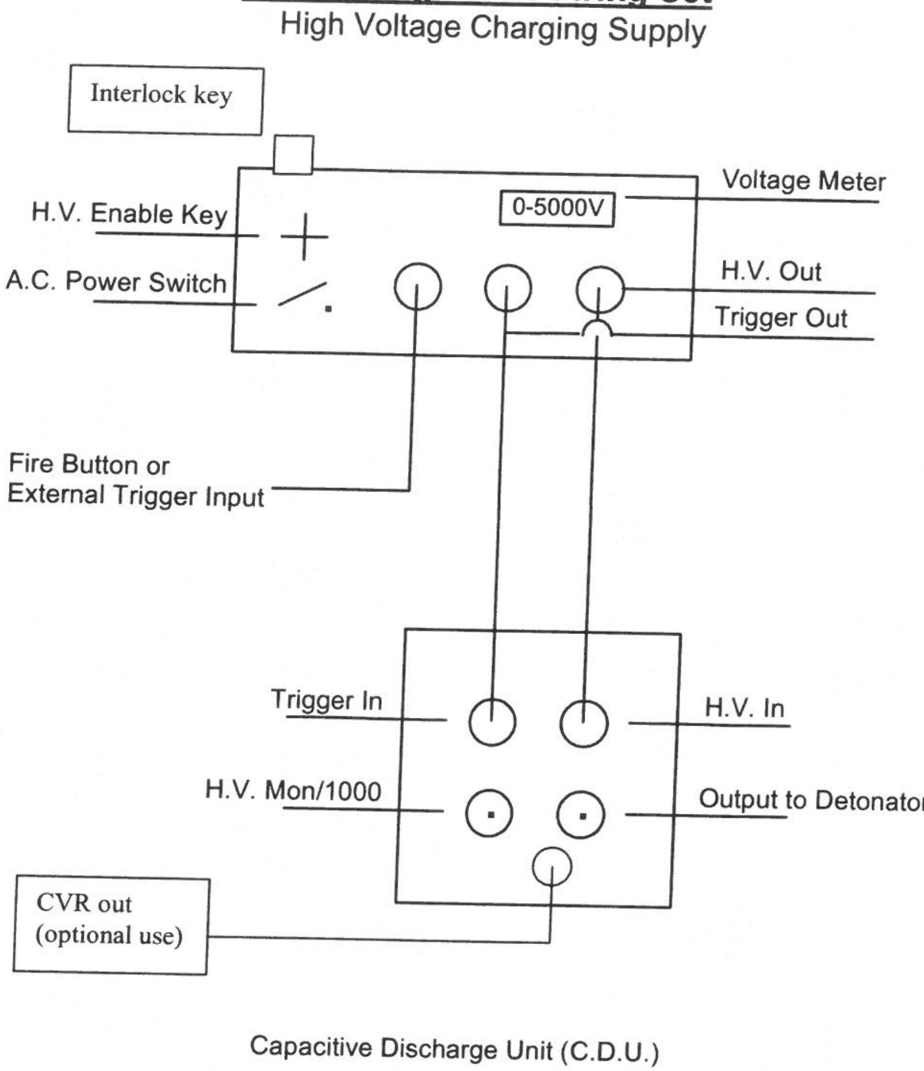
2.1 This process is to be used to destroy secondary explosives in solid, billet form or propellant, pyrotechnics, primary and secondary explosives contained within ordnance devices and/or their subassemblies. Blasting under this DOP should only be used to destroy devices that are not suitable for open burning or other means of disposal.

2.2 All devices will be destroyed utilizing an exploding bridgewire detonator as an initiating device. EBW's are relatively low sensitivity electric detonators which require high energy levels to detonate, but as always all explosive items should be handled with extreme care. EBW's are assembled with a gold bridgewire, an initiating explosive and a high density output explosive. EBW's vary in physical size and explosive weight, but all have similar electrical firing characteristics.

- All fire: 400 Kwatts at 320 amps
- No fire: 60 Kwatts at 75 amps

2.3 A diagram of the fire set is shown in Figure 1.

High Voltage EBW Firing Set



Note: Shown above is an example of the basic feature of Firing Sets currently being used at ATPG. These sets have additional features for monitoring various currents and voltages but these features are not essential for basic operation. Read and follow the operating instructions for each particular fire set. Also become familiar and check out each firing set prior to using it for an explosive test.

Figure 1

NOTE:
The following are absolute maximum quantities allowed by our hazardous waste treatment permit, there are more strict (smaller) operational limitations driven by safety considerations and listed in the item specific Addendum

2.4 Hazardous Waste Permit Conditions

2.4.1 The maximum treatment capacity is 1,000 pounds NEW of waste explosives/ propellants per burn as specified in MN Rules 7045.0542, Subpart 9. Simultaneous burns may occur at various treatment units; however, the combined explosive/propellant treatment limit of 1,000 pounds within 1,250 feet from the property line must not be exceeded. For example, hardware with 50 pounds NEW can be treated in each of three (3) burn boxes and 850 pounds NEW propellant can be treated on one (1) burn pad at the same time because the total pounds NEW being treated does not exceed 1000 pounds NEW.

2.4.2 The Hazardous Waste Storage/Treatment Facility Permit limits the detonation pit operation as follows:

2.4.2.1 Twenty-five (25) pounds NEW per detonation

2.4.2.2 Five hundred (500) detonations per day

2.4.2.3 Twelve thousand five hundred (12,500) pounds NEW per day.

3.0 EXPLOSIVE CONTENT:

ITEM DESCRIPTION	PART NO.	QTY. EA	N.E.W. EA	MATERIAL
Primary Explosives *,**	N/A	N/A	1/4 lb.	
Secondary Explosive**	N/A	N/A	20 lbs.	

***This item contains primary explosive.**
****See details in material specific addendum**

4.0 WORK SITE AND SAFETY EQUIPMENT:

OPERATION	SITE	SITE NO.	MAX N.E.W.
Demolition by Detonation	Burn Grounds	675	3000 lbs.

PERSONAL PROTECTIVE EQUIPMENT

FOOTWARE		BODY WEAR		FACE WEAR		HEAD/EAR WARE		HAND WEAR	
Steel Toe	x	Coverall	x	Glasses/shield	x	Plugs	x	Heat Reflective	
Conductive		Cotton (under)		Goggles		Muff	x	Cut resistant	
Boots (rubber)		Smock		Full face		Hard hat		Canvas	
		Special		Respirator		Paper Dust Mask		Leather	x
				Half mask				Latex/Vinyl	
				Full face					

SPECIALIZED SAFETY EQUIPMENT

Conductive Wrist Strap		Non Sparking Tools		Fall Protection	
Bench Shield		Ground Fault Interrupter		Keyed Lock Box	x
Aluminized Suit		Paint Hood		Other (specify)	x
				- Blasting Galvanometer (or)	x
				- EED Approved Meter	x

PROCEDURE SAFETY

Note: Any equipment or instrumentation that is part of this operation shall be inspected. Any equipment found to be defective or damaged <u>must</u> be physically / electrically disconnected from the setup. The equipment shall then be returned to the instrument lab for maintenance and / or repair before further use.

5.1 Initial Startup

5.1.1 Verify that telephone or two-way radio communication between the burn ground site and the Operations building is functional.

5.1.2 Sign off the included safety checklist as the steps are performed the first time in any day.

5.1.3 The site will be inspected for evidence of unexploded ordnance or explosive material remaining from previous demil operations. Any explosive material or ordnance located must be dealt with before proceeding with this procedure. (See Section 5.3)

5.1.4 The site will be inspected for potential fire hazards caused by dry grass or other vegetation. Any fire hazards must be removed prior to proceeding with this procedure.

5.1.5 Lay out firing circuit as described in Figure 1.

Warning: This operation requires a 2-key safety system and properly stickered firing set. The firing set key shall be in the possession of the Safety Observer and the lock box key shall be in the possession of the Safety Second. Both keys are required to activate the firing circuit and at no point in this operation shall both keys be in the possession of a single operator. This will prevent inadvertent detonation of the devices to be demiled which could result in death or injury.

5.1.6 Firing Set and firing line(s) preparation and checkout.

5.1.6.1 Check the full length of each firing line for abnormalities such as gouges, cuts, abrasions, etc. Cut away any bad line that may exist. Strip back approximately three inches of outer insulation from the detonator end, and then separate the shield from the center conductor.

5.1.6.2 Refer to attached Safety Checklist – Pre Test "Fire Set Check-out." With the firing circuit secured (per 2-key system) in the off condition and the C.D.U. charging line(s) shorted and secured, attach a "header" (spark gap device or single filament from the ground braid of the firing line) to the previously prepared end of the firing line(s). Connect the other end of the firing line to the output of the appropriate C.D.U.

5.1.6.3 Connect C.D.U. to firing set, enable the firing set, charge to 3,000 to 4,000 volts and fire the set. A high voltage snap or physical witness should be witnessed at the header. A current viewing resistor may also be monitored to electrically verify the output level and timing of the C.D.U.(s).

5.1.6.4 Upon satisfaction of the firing set / firing line combination, once again secure and lock out the firing set in the off condition and remove key. Short the C.D.U. charging line, lock in box and remove the key from the lock box. The firing set key shall be in the possession of the Safety Observer and the lock box key shall be in the possession of the Safety Second.

5.1.7 Detonator Check Out

5.1.7.1 With the firing line(s) shorted and disconnected from the C.D.U., connect the detonator(s) to the firing line(s). Connect one lead of the detonator to the shield and the other to the center conductor.

5.1.7.2 From behind a shield use a blasting galvanometer or EED approved meter to verify continuity of the detonator/firing line combination. The measured resistance should be only slightly higher (less than 1Ω) than a shorted firing line. Upon verification of a good detonator, reapply short to firing line and disconnect the detonator.

5.1.8 Preparing a detonation pit – Verify or prepare a detonation hole, not less than four feet deep and large enough in diameter to accommodate the bundle of item(s)being destroyed, shall be dug, reinforced with a 10 inch Sonotube and inspected for its integrity.

5.1.9 Once the site is found to be in an acceptable condition and the firing lines checked out, clear the burn ground by performing the following steps. See Figure 2 for a site drawing.

5.1.9.1 Drive the entire length of the North Range Road and verify that it is clear of personnel.

5.1.9.2 Shut gate H.

5.1.9.3 Escort all nonessential personnel out of the burn ground site.

5.1.9.4 Instruct all demil witnesses to stay at the burn ground shelter.

5.1.9.5 Shut gate F and raise the gate F flag

5.1.10 Complete Pre-test section of safety checklist.

5.2 Normal Operation

Note: The steps in 5.2.1-5.2.4 maybe performed at the Effects site or a loading building prior to the completion of the steps in 5.1.

5.2.1 A specific addendum will be written to describe the specific instructions for the destruction of each material or device. The addendum will be signed off by the DOP review committee and will include specifics on quantities, donor charges and bundle making requirements

5.2.2 Preparing the Bundle - Using tape or rope, bind the materials to be destroyed into a single bundle per addendum.

Caution: A single bundle is not to exceed a 20-pound NEW limit total weight.

Note: Alternately, if deemed appropriate, items may be demilled above ground at the discretion of management.

5.2.3 Prepare the donor/transfer charge - Position the donor/transfer charge on the bundle and secure it in place per addendum. Install Primadet assembly to detonate the donor charge and secure with tape or equivalent

Note: The donor/transfer charge shall consist of an H.E. booster assembly of sufficient size to ensure initiation and destruction of the elements within the bundle and a Primadet assembly with Primacord

of sufficient length to be exposed at the surface after the bundle is buried in the detonation hole.

5.2.4 Insert the prepared charge from the previous step inside a smaller 8-inch diameter Sonotube with the Primacord extending from the top. The Sonotube should have a rope attached to facilitate removal of the tube and charge from the detonation hole in case of a malfunction.

Note: Demil witness may observe the bundles being lowered into the detonation hole at the discretion of the Safety observer.

5.2.5 Lower the 8-inch diameter Sonotube to the bottom of the detonation hole and extend the Primacord such that the free end is clear of the pit.

5.2.6 Cover the tube with a minimum of two sandbags.

5.2.7 Arming Procedure –

5.2.7.1 Remove all observers and nonessential vehicles from the hazard area to the control bunker. Indicate that they shall remain there until given the all clear from the Safety Observer.

5.2.7.2 Ensure that the firing circuit is secured in the off condition, the key(s) removed and in the possession of the Safety Observer and Safety Second. Check for zero high voltage on the C.D.U. monitor(s).

5.2.7.3 The Safety Observer/Demolitionist will approach the detonation pit and attach the detonator(s) to the shorted firing line(s).

5.2.7.4 The detonator may now be attached to the Primacord extending from the detonation hole and secured utilizing a detonator holder, tape or other suitable device that allows detonator removal if there is a malfunction.

5.2.7.5 Un short and connect the firing line to the C.D.U., then retreat to the control point.

5.2.7.6 Confirm that the first three items in the Normal Operations section of the Safety Checklist are complete and signed off

5.2.8 Detonating

5.2.8.1 The Safety Second will then remove the charging lines from the lock box. The Safety Observer/Demolitionist will then remove short(s) from the charging line(s) and attach it to the high voltage charging supply. The Safety Observer will then enable the firing set with the key and charge the firing set.

5.2.8.2 Monitor C.D.U. voltage meter(s) to assure C.D.U. (s) is charged (approximately 4 volts indicated).

5.2.8.3 Alert all personnel with a countdown to fire.

5.2.8.4 Trigger firing set by depressing fire button on charging unit.

5.2.8.5 Safety observer will then safe the firing circuit by removing the key, shorting the charging line (s) and locking up the charging lines. The firing set key shall be in the possession of the Safety Observer and the lock box key shall be in the possession of the Safety Second.

5.2.9 Complete normal operations section of the checklist.

5.3 Normal Shutdown

5.3.1 After detonation, delay 5 min, the pit area will be inspected for explosive material/devices that have been expelled by the blast. Bare explosive pieces may be picked up and packaged for return to storage or set aside for inclusion in the next bundle to be destroyed.

5.3.2 All other items must be flagged "DO NOT TOUCH" until the lead engineer has analyzed the situation and a decision has been made as to their safe disposal.

Note: This DOP does not cover the disposition of such items. A specific addendum will be written for these items.

5.3.3 Complete post test section of the safety checklist (Attachment 3).

5.3.4 Attachments 1 and 2 to this document must be filled out and filed. Update the Hazardous Waste database.

5.0 MALFUNCTION PROCEDURE

5.1 Restart after a system failure.

6.1.1 In the event of the charge failing to detonate, check C.D.U. voltage monitor to determine the firing set had triggered and discharged. If not repeat steps in 5.2.8.

6.1.2 If second attempt yields same results, proceed to emergency shutdown to troubleshoot anomaly.

5.2 Emergency Shutdown

6.2.1 Safe firing set by turning off and removing keys, then short and lock up C.D.U. charging line. The firing set key shall be in the possession of the Safety Observer and the lock box key shall be in the possession of the Safety Second. At this point there exists a strong possibility of a dud charge bundle.

6.2.2 **WAIT 15 MINUTES**. Following the 15-minute wait period from capacitor discharge, the safety observer only may approach the hazard area.

6.2.3 Upon reaching the hazard area, remove the firing line from C.D.U. and apply the short prior to approaching the buried charge.

6.2.4 If the detonator and Primacord have functioned and the charge did not, remove the charge bundle from the hole and reconfigure bundle and reattempt to detonate per step in 5.2.3 on. If a second attempt fails, contact appropriate personnel.

6.2.5 If the detonator did not function, remove from Primacord and conduct system check out per 5.1.6 through 5.1.7. If detonator checks O.K., resume operation at 5.2.7.

6.2.6 If a condition exists that is not covered in this DOP, contact the appropriate safety committee member for instructions.

5.3 Shutdown/Restart Operation if an unplanned/accidental detonation occurs.

6.3.1 If the event has resulted in personal injury (Dial 7777 or notify security with two way radio). Follow the procedure found in the ATPG Emergency Plan.

6.3.2 If the event has not resulted in personal injury, secure the area and notify management and the safety engineer. Monitor any brush fires from the perimeter of the Burn Ground to ensure they do not cross the firebreaks. **Do not enter the detonation zone**.

6.3.3 In either case **NO** attempt will be made to perform this procedure again until an investigation into the root cause of the unplanned detonation has been conducted and corrective actions have been taken.

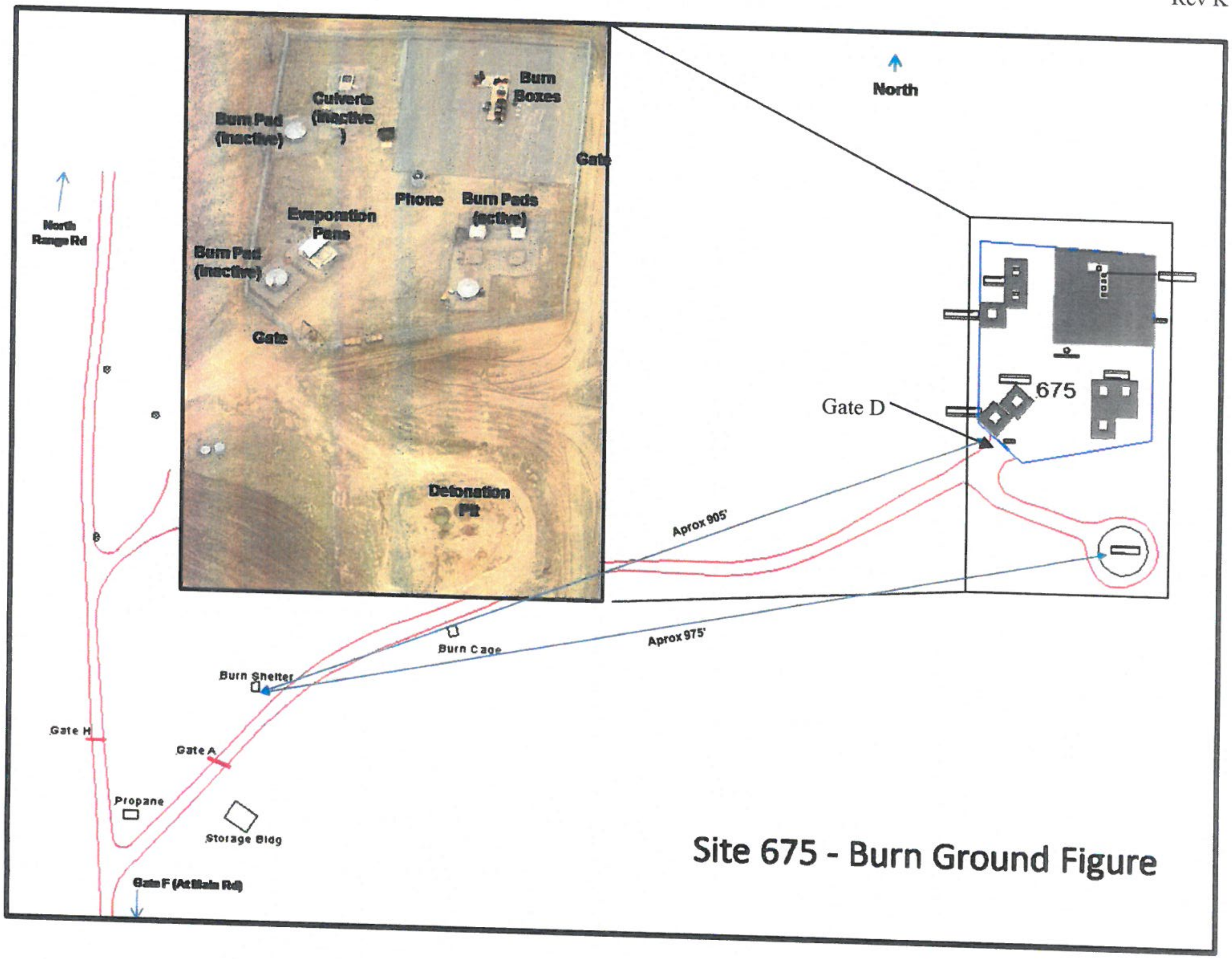

North
Burn Boxes
Culverts (Inactive)
Burn Pad (Inactive)
Gate
Phone
Burn Pads (active)
Evaporation Pans
Burn Pad (Inactive)
Gate
Detonation Pit
North Range Rd
Gate D
675
Aprox 905'
Aprox 975'
Burn Cage
Burn Shelter
Gate H
Gate A
Propane
Storage Bldg
Gate F (At Main Rd)
Site 675 - Burn Ground Figure

Figure 2

Burn Ticket

BurnID
Record Number
Quantity
Item
Storage location
State number
Generator name
Ticket Issue Date
Method name
Tally Number

Date destroyed
Operator
Witness

☐ **Government Witness Required ?**

Instruction name
Instruction

Fuel Used

Attachment 1

S/N ATPG

ATPG WASTE EXPLOSIVE TRACKING FORM

(Including bulk explosive and scrap/waste explosive)

Today's Date: ______________ Generating Location: ______________

Waste Description/
Composition: (bulk/raw) ______________

Explosive Device: ______________

☐ Attached DOP Explosive Content Table

Total Number of Units: ______________
(i.e., 3,500 PGU noses or "1" if waste is bulk material)

Net Explosive Weight:
(Per Unit) ________ ☐ Grams ☐ Kilograms Part Number: ______________

Total Number of
Containers: ______________ Container Type (i.e., bags): ______________

Reason for Disposition: ☐ Surplus ☐ Damaged ☐ Production Scrap ☐ Other: ______________

Special Handling
Considerations: ☐ ESD Sensitive ☐ Contains Primaries
☐ Subjected to Environmental Testing/Conditioning ☐ Other: ______________

Tally Number: ______________ Program Name: ______________

Person Completing
Form: ______________ ______________
Print Name Initials

WARNING: **If condition of any explosive device is unknown or if it's in an "armed" condition; stop, isolate the component and immediately notify Safety and the Burn Ground Engineer.**

NOTE: Any container holding hazardous waste MUST have the waste name, generation date, generating location, ATPG S/N (found at the top of this form), and the words "Hazardous Waste" written on the container or on a label affixed to the container.

If the above is not complete at the time of pick-up, then the material will not be picked up.

Forward this form to Matt Elletson, Jake Kindseth, or Don Newman when completed.

For Hazardous Waste Team Only:

Moved Into Storage: ______________ ______________
Print Name Initials

Magazine Storage Location: ______________

Record Number: ______________ Burn Ticket #: ______________

ATPG Waste Explosive Tracking Form

Attachment 2

Date____________ Name (Safety Observer)____________

Program____________ Name (Safety Second)____________

N.E.W. ____________

Safety Checklist

Safety Observer	Safety Second	Pre Test
____	____	Disconnect/remove any faulty/non-functional equipment from test setup.
____	____	Test telephone land-line for functionality. Alternate: Two-way radios.
____	____	Inspect the test site for unexploded ordnance from previous test.
____	____	Inspect the test site for potential fire hazard.
____	____	Perform a full firing circuit checkout by conducting a bridgewire function test.
____	____	Short module end of firing line(s).
____	____	Short supply end of charging line(s).
____	____	Lock charging lines in lock box, remove key to Safety Second.
____	____	Remove interlock key from charging supply to Safety Observer.
____	____	Conduct continuity check on detonator.
____	____	Clear and secure range. Close gates and post flag up.

Safety Observer	Safety Second	Normal Operations
____	____	Move all on-site personnel to control bunker.
____	____	Emplace demolition charge and attach firing line to detonator and CDU.
____	____	Safety Observer returns to control bunker.
____	____	Safety second shall unlock HV supply line(s) from lock box.
____	____	Safety observer shall attach lines into charging supply.
____	____	Safety observer shall insert interlock key into charging supply and enable.
____	____	Charge CDU and commence countdown.
____	____	Fire warhead.

Safety Observer	Safety Second	Post Test
____	____	Turn off / discharge firing set charging supply,
____	____	Remove key from charging supply to Safety Observer.
____	____	Remove charging lines from supply, short and secure to lock box, remove key to Safety Second.
____	____	Safety Observer inspects detonation pit for complete demolition of items.
____	____	Return equipment to proper storage.
		Malfunction / No Fire
____	____	Follow procedure in Section 6

Comments: ________________________

ATPG DETAILED OPERATING PROCEDURE

DOP #H5407 **REV. F** **Expiration Date:1-21-16**

TITLE: **Firing of Medium Caliber Ammo in a MK44 Autogun at PSR/McCoy**

REVIEW PANEL APPROVALS:

OPERATOR	SIGNATURE	DATE
Cary Whetstone	Signature on file	1-21-15

ENGINEER	SIGNATURE	DATE
Mike Cypher	Signature on file	1-19-15

MANAGEMENT	SIGNATURE	DATE
Wayne Nelson	Signature on file	1-20-15

SAFETY	SIGNATURE	DATE
Erik Monsos	Signature on file	1-20-15

SAFETY TRAINING REQUIREMENTS

OPERATION	SAFETY OBSERVER	SAFETY SECOND
Ammunition Testing	1,2,3,27	1,2,3,27
Escort	1,2	1,2

WORK AUTHORIZATION

SAFETY OBSERVER SIGNATURE	RESTRICTIONS	TIME PERIOD	MANAGEMENT/DELEGATE
		/	
		/	
		/	
		/	

SAFETY SECOND SIGNATURE	RESTRICTIONS	TIME PERIOD	MANAGEMENT/DELEGATE
		/	
		/	
		/	
		/	

1.0 **SUPPORTING DOCUMENTS**

1.1 ATPG Emergency Plan

1.2 ATPG Facility SOP #600

1.3 ATPG SOP 600.05, "Transportation of Explosives at ATPG"

1.4 SOP 650, "PSR"

2.0 DEVICE DESCRIPTION

2.1 Weapon

2.1.1 The 30mm & 40 mm MK44 auto gun is an externally powered, motor driven, chain operated, single barrel gun. The rate of fire varies from single shot operation to a burst rate of 5 shots at 200 SPM, or to a auto rate of 200 SPM. The gun is operated from a remote position through a control panel, which allows selection of ammunition feed direction, firing rate and misfire override. This panel provides for remote display of "safe", "feed select", and "bolt position" conditions for the gun. An interlock key provides disabling of the firing circuit insuring safety to a gunner working in front of the weapon or loading the weapon.

2.2 Ammunition (30mm ABM)

2.2.1 The 30mm projectile is launched from the MK44 autogun at a velocity of ~1000 m/s. It has a HE projectile design configured to detonate at user specified distances from the launch tube; and an inert projectile designed for training purposes (TP rounds). The round has a single warhead at the nose of the projectile and a fuze at the base. The projectile is crimped to a conventional design cartridge case loaded with a double base commercial propellant. Case ignition is achieved by means of a standard percussion primer in concert with a black powder flash tube, which ignites the propellant; pressurizing the cartridge case and launching the 30mm projectile down a rifled barrel.

2.2.2 The 30mm projectile is launched from the MK44 autogun at a velocity of ~1000 m/s. It has a HE projectile design configured to detonate at user specified distances from the launch tube; and an inert projectile designed for training purposes (TP rounds). The round has a single warhead at the nose of the projectile and a fuze at the base. The projectile is crimped to a conventional design cartridge case loaded with a double base commercial propellant. Case ignition is achieved by means of a standard percussion primer in concert with a black powder flash tube, which ignites the propellant; pressurizing the cartridge case and launching the 30mm projectile down a rifled barrel.

2.2.3 The 30mm fuze contains a micro controller based electronics module, setback generator, and an out-of-line S&A (rotor). The micro controller receives and stores data from an external fuze setter prior to projectile firing. This allows the desired mode of operation of the fuze to be set. The fuze has 5 modes of operation: airburst, point detonate, 2 modes of point detonate delay, and a backup mode, plus self destruct and selfneutralizing features. The micro controller also counts turns, or the number of rotations made by the projectile during flight.

2.2.4 On firing the fuze operates in the following manner. At launch, the set back generator charges a capacitor that supplies voltage to the micro controller and a setback-detection switch initializes the micro controller. In the S&A the rotor is normally held out of line by a setback-locking pin and a shear tab. At launch, a setback force of ~30,000 g's causes the rotor lock pin to release the rotor. The lock pin is then held in the setback position by a small ball bearing. The shear tab maintains the rotor in the safe position until the projectile is approximately 80 meters from the muzzle. The micro controller then commands a piston actuator to initiate. This piston actuator causes the shear tab to break and rotates the rotor to the in-line, armed position. The setback-locking pin is then able to return to its initial position, locking the rotor and keeping it from moving once it is armed. When the proper target conditions (preset number of projectile turns or impact) have been sensed and processed, a M100 detonator in the rotor is initiated, which in turn initiates the MDF cord with booster assembly. The booster assembly then initiates the warhead, this is how the desired detonation point is set in the air burst mode.

2.2.5 Self-neutralization occurs if the turns count never reaches the correct number of turns for the 80m arming point within the 10 sec mission window. The self-neutralization consists of powering down the fuze. Approved ammo for this DOP. 30mm & 40 mm TP, APDS-T, HEI-T, PAF-ABM

3.0 EXPLOSIVE CONTENT:

ITEM DESCRIPTION	PART NO.	QTY. EA	N.E.W. EA	MATERIAL
30mm Cartridge TP\HE				
Primer			**.2 grams**	
Flashtube			**.5 grams**	
Propellant			**190 grams**	
Secondary Explosive			**60.0 grams**	
Pyrotechnic			**.5 grams**	
Primary Explosive			**.2 grams**	
40mm Cartridge TP\HE				
Primer			**.2 grams**	
Flashtube			**.5 grams**	
Propellant			**250 grams**	
Secondary Explosive			**75.0 grams**	
Pyrotechnic			**.5 grams**	
Primary Explosive			**.2 grams**	

***Assemblies being measured may include components which contain primary explosives.**

30mm ABM Cartridge

Part Number	Item Description	Total Net Explosive Weight (grams)				Material
28074533	30mm Cart Assy	**193.9318**				
28111594	Propellant		152.0000			Radford RP-1315 Single base
28108349	Flashtube and Cartridge Case Assy.			0.5350		
7259094	Primer, Percussion M36A2				0.1600	Primer Composition FA-956 or Primer Mix 1059
28109896	Flash Tube Assembly				0.3750	Black powder
28074534	Projectile Assy		41.3968			
28074535	30mm Air Burst Fuze Warhead			39.0000		

9210412	Incendiary Pellet				3.0000	zirconium
PBXN-5	Main Charge				36.0000	HE Pellet 28055412
28074538	Aft Body Assy			2.1000		
12556775	Pellet, Tracer				1.6000	Tracer Mix – 12556780-4
12556698	Pellet, Igniter				0.5000	Igniter composition – 12556785
28074037	Fuze Assembly			0.2968		
28069941	Piston actuator				0.0010	KDNBF
9245691	Electric Detonator				0.0140	Lead Azide RD-133
					0.0008	Lead Stephnate
					0.0160	HMX
28074541	MDF Assembly				0.2030	Mild Detonating Fuze (MDF) Tin Clad, CH-6, 5.0 grains/ft
					0.0620	PBXN-5, Type 1, Class 3

4.0 WORK SITE AND SAFETY EQUIPMENT

OPERATION	SITE	SITE NO.	MAX N.E.W.
Firing 30mm & 40mm MK44 Autogun at the PSR Range	**PSR**	**650**	**200**
Firing 30mm & 40 mm MK44 Autogun at For McCoy	**Fort McCoy**		**200**

PERSONAL PROTECTIVE EQUIPMENT

FOOTWEAR	BODY WEAR	FACE WEAR	HEAD/EAR WEAR	HAND WEAR
Steel Toe ☒	Coverall ☐	Glasses/shield ☒	Plugs ☒	Heat Resistant ☐
Conductive ☐	Cotton (under) ☐	Goggles ☐	Muff ☐	Cut resistant ☐
Boots (rubber) ☐	Smock ☐	Full face ☐	Hard hat ☐	Canvas ☐
	Special ☐	Respirator	Dust Cap ☐	Leather ☐
		Half mask ☐		Latex/Vinyl ☐
		Full face ☐		

SPECIALIZED SAFETY EQUIPMENT

Conductive Wrist Strap ☐	Non-Sparking Tools ☐	Fall Protection ☐
Bench Shield ☐	Ground Fault Interrupter ☐	Other (specify) ☐
Aluminized Suit ☐	Paint Hood ☐	

5.0 PROCEDURE SAFETY

5.1 Initial Startup

5.1.1 Check instrument setup. Any faulty equipment found must be removed immediately from setup.

5.1.2 Fort McCoy

5.1.2.1 Call range control to let them know that the test will start soon. This also checks to see that the cell phones are working

5.1.2.2 Turn on the light on the crow's nest.

5.1.2.3 Close access to the range by locking drop gates in closed position, verify no one is visible on the range.

5.1.2.4 Check safety instructions on fire extinguisher.

5.1.3 PSR

5.1.3.1 Verify that communication between PSR and Operations Building is operational.

5.1.3.2 Verify that all personnel are signed on the range board and that they are accounted for.

5.1.3.3 If Escort/Forward Observer is required, inform down range escort that he is responsible for the safety of any downrange personnel. He needs to insure that the down range observers are in the bunker at all times except when verbally allowed out by the Safety Observer. The door is to be latched from inside the bunker prior to the gun being loaded. If at any time communication is lost stay in the bunker until the safety Observer arrives to release you.

5.1.3.4 Energize range so the sign above the door reads 'Range in use'.

5.1.3.5 Verify smash plate if required (for HE) and that there is adequate sand in the catcher

5.1.3.6 Remove operator key located in gunroom and walk the length of the range to verify the range is clear.

5.1.3.7 Energize range by pushing the green button located by the bunker door.

5.1.3.8 Return to the gunroom and replace operator key.

5.1.3.9 Connect the interlock of the range to the mk44 gun firing panel power if at PSR.

Note: Mk44 gun will fire only when the gun room door is shut. The fire control panel key will be removed and in the possession of the safety observer and the fire control panel will be locked up when ever operators enter the gun room.

5.1.4 General

5.1.4.1 Determine that gun is assembled and operating properly.

5.1.4.1.1 Verify that the barrel is secure, locked in place

5.1.4.1.2 Check back of feeder to see if dial indicator is in sear position.

5.1.4.1.3 Check receiver to make sure bolt is in locked position.

5.1.4.1.4 Slide feeder onto receiver.

5.1.4.1.5 Apply power cable to receiver.

5.1.4.1.6 Connect firing panel. Unlock lock box. Energize firing panel.

5.1.4.1.7 Dry cycle three times and the gun should go to the sear position (green light). Listen to the gun mechanism to make sure it sounds normal.

5.1.4.2 Turn off power to the firing control panel and remove the key (safety observer).

5.1.4.3 Place the firing control panel in the lock box and remove the key from the lock box (safety second).

5.1.4.4 Install the softcatch if required.

5.1.4.5 If required Install the programming steel box (minimum 1 inch thick – 5 sided). Place the programming coil in the downrange side of box. Place the programmer on the table on the up-range side of the box.

WARNING

From this point forward anyone approaching the gun must be accompanied by the Safety Observer or Safety Second who has one of the safety control keys

Warning:

No one is allowed to move forward of the gun's muzzle while the gun is loaded. Gun must be downloaded and verified to be empty prior to moving in front of the gun including entering the target area. Failure to do so may result in severe injury or death to the operator if the gun system were to malfunction.

NOTE:

The following bore sighting steps must be performed any time bore sighting isrequired. If this the initial setup the bore sighting steps may start at step 5.1.6.2

WARNING:

Inadvertently leaving the bore-sight in the gun will result in severe damage to the gunand may result in bodily injury to the operator

5.1.4.6 When sighting in the MK44 gun:

5.1.4.6.1 Verify that the gun is unloaded by cycling the gun using the following steps

5.1.4.6.2 Unlock the lock box and energize the firing panel by inserting the key in the firing panel.

5.1.4.6.3 Dry cycle the gun three times by pressing the firing button. The gun should go to the sear position.

5.1.4.6.4 Turn off power to the firing control panel. This is done by removing the interlock key from the firing control panel. The Safety Observerwill retain this key.

5.1.4.6.5 Place the firing control panel in the lock box and remove the key from the lock box. The Safety Second will retain this key.

5.1.4.6.6 Verify that the bore site is equipped with a safety cable.

5.1.4.6.7 Disengage clutch drive sprocket.

5.1.4.6.8 Remove the feeder assembly from the gun by disengaging the latch and sliding the feeder to the rear.

5.1.4.6.9 Proceed to the gun muzzle and insert the bore sight cable into the gun until the bore site is seated.

5.1.4.6.10 Route the cable, protruding from the breech end of the barrel, and hook it to the bore sight. If this is not possible have the bore sight reworked before proceeding

5.1.4.6.11 Bore sight the gun as necessary.

5.1.4.6.12 Unhook the cable from the bore sight.

5.1.4.6.13 Remove the bore sight from the gun and look down the barrel to verify that it is not obstructed.

5.1.4.6.14 Reinstall the feeder assembly onto the gun and rotate the latch into the locked position.

5.1.4.6.15 Engage clutch drive sprocket.

5.2 Normal Operations

5.2.1 Setting an ABM (If Required)

5.2.1.1 <u>Setting of the ABM fuze with live fuze Components with or without H.E. (If Required)</u>

5.2.1.1.1 Insert the fuze end of the projectile into the setter.

5.2.1.1.2 Go to up range side of shielded box.

5.2.1.1.3 Push the setting button to set the fuze.

5.2.1.1.4 Wait 10 seconds.

5.2.1.1.5 Remove the projectile from the setter.

5.2.2 <u>Single Shot</u> (no feed chutes attached and rounds are not linked)

5.2.2.1 Check that Bolt Position Indicator is in sear position.

5.2.2.2 The weapon safety handle should be left in the fire position, as no round will be moved into ram position during auto gun loading.

Caution: With the safety handle in "safe" any attempt to fire the gun will result in a misfire and repeated cycling of the gun under this condition will result in a live round being ejected from the spent case ejection chute.

5.2.2.3 Insure all personnel are safe in the fire control room and downrange observation bunker.

5.2.2.4 Place one round in first sprocket of feeder link stripper.

5.2.2.5 Unlock the lock box using the safety seconds key, which is in his/her possession.

5.2.2.6 The safety observer will place his/her key into the control box and turn the power on. Rate select to single fire.

5.2.2.7 Cycle weapon by pressing the fire button once to place round in a ready to fire condition (sear light should be on).

5.2.2.8 At the PSR only, sound warning horn.

5.2.2.9 Press fire button to fire the weapon.

5.2.2.10 After firing the weapon and prior to approaching weapon or moving down range, the operator shall clear the gun.

This is done by operating the gun through one complete cycle to ensure that all rounds have been fired and that the last spent cartridge has been removed from the weapon. The sear light will be on.

5.2.2.11 Turn off power to the firing control panel. Remove the interlock key from the firing control panel and lock the panel in the lock box. The lock box key is to be in the control of the safety second.

5.2.3 Auto Fire (feed chute attached and rounds linked)

5.2.3.1 Check the Bolt Position Indicator is in "sear" position.

5.2.3.2 The weapon safety handle should be left in the fire position, as no round will be moved into ram position during auto gun loading.

> **Caution**: With the safety handle in "safe" any attempt to fire the gun will result in a misfire and repeated cycling of the gun under this condition will result in a live round being ejected from the spent case ejection chute.

5.2.3.3 Insure all personnel are in safe positions in the fire control room and downrange observation bunker.

5.2.3.4 Attach the feed chute(s) to gun and draw belt of linked rounds into sprocket of feeder link stripper.

5.2.3.5 Place wrench on feeder shaft extension and rotate feeder into stop position; gun is now ready to operate.

5.2.3.6 Remove the firing control panel from the lock box (safety second).

5.2.3.7 Place control box power switch on, rate select to single fire.

5.2.3.8 Cycle weapon by pressing the fire button once. This will place a round in the ready to fire Position. (sear light should be on).

5.2.3.9 Select to burst fire or auto fire.

5.2.3.10 At the PSR only, sound the warning horn.

5.2.3.11 Press fire button on. Hold till burst is complete. Fire all the rounds in the belt.

5.2.3.12 After firing the weapon and prior to approaching weapon or moving down range, the operator shall clear the gun. This is done by placing the firing control panel in the single fire mode and operating the gun through one complete cycle to ensure that all rounds have been fired and that the last spent cartridge has been removed from the weapon. The sear light will be on. Turn off power to the firing control panel.

Warning: Do not go in front of the gun when there is still unfired ammo in the belt. Injury could occur if gun is discharged See malfunction procedure.

5.2.3.13 Remove the interlock key from the firing control panel and lock the panel in the lock box. The lock box key is to be in the control of the safety second.

5.2.4 Retrieving the ABM projectile with some or all live S&A Components with or without MDF and with no HE from the softcatch.

5.2.4.1 Remove one bundle of Biltrite from the softcatch at a time. Find which bundles contain the ABM projectiles.

5.2.4.2 Remove one sheet of Biltrite at a time from the bundle to find the projectile.

5.2.4.3 Place in an ammo can to transport and properly label the can

5.2.4.4 Transport the projectiles to shipping and send to Plymouth.

5.2.4.5 (CAUTION) If the fuze comes off the projectile in the softcatch, use leather gloves to handle the fuze and keep the output end pointed away from you.

5.3 Normal Shutdown

5.3.1 **Down loading ammunition from the gun without firing.**

5.3.1.1 Turn off power to the firing control panel. This is done by removing the interlock key from the firing control panel. The Safety Observer will retain this key.

5.3.1.2 Then lock the control panel in the lock box. The lock box key is to be in the possession of the safety second.

Warning

Do not go in front of the gun when there is still unfired ammo in the belt. Injury could occur if gun is discharged. See malfunction procedure. Casuals cannot leave the bunker until cleared to do so

5.3.1.3 Place safety in the "safe" position.

5.3.1.4 Release link stripper chuck and slide linked rounds out of feed chute(s). Stow removed ammo away from gun.

5.3.1.5 Remove feeder form gun and remove any live rounds from feeder. Stow ammo away from the gun.

5.3.1.6 Return to step 5.2 if more testing is desired.

5.3.2 Turn off power to all equipment.

5.3.3 Turn off the red light (Located in the crow's nest at Fort McCoy.)

5.3.4 Secure unfired ammunition

5.3.5 Store equipment.

5.3.6 If gun barrel needs to be removed before it has cooled, the use of heat resistant gloves are required to remove barrel.

6.0 MALFUNCTION PROCEDURE

6.1 Misfire

6.1.1 In the event of an auto gun misfire, release fire button. Failure to release fire button will result in a two second pause in the auto gun cycle, followed by a return to the firing mode and the ejection of the "misfire" out of the spent case ejection chute.

6.1.2 Wait one minute, switch the control box to single fire mode and attempt to cycle gun to the "sear" position. The potential hazard here is a hang fire.

6.1.2.1 If the gun can be remotely cycled to the "sear position following a misfire, a minimum wait of two minutes is required be fore attempting to manually clear the gun (potential hazard = "hang fire"). In this case the malfunctioning round is lying on the floor and must not be disturbed for 2 minutes. After 2 minutes, the round can be placed in a metal can for teardown and disposal.

6.1.2.2 Failure to cycle the gun to the "sear" position following a misfire will require a wait of 20 minutes prior to attempting to manually clear the gun (potential hazard = "cook-off").

6.1.3 If you can't get the gun to clear itself (get to the sear position) you must follow the following steps:

6.1.3.1 Turn off power at firing control panel and remove interlock key. Lock the panel in the lock box.

6.1.3.2 When the prescribed wait period (20 Minutes) has expired, remove power cable from gun and place safety in the "safe" position.

6.1.3.3 Release link stripper chuck and slide linked rounds out of feed chute(s).

6.1.3.4 Remove feeder from gun and remove live rounds from feeder.

6.1.3.5 Remove misfired round from receiver and place round in a storage container separate from others explosives and have disposed of as soon as possible.

6.1.3.6 Record the details of the misfire round such as its sequence in the test series, the serial number, explosive content, and anomalies observed.

6.2 Restart After A System Failure

6.2.1 In the event of an unusual event such as a stuck projectile (not a jammed round), shut down all testing and consult management, restart only after management approval.

6.3 Contingency Failures

6.3.1 In the event of a fire, call 7777 at ATPG and range control at McCoy and then leave the building.

ATPG DETAILED OPERATING PROCEDURE

DOP #H4859 **REV. I** **Expiration Date: 6-1-2016**

TITLE: EVAPORATION OF EXPLOSIVE LADEN WATER BY BURNING

REVIEW PANEL APPROVALS:

OPERATOR	SIGNATURE	DATE
Jake Kindseth	*SIGNATURE ON FILE*	6-1-2015

ENGINEER	SIGNATURE	DATE
Drew Gordon	*SIGNATURE ON FILE*	6-1-2015

MANAGEMENT	SIGNATURE	DATE
Greg Filo	*SIGNATURE ON FILE*	6-1-2015

SAFETY	SIGNATURE	DATE
Erik Monsos	*SIGNATURE ON FILE*	6-1-2015

SAFETY TRAINING REQUIREMENTS

OPERATION	SAFETY OBSERVER	SAFETY SECOND
Setup and use of evaporation pans	1,2,12	1,2,12

WORK AUTHORIZATION

SAFETY OBSERVER SIGNATURE	*RESTRICTIONS*	*TIME PERIOD*	*MANAGEMENT/DELEGATE*
		/	
		/	
		/	
		/	

SAFETY SECOND SIGNATURE	*RESTRICTIONS*	*TIME PERIOD*	*MANAGEMENT/DELEGATE*
		/	
		/	
		/	

1.0 SUPPORTING DOCUMENTS

1.1 SOP 600, ATPG Facility

1.2 Burn Ticket Example (attachment 1)

1.3 ATPG Waste Explosive Tracking Form Example (attachment 2)

1.4 Safety Checklist (attachment 3)

1.5 Site Map (figure 1)

1.6 Burn Ground Site, SOP #675

2.0 DEVICE DESCRIPTION

2.1 Material to be disposed of in this manner is wastewater that is contaminated with explosive residue normally from machining and clean up operations.

NOTE:

"Evaporation Pad" as it applies here is a watertight metal container (approximately 4' x 8' x 12 inches high) positioned over a concrete tub. A propane-fueled gas burner is located such that its heat is distributed across the underside of the pan causing the water contained in the pan to boil and evaporate.

NOTE:
The following are absolute maximum quantities allowed by our hazardous waste treatment permit, there are more strict (smaller) operational limitations driven by safety considerations and listed in section 3

Hazardous Waste Permit Conditions

2.1.1 The maximum treatment capacity is 1,000 pounds NEW of waste explosives/propellants per burn as specified in MN Rules 7045.0542, Subpart 9. Simultaneous burns may occur at various treatment units; however, the combined explosive/propellant treatment limit of 1,000 pounds within 1,250 feet from the property line must not be exceeded.

2.1.2 The Hazardous Waste Storage/Treatment Facility Permit limits evaporation pan operation as follows:

- Two hundred (200) gallons per pan per day yielding six hundred (600) gallons treated per day.

3.0 EXPLOSIVE CONTENT

CAUTION: Solid chunks or agglomerates of explosive are NEVER to be placed in these pans for disposal.

ITEM DESCRIPTION	PART NO.	QTY. EA	N.E.W.	MATERIAL
Bulk secondary H.E.*	**NA**	**NA**	**5 lbs.**	**HC 1.1**
Bulk propellant *	**NA**	**NA**	**5 lbs**	**HC 1.3**
Bulk pyrotechnics *	**NA**	**NA**	**5 lbs**	**HC 1.4**

*** This material is suspended in a dilute water solution of up to 200 gallons.**

4.0 WORK SITE AND SAFETY EQUIPMENT

OPERATION	SITE	SITE NO.	MAX N.E.W.
OB/OD BURNING	**BURN GROUND**	**675**	**1000 LBS.**

PERSONAL PROTECTIVE EQUIPMENT

FOOTWARE		BODY WEAR		FACE WEAR		HEAD/EAR WARE		HAND WEAR	
Steel Toe	X	Coverall	X	Glasses/shield	X	Plugs		Heat Reflective	
Conductive		Cotton (under)		Goggles		Muff		Cut resistant	
Boots (rubber)		Smock		Full face		Hard hat		Canvas	
		Special		Respirator		Dust Cap		Leather	X
				Half mask				Latex/Vinyl	
				Full face					

SPECIALIZED SAFETY EQUIPMENT

Conductive Wrist Strap		Non Sparking Tools	X	Fall Protection	
Bench Shield		Ground Fault Interrupter		Other (specify)	X
Aluminized Suit		Paint Hood		Filter Media	X

5.0 PROCEDURE SAFETY

NOTE: If this operation is performed in conjunction with propellant pad or burn box operations, the propellant pads will be lit first per the appropriate DOP. After the pad fire is well established the burn box will be lit per the appropriate DOP and after the burn box fire is well established the water pan will be lit per this DOP.

5.1 Initial Startup

5.1.1 This operation shall be limited to those days when the threat of grass or brush fire in the near by area is low. This operation **will not** be conducted when any of the following weather conditions are present:

A- The wind velocity exceeds 25 MPH.
B- There is a lightning alert in effect.
C- There is the likelihood of precipitation.
D- There is restricted visibility (fog, blowing snow, sand or dust).

5.1.2 Area Inspection

5.1.2.1 Verify that the telephone or an alternate form of communication is operational. DO NOT proceed without a communication link to operations.

5.1.2.2 Determine that no potential danger exists at any of the other work sites in the OB/OD area. Any and all fires shall have been completely extinguished at the other burn sites.

5.1.2.3 Determine that no unauthorized personnel are in the area. Close gate F. Then drive the full length of the North Range Road and verify that no one is there. Drive up to the burn boxes and see that no one else is in the vicinity. See Figure 1.

5.2 Normal Operations

The Safety Checklist located in Attachment 3 to this DOP shall be filled out and initialed by both the Safety Observer and Safety Second for all evaporation pad operations.

NOTE: The gas valve activation switch will be in the OFF position and the switch key will be in the possession of the Safety Observer from this point on until ignition is complete.

5.2.1 Pad Preparation

5.2.1.1 Remove weather cover from pad.

5.2.1.2 Visually inspect the pan(s) for holes or other damage.

5.2.1.3 Prepare a sieve by placing a quantity of clean spun glass (or equivalent filter material) in a wire mesh basket and position it over the lip of the pan

5.2.1.4 Back the tanker truck up to the pan such that the drain spout is positioned over the sieve. Turn off truck ignition and chock wheels.

5.2.1.5 Open the drain valve and slowly pour the contents into the sieve to separate out any solids from the water. This will help prevent an unwanted detonation of the burn pans.

NOTE: If the flow through the filter appears to be obstructed it may be necessary to change the filter material.

5.2.1.6 Continue until the tank is empty or until the fill depth in the pan reaches six inches.

5.2.1.7 Place the contaminated filter material in a watertight container and mark it for future disposal in the burn box. Place back into hazwaste inventory.

5.2.1.8 Instruct the tanker truck driver to leave the area.

5.2.2 Ignition

5.2.2.1 Both operators will return to the burn shelter. Close and lock gate D when leaving the burn pan area. Gate D shall be locked whenever the Burn Ground is unattended.

5.2.2.2 Turn on gas valve at tank (manually)

5.2.2.3 After a final visual inspection of the area (field glasses), the safety observer will insert the gas valve activation key into the lock and turn it to the ON position.

5.2.2.4 The evaporation pan fuel shut off timer will be adjusted to the proper setting up to a maximum of 12 hours.

5.2.2.5 The evaporation burner ignition switch will be moved to the ON position as one of the operators watches the burner (field glasses) for signs of ignition.

5.2.2.6 The operators and all other personnel are now free to leave the area locking Gate F behind them.

5.3 Normal Shutdown

5.3.1 Area Control

5.3.1.1 The OB/OD area will not be reentered for 2 hours after turning off the burner. The water pan will not be refilled for 12 hours after turning off the burner. Gate “D” will be locked and Gate “F” will be opened.

5.3.1.2 When the area is reentered one operator will determine (field glasses) that there are no active fires at any of the other burn sites before reentering the fenced area.

5.3.2 Fuel Line Control

5.3.2.1 The evaporation pan ignition switch will be moved to the OFF position.

5.3.2.2 The gas valve activation key will turned to the OFF position and the key removed.

5.3.2.3 Turn off gas valve at tank (manually)

5.3.3 Administrative

5.3.3.1 Complete (if Necessary) and file the documents found in Attachments 1,2&3.

5.3.4 Clean up /Clean out

5.3.4.1 After the two-hour wait period, visual examination of the pans will be made to verify that the operation was successful and that all of the water and explosive material was disposed of.

5.3.4.2 If the operator finds a film of material collected in the pan it can be swept into a bag and marked for future disposal.

5.3.4.3 Sweep the area around the pan and place the debris in a waste disposal container.

5.3.4.4 Replace weather cover over pad.

6.0 MALFUNCTION PROCEDURE

6.1 Emergency Shutdown/Operations

6.1.1 Should an ignition failure occur, shut off the gas valve and ignition switch, wait a minimum of 30 minutes and then conduct a system examination. Correct the problem and then return to step 5.2.3. Remove the water before doing maintenance on the burners.

6.1.2 In the event of an explosion of any kind at this site, shut off the gas valve and ignition switch, close the area and notify both management and the safety engineer. DO NOT REENTER THE AREA UNTIL AFTER AN INCIDENT INVESTIGATION PLAN HAS BEEN WRITTEN AND APPROVED.

6.2 Restart After Emergency

6.2.1 Following any remediation an on site review by management the environmental engineer and the safety engineer is required before resuming operations to verify that the area is returned to its normal operating condition.

6.3 Contingency Failures

6.3.1 In case of a wastewater spill refer to the ATPG Hazardous Waste Contingency Plan for instructions.

ATTACHMENT 1

Burn Ticket

BurnID	
Record Number	
Quantity	
Item	
Storage location	
State number	
Generator name	
Ticket Issue Date	
Method name	
Tally Number	
Date destroyed	
Operator	
Witness	

☐ Government Witness Required ?

Instruction name	
Instruction	
Fuel Used	

ATTACHMENT 2

S/N ATPG

ATPG WASTE EXPLOSIVE TRACKING FORM

(Including bulk explosive and scrap/waste explosive)

Today's Date: ____________ Generating Location: ____________

Waste Description/ Composition: (bulk/raw) ____________

Explosive Device: ____________

☐ Attached DOP Explosive Content Table

Total Number of Units: ____________
(i.e., 3,500 PGU noses or "1" if waste is bulk material)

Net Explosive Weight: (Per Unit) ______ ☐ Grams ☐ Kilograms Part Number: ____________

Total Number of Containers: ____________ Container Type (i.e., bags): ____________

Reason for Disposition: ☐ Surplus ☐ Damaged ☐ Production Scrap ☐ Other: ____________

Special Handling Considerations: ☐ ESD Sensitive ☐ Contains Primaries ☐ Subjected to Environmental Testing/Conditioning ☐ Other: ____________

Tally Number: ____________ Program Name: ____________

Person Completing Form: ____________ (Print Name) ______ (Initials)

WARNING: **If condition of any explosive device is unknown or if it's in an "armed" condition; stop, isolate the component and immediately notify Safety and the Burn Ground Engineer.**

NOTE: Any container holding hazardous waste **MUST** have the **waste name, generation date, generating location, ATPG S/N** (found at the top of this form), and the words **"Hazardous Waste"** written on the container or on a **label** affixed to the container.

If the above is not complete at the time of pick-up, then the material will not be picked up.

Forward this form to Matt Elletson, Jake Kindseth, or Don Newman when completed.

For Hazardous Waste Team Only:

Moved Into Storage: ____________ (Print Name) ______ (Initials)

Magazine Storage Location: ____________

Record Number: ____________ Burn Ticket #: ____________

ATPG Waste Explosive Tracking Form

ATTACHMENT 3

H4859 EVAPORATION PAN SAFETY CHECKLIST

Date: ____________ Comments: ____

1. Determine that the area is clear (see 5.1.2.3).		
2. Check that phones are operational or alternate form of communication is available.		
3. Determine that gas valve is off and Safety Observer keeps key in possession for duration of the operation.		
4. Filter water through sieve.		
5. After burn time Safety Observer insures system is shut off.		

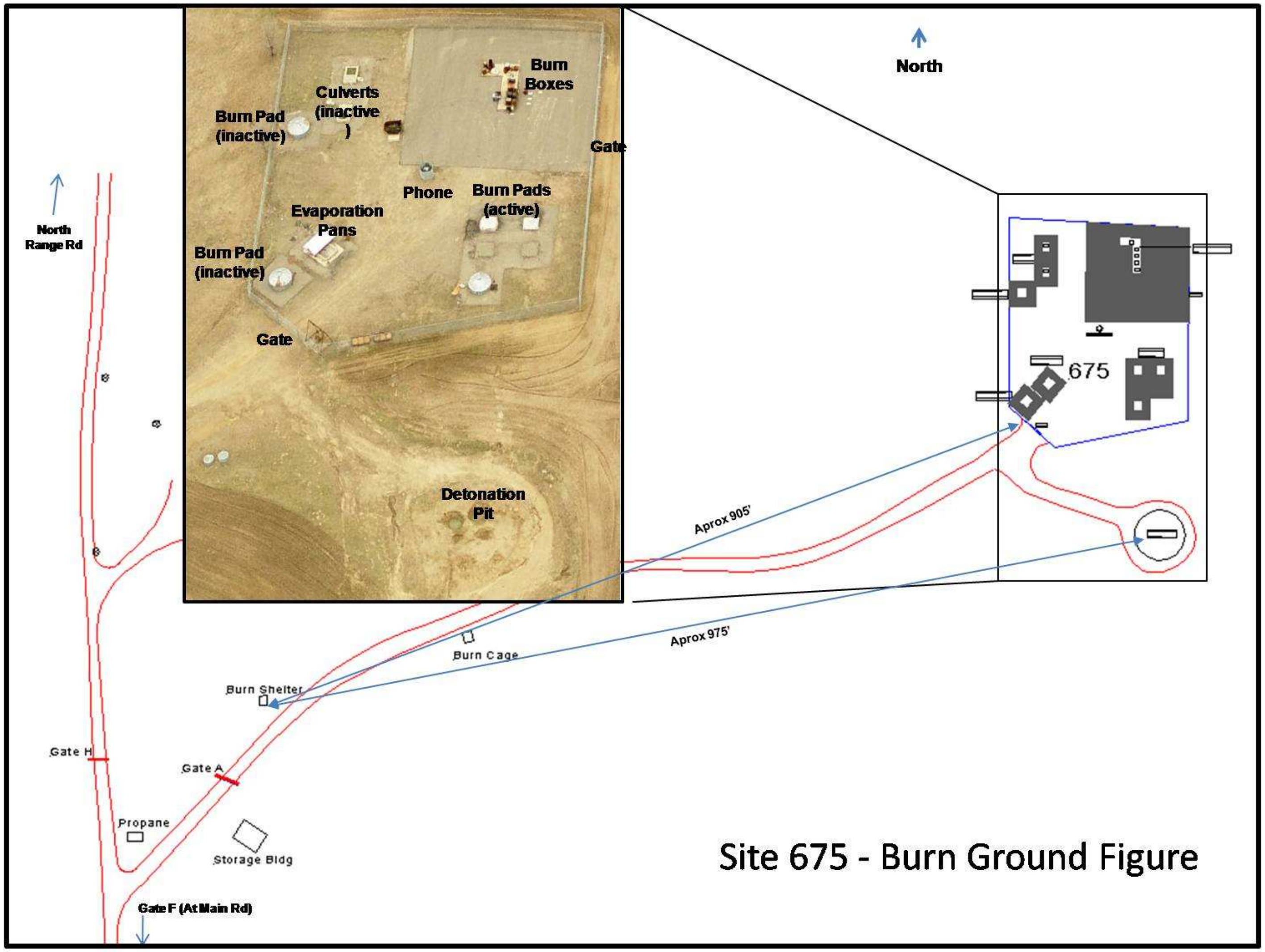

North
Burn Boxes
Culverts (inactive)
Burn Pad (inactive)
Gate
Phone
Burn Pads (active)
Evaporation Pans
Burn Pad (inactive)
Gate
Detonation Pit
North Range Rd
675
Aprox 905'
Aprox 975'
Burn Cage
Burn Shelter
Gate H
Gate A
Propane
Storage Bldg
Gate F (At Main Rd)
Site 675 - Burn Ground Figure

FIGURE 1

ORBITAL ATK
TPG DETAILED OPERATING PROCEDURE

DOP #H4942 **REV. O** **Expiration Date:**

TITLE: Destruction of Scrap Explosive Devices using a "Burn Box"

REVIEW PANEL APPROVALS:

OPERATOR	SIGNATURE	DATE
Maleck Terrion		

ENGINEER	SIGNATURE	DATE
Drew Gordon		

MANAGEMENT	SIGNATURE	DATE
Greg Filo		

SAFETY	SIGNATURE	DATE
Erik Monsos		

SAFETY TRAINING REQUIREMENTS

OPERATION	SAFETY OBSERVER	SAFETY SECOND
Setup & use of a gas-fired burn box	1,2,12	1,2,12

WORK AUTHORIZATION

SAFETY OBSERVER SIGNATURE	RESTRICTIONS	TIME PERIOD	MANAGEMENT/DELEGATE
		/	
		/	
		/	
		/	
		/	
		/	
		/	

SAFETY SECOND SIGNATURE	RESTRICTIONS	TIME PERIOD	MANAGEMENT/DELEGATE
		/	
		/	
		/	
		/	
		/	
		/	

1.0 SUPPORTING DOCUMENTS

1.1 SOP 675 Burn ground

1.2 TPG Emergency Plan

1.3 Burn Ticket Example (Attachment 1)

1.4 TPG Waste Explosive Tracking Form Example (Attachment 2)

1.5 Safety Check List (Attachment 3)

1.6 Area layout (Figure A)

1.7 SOP 600, TPG Facility

1.8 ADDENDUMS (ATTACHED but not part of DOP)

2.0 DEVICE DESCRIPTION

2.1 Materials to be disposed of in this manner are explosive loaded devices as listed in Addendums, which are attached physically to DOP but too numerous to include in electronic copy of DOP.

2.2 All items to be disposed of under this DOP must have a signed and authorized addendum prior to any work with that item. The addendum will have a picture of the item to be disposed of with a reference for determining its size and shape, its explosive quantity, any special instructions on how it will be placed or layered, the total quantity (number of units) to be allowed at one time in the burn box, and any other pertinent information.

NOTE: "Burn Box" as it applies here is a heavy walled steel container with a vented steel lid. The box contains a steel grid screen mounted over a chamber which is connected to a propane gas burner. The burner flame is directed such that it will rapidly envelop the materials lying on the grid screen, also a Det burner which is completely enclosed steel box with air vent holes near bottom and a baffle system on the top lid.

NOTE:
The following are absolute maximum quantities allowed by our hazardous waste treatment permit, there are more strict (smaller) operational limitations driven by safety considerations and listed in the item specific Addendum

2.3 Hazardous Waste Permit Conditions

2.3.1 The maximum treatment capacity is 1,000 pounds NEW of waste explosives/ propellants per burn as specified in MN Rules 7045.0542, Subpart 9. Simultaneous burns may occur at various treatment units; however, the combined explosive/propellant treatment limit of 1,000 pounds within 1,250 feet from the property line must not be exceeded.

2.3.2 The Hazardous Waste Storage/Treatment Facility Permit limits burn box operation as follows:

2.3.2.1 One thousand (1,000) pounds NEW per burn combined across all boxes being used at one time

2.3.2.2 Three (3) burns per day

2.3.2.3 Yields three thousand (3,000) pounds NEW treated per day maximum.

3.0 EXPLOSIVE CONTENT:

ITEM DESCRIPTION	PART NO.	QTY. EA	N.E.W. EA	MATERIAL
As listed in Addendums	N/A	N/A	Per addendum	N/A

4.0 WORK SITE AND SAFETY EQUIPMENT

OPERATION	SITE	SITE NO.	MAX N.E.W.
OB/OD Burning	Burnground	675	3000 lbs.

PERSONAL PROTECTIVE EQUIPMENT

FOOTWEAR		BODY WEAR		FACE WEAR		HEAD/EAR WEAR		HAND WEAR	
Steel Toe	☒	Coverall	☒	Glasses/shield	☒	Plugs	☒	Heat Reflective	☐
Conductive	☐	Cotton (under)	☐	Goggles	☐	Muff	☐	Cut resistant	☐
Boots (rubber)	☐	Smock	☐	Full face	☐	Hard hat	☐	Canvas	☐
		Special	☐	Respirator		Dust Cap	☐	Leather	☒
		Back Belt *	☒	Half mask	☐			Latex/Vinyl	☐
				Full face	☐				

*** As defined in step 5.2.1.5**

SPECIALIZED SAFETY EQUIPMENT

Conductive Wrist Strap	☐	Non-Sparking Tools	☐	Fall Protection	☐
Bench Shield	☐	Ground Fault Interrupter	☐	Other (specify)	☐
Aluminized Suit	☐	Paint Hood	☐		

5.0 PROCEDURE SAFETY

5.1 Initial Startup

5.1.1 This operation shall be limited to those days when the threat of grass or brush fire in the nearby area is low. This operation **will not** be conducted when any of the following weather conditions are present:

A. The wind velocity exceeds 25 MPH.

B. There is a lightning alert in effect.

C. There is the likelihood of more than a light mist of rain.

D. There is restricted visibility (fog, blowing snow, sand or dust).

5.1.2 **Area Inspection**

5.1.2.1 Verify that the telephone or an alternate form of communication is operational. DO NOT proceed without a communication link to operations.

5.1.2.2 Determine that no potential danger exists at any of the other work sites in the OB/OD (Open Burn/Open Detonation) area. Any and all fires shall have been completely extinguished at the other burn sites.

5.1.2.3 Determine that no unauthorized personnel are in the area. The area shall be secured by driving the length of the North Range Road and verifying that no one is in there. Then close Gate H. Drive up to the burn boxes and see that no one is present, then drive to Gate F and close it verifying that no one is anywhere in the vicinity. (See Figure A)

5.1.2.4 Remove the weather protector from the box/boxes to be used.

Note: The Safety Checklist (attachment 3) shall be filled out and initialed by both the Safety Observer and Safety Second for all Burn operations. Any equipment used for operations covered by this DOP must be checked out functionally and the JOE sticker is valid. Any equipment found defective shall be physically removed from the operation setup and returned to the lab for repair prior to use.

5.2 **Normal Operations**

Warning: The "disconnect all burners" (switch 1 in shelter) will be in the OFF position and the switch key will be in the possession of the Safety Observer from this point on until ignition is complete. Lock the Control Bunker with the key in the Safety Second's possession until ignition is complete.

5.2.1 **Box Preparation**

5.2.1.1 Lift the box cover off with hoist or other approved lifting device such as a fork truck (off-road, skid steer, etc.).

5.2.1.2 Inspect the box for holes or other damage. If it is judged unserviceable, RED TAG it and report the problem to your manager.

5.2.1.3 Empty the box of any items remaining from the previous burn (see Section 5.3.4.3).

5.2.1.4 Verify that the box is cool by testing the box grate with an ungloved hand. Carefully move the hand toward the grate and feel for an above ambient temperature. If the grate feels warmer than ambient, wait longer before loading the box.

5.2.1.5 Place a quantity up to the maximum listed for the item in the Addendum in the burn box insert or on the grid screen. If the containers are over 50 lbs. and under 100 lbs., then two operators are required to lift them. With the burner control key in the safety observer's possession and the bunker key in the safety second's possession, proceed to carefully load the burn boxes.

5.2.1.6 Spread the material across the surface of the grid screen or screen box taking care to ensure that it is distributed as required for the item in the Addendum.

5.2.1.7 Place the box cover back on the burn box.

5.2.2 **Ignition**

NOTE: If this operation is performed in conjunction with propellant pad or water pan operations, the propellant pads will be lit first per the appropriate DOP. After the pad fire is well established the burn box will be lit per this DOP and after the burn box fire is well established the water pan will be lit per its DOP.

5.2.2.1 Both operators will return to the burn shelter. Close and lock gate D when leaving the burn box area. Gate D shall be locked whenever the Burn Ground is unattended. After a final visual inspection of the area, open the upper and lower main gas valves (manually) on both LP tanks.

5.2.2.2 Insert key and turn on “Disconnect all burners” (located lower right of photo, SWITCH 1).

5.2.2.3 Turn on “Timer” (upper left of photo, TIMER 1)

5.2.2.4 Switch on “Main gas valve burn box” (center left, SWITCH 2)

5.2.2.5 Switch on “Burn box 3-5” (lower left, SWITCH 3) to the box/boxes being used. The Burn Boxes are numbered as you’re looking from the chariot/shelter, left to right, box 3, box 4, and box 5. (Switches for box 1 and 2 are not used). The Burn Box Burner Control Unit has a 30 second delay/purge before it allows the burner to ignite. Verify Burn Box ignition by using binoculars to view the smoke/flame out the top of the box.

5.2.2.6 Keep the burners on for the required time as specified in Addendum for the burn or 20 minutes if not specified.

5.2.2.7 The operators will maintain surveillance for at least 15 minutes after the burners are off to ensure there are no residual fires burning uncontrolled.

5.2.2.8 If an ignition failure occurs while using ONLY (1ea.) Burn Box, wait a minimum of 10 minutes and then proceed to conduct a system examination. Turn off ALL switches. The key for SWITCH 1 will remain with the Safety Second who will stay in the chariot. Safety Observer will close ALL gas valves at the tanks. Using 2-way radios for communication, the Safety Observer will proceed to the Burn Boxes. The Burners have an electronic control unit to control the ignition process. If all BIT’s (Built In Tests) don’t pass, it will trip into RESET mode in which you must manually press the RESET button on the control unit (power must be applied to do this). This will be done by accessing the back of the Burner Hood; you should notice the ALARM red lights to be lit. The Safety Observer will instruct the Safety Second to insert the key and turn on SWITCH 1, turn on TIMER 1, and turn on SWITCH 3 (example: Box 5). POWER ONLY will then be applied to that particular Burn Box so you are able to reset the control unit by pressing the BLUE reset button. This will turn out the ALARM lights and put the control unit back into startup mode. At this point, the Safety Observer will instruct the Safety Second to turn off ALL switches. Then proceed to step 5.2.2.1.

5.2.2.9 If an ignition failure occurs while using more than (1ea.) Burn Box, and at least (1ea.) of the Burn Boxes proceeds to ignite, you must wait the 2 HOUR wait period from when the last Burn Box is turned off. Then you can proceed to conduct a system examination on that particular Burn Box.

5.2.2.10

5.3 Normal Shutdown

5.3.1 Fuel Line Control

5.3.1.1 The “Burn box 3-5 switch” (SWITCH 3) will be moved to the off position.

5.3.1.2 Switch off “Main gas valve burn box” (SWITCH 2)

5.3.1.3 The **“**Disconnect all burners” (SWITCH 1) will be turned to the off position and the key removed.

5.3.1.4 Manually close the main gas valves at the source.

5.3.2 Area Control

5.3.2.1 The OB/OD area will be locked and not reentered for two hours after the burn has shut down. During this wait time Gate “F” and “D” will be shut. The boxes will not be reloaded for 4 hours after the burner has been shut down. However, the gate may be opened to empty the burn box after 2 hours.

5.3.2.2 All AA&E items not contained in one of the burn boxes must be returned to proper storage outside of the OB/OD Burnground area.

5.3.3 Administrative

5.3.3.1 Complete the relevant Burn Ticket (Attachment 1) or equivalent for the burn. Reference the corresponding waste Tracking Form as required (Attachment 2).

5.3.4 Clean Up / Clean Out

5.3.4.1 After the two hour wait period has passed and the area is re-entered, one operator will verify that the fuel line valve switch is locked in the "OFF" position and the keys in his possession, using field glasses or video, that there are no active fires at any of the burn sites.

5.3.4.2 The box cover will be lifted off and the contents of the box will be examined to verify that the explosives have been destroyed.

5.3.4.3 Segregate any item(s) which appear to have failed to burn. Re-burn the items or mark them for future destruction and store them in an appropriate container in a magazine and label properly.

5.3.4.4 Remove all of the successfully destroyed items to the scrap metal dumpster.

5.3.4.5 Sweep the area around the Burn Boxes and place the ash/debris in an approved container and transport to the short 20 range in the garage and place in waste disposal container with the proper Hazardous Waste label and log-in the waste if it does not already have a start date.

5.3.4.6 Replace weather covers on all burn boxes. The weather cover may be replaced after the two-hour wait and will be replaced within 8 hours of the last burn ignition time if it is deemed safe to do so. Single burn deviations to this requirement may be OK'd by a waiver signed by the environmental engineer.

6.0 MALFUNCTION PROCEDURE

6.1 Emergency Shutdown/Operation

6.1.1 Should an ignition failure occur, and the problem isn't resolved with the reset button on the control unit, contact test engineer and/or supervisor to proceed. The boxes must have the explosives removed before any maintenance work is done.

6.1.2 In the event of a detonation, shut off the gas valve and the ignition switch and continue surveillance of the area until the threat of grass or brush fires has passed. If a fire is observed, report the general location of the fire to the security desk with instructions NOT TO ENTER THE BURNGROUND AREA without management approval.

6.1.3 Close the area at Gate "A" and notify both management and the safety engineer. DO NOT REENTER THE AREA UNTIL AFTER AN INCIDENT INVESTIGATION PLAN HAS BEEN WRITTEN AND APPROVED.

6.2 Restart After A System Failure

6.2.1 Following any remediation an on-site review by management, the environmental engineer and the safety engineer is required before resuming operations to verify that the area is returned to its normal operating condition.

6.3 Contingency Failures

6.3.1 In case of a hazardous waste spill refer to the ATPG Hazardous Waste Contingency Plan for instructions or contact the Facility environmental engineer.

Burn Ticket

BurnID
Record Number
Quantity
Item
Storage location
State number
Generator name
Ticket Issue Date
Method name
Tally Number

Date destroyed
Operator
Witness

☐ Government Witness Required ?

Instruction name
Instruction

Fuel Used

Attachment 1

Attachment 2

S/N ATPG

ATPG WASTE EXPLOSIVE TRACKING FORM
(Including bulk explosive and scrap/waste explosive)

Today's Date: ____________ Generating Location: ____________

Waste Description/ Composition: (bulk/raw) ____________

Explosive Device: ____________

☐ Attached DOP Explosive Content Table

Total Number of Units: ____________
(i.e., 3,500 PGU noses or "1" if waste is bulk material)

Net Explosive Weight: (Per Unit) ____________ ☐ Grams ☐ Kilograms Part Number: ____________

Total Number of Containers: ____________ Container Type (i.e., bags): ____________

Reason for Disposition: ☐ Surplus ☐ Damaged ☐ Production Scrap ☐ Other: ____________

Special Handling Considerations: ☐ ESD Sensitive ☐ Contains Primaries
☐ Subjected to Environmental Testing/Conditioning ☐ Other: ____________

Tally Number: ____________ Program Name: ____________

Person Completing Form: ____________ ____________
Print Name Initials

WARNING: **If condition of any explosive device is unknown or if it's in an "armed" condition; stop, isolate the component and immediately notify Safety and the Burn Ground Engineer.**

NOTE: Any container holding hazardous waste **MUST** have the waste name, generation date, generating location, **ATPG S/N** (found at the top of this form), and the words **"Hazardous Waste"** written on the container or on a label affixed to the container.

If the above is not complete at the time of pick-up, then the material will not be picked up.

Forward this form to Matt Elletson, Jake Kindseth, or Don Newman when completed.

For Hazardous Waste Team Only:

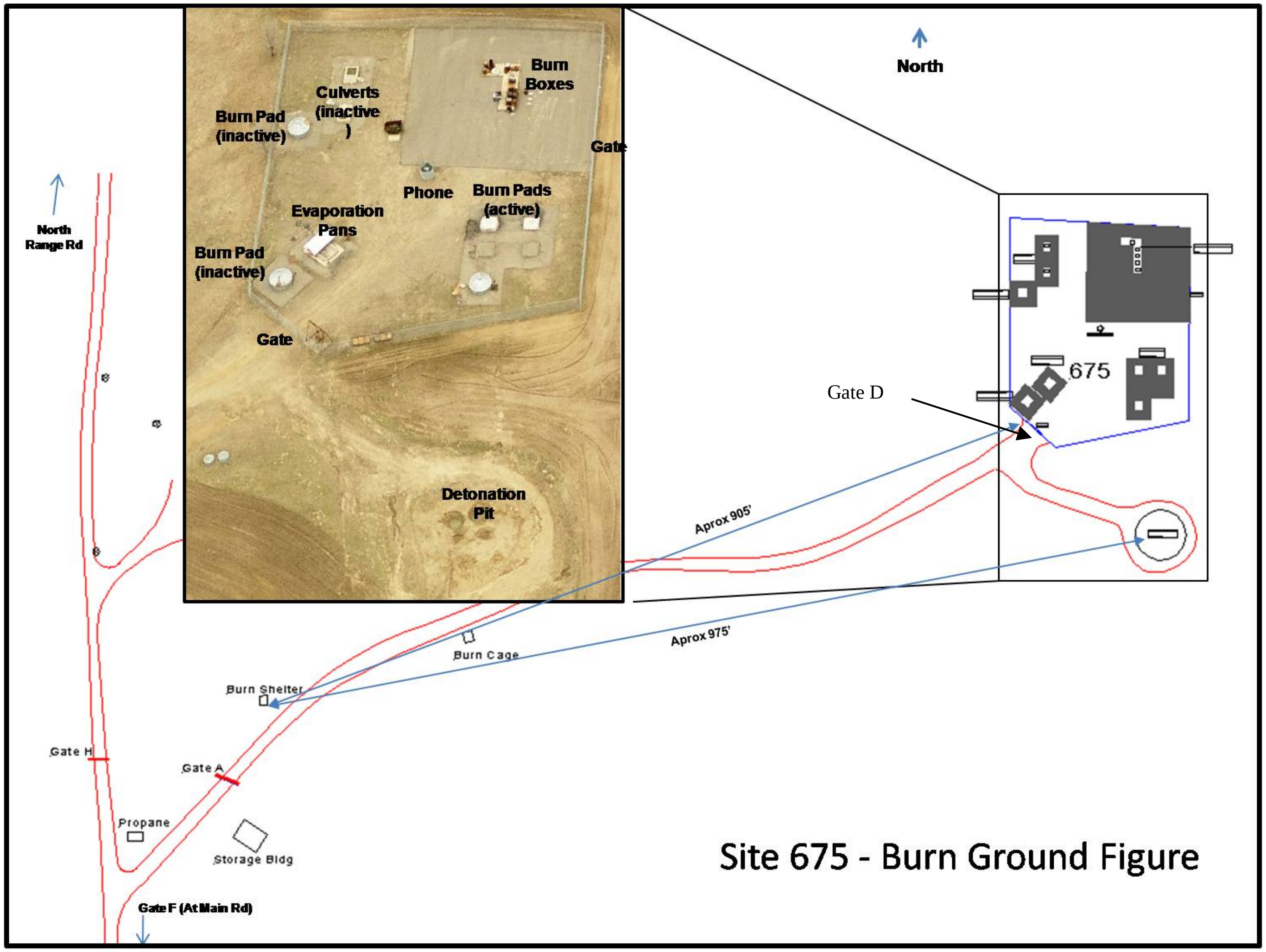
Moved Into Storage: ____________ ____________
Print Name Initials

Magazine Storage Location: ____________

Record Number: ____________ Burn Ticket #: ____________

ATPG Waste Explosive Tracking Form

FIGURE A


North
North Range Rd
Burn Boxes
Culverts (inactive)
Burn Pad (inactive)
Gate
Phone
Burn Pads (active)
Evaporation Pans
Burn Pad (inactive)
Gate
Detonation Pit
Gate D
675
Aprox 905'
Aprox 975'
Burn Cage
Burn Shelter
Gate H
Gate A
Propane
Storage Bldg
Gate F (At Main Rd)
Site 675 - Burn Ground Figure

H4942 Destruction of Scrap Explosive Devices using a “Burn Box”

Date: ____________ Comments: ____

Checklist

Operator 1	Operator 2	Initial Startup
		Limiting weather conditions do not exist
		All site fires are out.
		Drive site for area control and lock Gate A.
		Normal Operations
		The ignition switch key is with the safety observer, and The bunker key is with the safety second’s possession.
		Inspect the box for holes or other damage
		Empty the box of any items remaining from the previous burn
		Verify that the box is cool by testing the box grate with an ungloved hand
		Spread the material across the surface of the grid screen taking care to ensure that is distributed as required for the item in Addendum. Gate D will be locked before returning to burn shelter.
		Both operators in the burn shelter.
		Final visual inspection of the area
		The operators will maintain surveillance for at least 15 minutes after the burners are off.
		Normal Shutdown
		The box burner ignition switch will be moved to the off position.
		The gas valve activation key will be turned to the off position and the key removed.
		The OB/OD area will be locked
		All AA&E items not contained in one of the burn boxes must be returned to proper storage outside of the OB/OD Burn Ground area.
		After the two hour wait period has passed and the area is re-entered, one operator will verify that the fuel line valve switch is locked in the “off” position and, using field glasses, that there are no active fires at any of the other burn sites.
		All explosives have been destroyed
		Replace weather covers on all burn boxes.

Attachment 3

Appendix D

Arrangements with Local Authorities

Alliant Techsystems Operations LLC
The Proving Grounds
23100 Sugarbush Rd NW
Elk River, MN 55330

February 22, 2016

Sheriff James Stuart
Anoka County
13301 Hanson Blvd NW
Andover, MN 55304

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Subject: Emergency Response – Hazardous Waste & Material Incidents
Alliant Techsystems Operations LLC – MND081138604

Dear Sheriff Stuart,

I am contacting you, as required by Federal EPA environmental regulation, to arrange for emergency assistance with your department should a hazardous waste / material incident occur at the Alliant Techsystems Operations – The Proving Ground (TPG), in St. Francis, MN. Included is site-specific hazard and emergency preparedness information which will assist your department in responding to an emergency at our facility. I am also enclosing a statement for your approval indicating that your department will respond to a hazardous waste / material incident at TPG. I would appreciate your response by March 15, 2016.

State and federal rules require facilities, such as TPG, that generate and treat hazardous waste have arrangements with local authorities to provide emergency response during hazardous waste / material incidents. This planning should minimize the risks and hazards to human health and the environment if such an incident occurs. It is anticipated that your department may be called upon to support the St. Francis Police during an emergency incident at TPG. If this is the case your department's role would be to help manage the situation and to assist any injured individuals. Your staff will not be requested to perform any cleanup of released hazardous waste or residuals. Alliant will bring on site, if necessary, an outside contractor to perform these duties. In order to facilitate any emergency response, the following information is included with this letter: i.) an TPG Emergency Plan; and, ii.) a summary of hazardous wastes / materials managed on site, their general characteristics and possible injuries that may result from an incident involving these materials.

If you would like a tour of our facility in order to improve familiarity, this can be scheduled at your convenience. Feel free to contact either myself (763) 744-5594 or Greg Filo, The Proving Grounds Site Director at (763) 241-7531 regarding this matter. Thank you for your continued support of our operations and please let me know if you have any questions or concerns.

Sincerely,

Steven Rauschendorfer
Environmental Engineer
office: (763) 744-5594
mobile: (612) 219-3623
e-mail: Steven.Rauschendorfer@orbitalatk.com

Orbital ATK

Alliant Techsystems Operations LLC
The Proving Grounds
23100 Sugarbush Rd NW
Elk River, MN 55330

February 22, 2016

Chief Jeff Harapat
St. Francis Police Department
4058 St. Francis Blvd. NW
St. Francis, MN 55070

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Subject: Emergency Response – Hazardous Waste & Material Incidents
Alliant Techsystems Operations LLC – MND081138604

Dear Chief Harapat,

I am contacting you, as required by Federal EPA environmental regulation, to arrange for emergency assistance with your department should a hazardous waste / material incident occur at the Alliant Techsystems Operations – The Proving Ground (TPG), in St. Francis, MN. Included is site-specific hazard and emergency preparedness information which will assist your department in responding to an emergency at our facility. I am also enclosing a statement for your approval indicating that your department will respond to a hazardous waste / material incident at TPG. I would appreciate your response by March 15, 2016.

State and federal rules require facilities, such as TPG, that generate and treat hazardous waste have arrangements with local authorities to provide emergency response during hazardous waste / material incidents. This planning should minimize the risks and hazards to human health and the environment if such an incident occurs. It is anticipated that your department may be called upon to support the St. Francis Police during an emergency incident at TPG. If this is the case your department's role would be to help manage the situation and to assist any injured individuals. Your staff will not be requested to perform any cleanup of released hazardous waste or residuals. Alliant will bring on site, if necessary, an outside contractor to perform these duties. In order to facilitate any emergency response, the following information is included with this letter: i.) an TPG Emergency Plan; and, ii.) a summary of hazardous wastes / materials managed on site, their general characteristics and possible injuries that may result from an incident involving these materials.

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Sincerely,

Steven Rauschendorfer
Environmental Engineer
office: (763) 744-5594
mobile: (612) 219-3623
e-mail: Steven.Rauschendorfer@orbitalatk.com

Alliant Techsystems Operations LLC
The Proving Grounds
23100 Sugarbush Rd NW
Elk River, MN 55330

February 22, 2016

Chief Matt Kohout
St. Francis Fire Department
3740 Bridge Street NW
St. Francis, MN 55070

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Subject: Emergency Response – Hazardous Waste & Material Incidents
Alliant Techsystems Operations LLC – MND081138604

Dear Chief McDonough,

I am contacting you, as required by Federal EPA environmental regulation, to arrange for emergency assistance with your department should a hazardous waste / material incident occur at the Alliant Techsystems Operations – The Proving Ground (TPG), in St. Francis, MN. Included is site-specific hazard and emergency preparedness information which will assist your department in responding to an emergency at our facility. I am also enclosing a statement for your approval indicating that your department will respond to a hazardous waste / material incident at TPG. I would appreciate your response by March 15, 2016.

State and federal rules require facilities, such as TPG, that generate and treat hazardous waste have arrangements with local authorities to provide emergency response during hazardous waste / material incidents. This planning should minimize the risks and hazards to human health and the environment if such an incident occurs. It is anticipated that your department may be called upon to support the St. Francis Police during an emergency incident at TPG. If this is the case your department's role would be to help manage the situation and to assist any injured individuals. Your staff will not be requested to perform any cleanup of released hazardous waste or residuals. Alliant will bring on site, if necessary, an outside contractor to perform these duties. In order to facilitate any emergency response, the following information is included with this letter: i.) an TPG Emergency Plan; and, ii.) a summary of hazardous wastes / materials managed on site, their general characteristics and possible injuries that may result from an incident involving these materials.

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Sincerely,

Steve Rauschendorfer

Steven Rauschendorfer
Environmental Engineer
office: (763) 744-5594
mobile: (612) 219-3623
e-mail: Steven.Rauschendorfer@orbitalatk.com

Alliant Techsystems Operations LLC
The Proving Grounds
23100 Sugarbush Rd NW
Elk River, MN 55330

February 22, 2016

Chief Curt Hallerman
Oak Grove Fire Department
19900 Nightingale Street N.W.
Cedar, MN 55011-9204

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Subject: Emergency Response – Hazardous Waste & Material Incidents
Alliant Techsystems Operations LLC – MND081138604

Dear Chief Hallerman,

I am contacting you, as required by Federal EPA environmental regulation, to arrange for emergency assistance with your department should a hazardous waste / material incident occur at the Alliant Techsystems Operations – The Proving Ground (TPG), in St. Francis, MN. Included is site-specific hazard and emergency preparedness information which will assist your department in responding to an emergency at our facility. I am also enclosing a statement for your approval indicating that your department will respond to a hazardous waste / material incident at TPG. I would appreciate your response by March 15, 2016.

State and federal rules require facilities, such as TPG, that generate and treat hazardous waste have arrangements with local authorities to provide emergency response during hazardous waste / material incidents. This planning should minimize the risks and hazards to human health and the environment if such an incident occurs. It is anticipated that your department may be called upon to support the St. Francis Police during an emergency incident at TPG. If this is the case your department's role would be to help manage the situation and to assist any injured individuals. Your staff will not be requested to perform any cleanup of released hazardous waste or residuals. Alliant will bring on site, if necessary, an outside contractor to perform these duties. In order to facilitate any emergency response, the following information is included with this letter: i.) an TPG Emergency Plan; and, ii.) a summary of hazardous wastes / materials managed on site, their general characteristics and possible injuries that may result from an incident involving these materials.

If you would like a tour of our facility in order to improve familiarity, this can be scheduled at your convenience. Feel free to contact either myself (763) 744-5594 or Greg Filo, The Proving Grounds Site Director at (763) 241-7531 regarding this matter. Thank you for your continued support of our operations and please let me know if you have any questions or concerns.

Sincerely,

Steve Rauschendorfer

Steven Rauschendorfer
Environmental Engineer
office: (763) 744-5594
mobile: (612) 219-3623
e-mail: Steven.Rauschendorfer@orbitalatk.com

Alliant Techsystems Operations LLC
The Proving Grounds
23100 Sugarbush Rd NW
Elk River, MN 55330

February 15, 2016

Ms. Andrea Olson
Patient Care Manager
Mercy Hospital
4050 Coon Rapids Blvd.
Coon Rapids, MN 55433

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Subject: Emergency Response – Hazardous Waste & Material Incidents
Alliant Techsystems Operations LLC – MND081138604

Dear Ms. Olson,

I am contacting you, as required by Federal EPA environmental regulation, to arrange for emergency assistance with your department should a hazardous waste / material incident occur at the Alliant Techsystems Operations – The Proving Ground (TPG), in St. Francis, MN. Included is site-specific hazard and emergency preparedness information which will assist your department in responding to an emergency at our facility. I am also enclosing a statement for your approval indicating that your department will respond to a hazardous waste / material incident at TPG. I would appreciate your response by March 15, 2016.

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Sincerely,

Steven Rauschendorfer
Environmental Engineer
office: (763) 744-5594
mobile: (612) 219-3623
e-mail: Steven.Rauschendorfer@orbitalatk.com

Orbital ATK

Alliant Techsystems Operations LLC
The Proving Grounds
23100 Sugarbush Rd NW
Elk River, MN 55330

February 15, 2016

Ms. Mary Beth Woitas
Director of Emergency Services
North Memorial Medical Center
3300 Oakdale Avenue North
Robbinsdale, MN 55422

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Subject: Emergency Response – Hazardous Waste & Material Incidents
Alliant Techsystems Operations LLC – MND081138604

Dear Ms. Woitas,

I am contacting you, as required by Federal EPA environmental regulation, to arrange for emergency assistance with your department should a hazardous waste / material incident occur at the Alliant Techsystems Operations – The Proving Ground (TPG), in St. Francis, MN. Included is site-specific hazard and emergency preparedness information which will assist your department in responding to an emergency at our facility. I am also enclosing a statement for your approval indicating that your department will respond to a hazardous waste / material incident at TPG. I would appreciate your response by March 15, 2016.

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If you would like a tour of our facility in order to improve familiarity, this can be scheduled at your convenience. Feel free to contact either myself (763) 744-5594 or Greg Filo, The Proving Grounds Site Director at (763) 241-7531 regarding this matter. Thank you for your continued support of our operations and please let me know if you have any questions or concerns.

Sincerely,

Steven Rauschendorfer
Environmental Engineer
office: (763) 744-5594
mobile: (612) 219-3623
e-mail: Steven.Rauschendorfer@orbitalatk.com

HAZARDOUS WASTE CONTINGENCY PLAN

ALLIANT TECHSYSTEMS OPERATIONS LLC

The Proving Grounds (TPG)

PLANT LOCATION

23100 SUGARBUSH ROAD NORTHWEST

ST. FRANCIS, MN 55070

ANOKA COUNTY

MAILING ADDRESS

23100 SUGARBUSH ROAD NORTHWEST

ELK RIVER, MN 55330

2016

TABLE OF CONTENTS

HAZARDOUS WASTE CONTINGENCY PLAN

Alliant Techsystems Operations LLC

The Proving Grounds (TPG)

Plant Location:
23100 Sugarbush Road Northwest
St. Francis, MN 55070 - Anoka County

Mailing Address:
23100 Sugarbush Road Northwest
Elk River, MN 55330

SECTION I

INTRODUCTION

A. This plan details measures that will be taken to minimize hazards to human health and the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste to the air, soil, or surface water per Minn. Rules Part 7045.0466.

The facility is located within the city limits of St. Francis, MN, Anoka County, at 23100 Sugarbush Road Northwest; however, its mailing address is 23100 Sugarbush Road, Elk River, MN 55330.

This plan is part of the Operating Record for the facility located in the Environmental Engineer's files.

B. <u>General Information</u>

The Proving Grounds (TPG) is owned by Orbital ATK, Inc. and operated by an Alliant Techsystems Operations LLC, and is a facility for research and development, storage, assembly and test of ordnance located in the northwest corner of Anoka County, Minnesota. The facility is located approximately 40 miles northwest of Minneapolis-St. Paul.

TPG manages hazardous waste as a storage and treatment facility for waste explosives and as a storage facility for liquid and solid waste.

The contact and party responsible for the hazardous waste management activities at TPG is the Site Director:

Greg Filo

(763) 241-7531

Each permitted hazardous waste storage area on-site is described below and the general location of each is shown on Figure 1:

1. **<u>Non-Explosive Waste Storage Building (T&S 3) - Site 673</u>**
   Open burn treatment residue (ash) and drums of liquid and solid hazardous wastes are stored in this locked metal building having an epoxy-sealed concrete floor. Secondary containment for liquid spills is provided indoors by a recessed sump. This building also stores spill absorbents / equipment and empty containers.

   In case of a fire DO NOT attempt to extinguish instead immediately evacuate the area to protect personnel from explosion hazard. Control the spread of fire only at an appropriate distance.

2. **<u>Flammable Storage Shed (T&S 4)</u>**
   Waste ignitable solvents generated on-site are stored in containers in the front half of the building. The liquid-containing containers are located on spill containment pallets. The rear half of the building is used for heated storage of paint and adhesive products. The building has metal walls and ceiling with a concrete floor.

   In case of a fire DO NOT attempt to extinguish instead immediately evacuate the area to protect personnel from explosion hazard. Control the spread of fire only at an appropriate distance.

3. **<u>Explosive Waste Storage Magazines (T&S 6) – Site 680, Site 683, & Site 692</u>**
   Five (5) explosive waste storage magazine areas are located within four (4) buildings, i.e., Magazines 5A/5B, 6, 7, 14, and 18. The total explosive waste storage capacity for the combined magazine areas is 112,000 pounds NEW.

   In case of a fire DO NOT attempt to extinguish instead immediately evacuate the area to protect personnel from explosion hazard. Control the spread of fire only at an appropriate distance.

4. **<u>Explosive Hazardous Waste Storage (T&S 10B) – Site 626</u>**

   This is a covered concrete loading dock with space for two (2) semi-trailers, which is used for storage of scrap medium caliber ammunition, other munitions and bulk energetic materials. The maximum storage capacity is 40,000 pounds NEW. No liquid hazardous waste is permitted for storage at this site.

   In case of a fire DO NOT attempt to extinguish instead immediately evacuate the area to protect personnel from explosion hazard. Control the spread of fire only at an appropriate distance.

Each hazardous waste/material <u>treatment</u> area on site is described below and the general location of each is shown on Figure 1:

1. **<u>Open Burn/Open Detonation (OB/OD) Treatment Area (T&S 5) – Site 675</u>**

   This area is used to open burn or open detonate waste explosives, propellants, and other components containing energetic materials. NO storage of hazardous waste is permitted at this unit. All waste taken to the burn grounds must be treated within 24 hours. If an unplanned detonation occurs, the Hazardous Waste Contingency Plan will be followed with the appropriate personnel notified immediately.

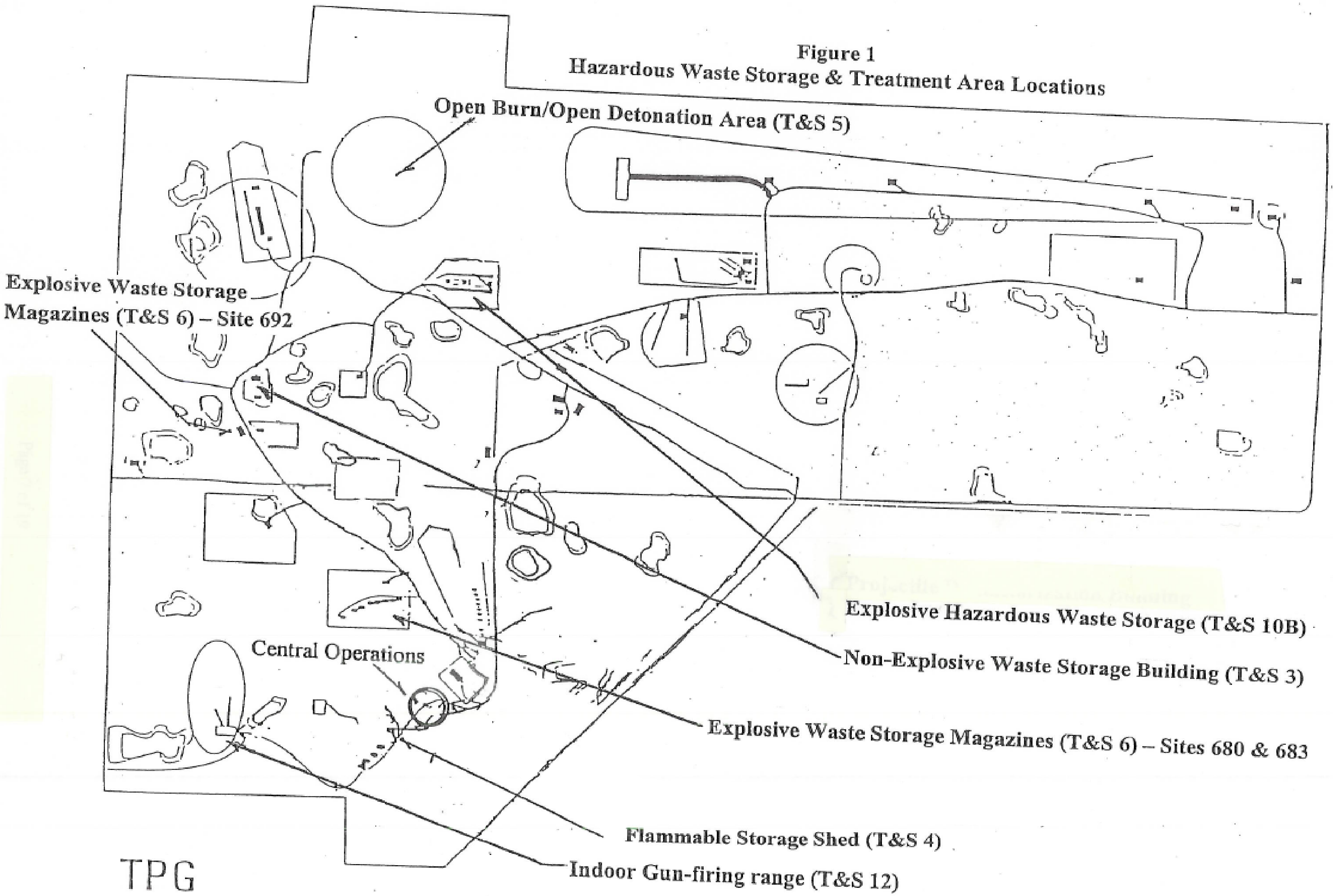
   In case of a fire DO NOT attempt to extinguish instead immediately evacuate the area to protect personnel from explosion hazard. Control the spread of fire only at an appropriate distance. However, grass fires may be fought as discussed in Section III, A.5 of this Plan.

2. **<u>Indoor Gun-firing Range (T&S 12) – Site 650</u>**

   This operation consists of an indoor structure with three (3) indoor gun firing ranges. Only intact cartridge cases, with or without projectiles, may be treated using gun firing. NO storage of hazardous waste is permitted at this unit. Photo wastewater is also processed at this site to remove silver below hazardous waste levels. Electrolytic recovery and/or steel wool canisters are used in this process.

   In case of a fire DO NOT attempt to extinguish instead immediately evacuate the area to protect personnel from explosion hazard. Control the spread of fire only at an appropriate distance.

Figure 1
Hazardous Waste Storage & Treatment Area Locations



SECTION II

PERSONNEL ASSIGNMENTS & EMERGENCY NUMBERS

KEY PERSONNEL	TELEPHONE OFFICE/HOME	HOME CITY
Site Director		
G. Filo	(763) 241-7531 (office) (763) 441-7871 x7531 (pager)* (763) 331-1581 (cell)	Corcoran
Emergency Coordinators		
Steve Rauschendorfer (Primary)	(763) 744-5594 (office) (612) 219-3623 (cell) (763) 441-7871 x7538 (pager)* (612) 500-6568 (home)	Elk River
Casey Steiner (Alternate)	(763) 744-5575 (office) (763) 441-7871 x7520 (pager)* (651) 226-5541 (home) (763) 248-0538 (cell)	Anoka
M. Cypher (Alternate)	(763) 241-7540 (office) (763) 441-7871 x7540 (pager)* (320) 274-6456 (home) (612) 817-6047 (cell)	Annandale
Facility Services		
C. Steiner	See above	Anoka
Fire Support Leader		
T. Thompson	(763) 241-7513 (763) 441-7871 x7513 (pager)* (763) 441-1110 (home)	Elk River

Release of Information

Follow guidance provided in Section 3 “Release of Information and Incident Reporting” in the “Emergency Plan – TPG.”

*** NOTE**: The paging system has limited range and should only be considered effective if the designated employee is on site at TPG.

EMERGENCY NUMBERS

Fire Department (In Order of Preference)	
St. Francis Fire Department	911 or (763) 427-1212
Oak Grove Fire Department	911 or (763) 427-1212
Medical	
Mercy Medical Center (emergency room)	911 or (763) 236-7144
North Memorial Medical Center (emergency room)	911 or (763) 520-5542
Anoka County Emergencies	
Anoka County Dispatch	911 or (763) 427-1212
St. Francis Police	911 or (763) 427-1212
Connexus Energy (24-hour electrical emergency)	(763) 323-2660
Sherburne County Emergencies	
Sherburne County Dispatch	(763) 241-2500
External Reporting	
National Response Center	1-800-424-8802
State Duty Officer	(651) 649-5451
Emergency Response Contractor	
Bay West Inc. 5 Empire Drive St. Paul, MN	(651) 291-0456 (24-hour number)

SECTION III

ON-SITE INCIDENT RESPONSE ACTIONS

A. In the event of a Fire or Explosion:

1. **During operating hours**, immediately notify the Security Officer by dialing 7777, the Internal Emergency Number (automatically rings the Site Director and the Security Officer).

   Give the following information over the telephone:

   a. Name of person calling
   b. Type and location of emergency
   c. Number of individuals involved
   d. Extent of injury to personnel if possible, and
   e. Extent of physical damage and/or type and extent of incident.

2. If required, the Security Officer will then send a text message via pager to plant personnel about the emergency. During **normal work hours**, on-site management may direct the Security Officer to call the Fire Department (911). **During off hours**, the officer will immediately call (911). When calling 911 for fire, always specify that the St. Francis Fire Department should be the responding fire department. This will avoid any potential confusion as to which fire department is being requested. If there is personnel injury, the officer will immediately call for an ambulance (911). The Security Officer shall also notify location management, who will then contact the facility environmental engineer **if** the fire or explosion involves hazardous waste, materials or related processes.

3. **During off hours, or in the absence of location management personnel**, the Security Officer shall assume the duties of the Site Director until an individual from the TPG management team arrives on site. If an after-hours fire or explosion occurs, notify the following after the fire department has been called:

   a. Site Director
   b. Facility Manager
   c. Environmental Engineer or designated alternate (acts as the Emergency Coordinator if an incident involves hazardous waste or materials)
   d. Safety Engineer

4. Grass Fires: Attempt to extinguish grass fires only if no explosives are involved, but evacuate if personal safety is at risk.

   Fires within buildings or structures: Do not attempt to extinguish any fire occurring within a building or structure. Employees shall not enter buildings or structures that are on fire. <u>Employees shall not be directed nor are they expected to use fire extinguishers to fight fires.</u>

   If explosives are involved or threatened, <u>NO</u> attempt shall be made to extinguish the flames and the area shall be evacuated immediately.

5. When fire-fighting equipment is removed from a fire truck or vehicle, the equipment shall be cleaned or restored to operable condition before being returned to the vehicle after an incident has been controlled.
6. The incident site shall not be disturbed by any one until authorized by the Site Director. No information regarding the emergency shall be given out by anyone except Alliant Techsystems management. This is discussed in the "Emergency Plan – TPG."

Fire Department/Emergency Responder Instructions

This facility displays signs called "Department of Defense Fire Hazard Signs" on or adjacent to buildings and vehicles that contain explosives, as well as occasionally having vehicles, which display DOT explosives placards. The numbers on these signs and placards are from the United Nations hazard classification system for dangerous goods - the lower the number the greater the explosive hazard. This number, shown in black, is placed upon a sign with a bright orange background (Refer to Figure 2):

'**1'** is for UN hazard class 1.1 with the explosive hazard of **Mass Detonation**
'**2'** is for hazard class 1.2 with the hazard of **Explosion with Fragment Hazard**
'**3'** is hazard class 1.3 where the explosive hazard is **Mass Fire**
'**4'** is hazard class 1.4 where the explosive hazard is **Moderate Fire**.

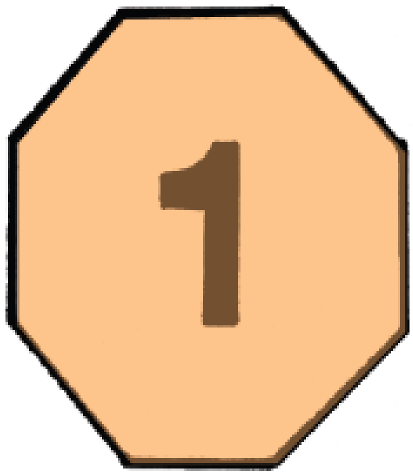
<u>DO NOT ATTEMPT</u> TO FIGHT ANY STRUCTURAL FIRE OR PERFORM RESCUE OPERATIONS WITHIN ANY STRUCTURE ON FIRE THAT DISPLAYS A FIRE HAZARD SIGN WITH AN ORANGE BACKGROUND AND BLACK NUMERAL. IF A GRASS FIRE THREATENS TO SPREAD TO A STRUCTURE LABELED WITH AN ORANGE FIRE HAZARD SIGN, EVACUATE THE AREA IMMEDIATELY.

Assume any structure or vehicle marked with a '1' on an octagonal sign; '2' on a cross sign, or '3' on an inverted triangle sign contain explosives that are heavily encased. Initially <u>isolate and evacuate an area of 1 mile (1600 meters) in all directions.</u> Consult with Alliant Techsystems management before moving in closer. Comply with the guidance provided in the DOT's Emergency Response Guidebook for 1.1, 1.2, and 1.3 Explosives (see Guide 112).

Assume a structure or vehicle marked with a '4' on a diamond contains DOT 1.4 explosives. Initially <u>isolate and evacuate an area of 1/3 mile (500 meters) in all directions</u>. Consult with Alliant Techsystems management before moving in closer. Comply with the guidance provided in the DOT's Emergency Response Guidebook for 1.4 Explosives (see Guide 114).

FIGURE 2

Department of Defense Fire Hazard Signs



Hazard Class 1.1
Mass Detonation

Hazard Class 1.2
Explosion with Fragmentation Hazard

Hazard Class 1.3
Mass Fire

Hazard Class 1.4
Moderate Fire

B. In the event of a Hazardous Waste Spill or Release:

1. Immediately contact the Emergency Coordinator (or alternate if the primary coordinator is not available) for guidance on how to respond to the chemical incident. The primary and alternate Emergency Coordinators are listed with their phone numbers and home city in SECTION II PERSONNEL ASSIGNMENTS & EMERGENCY NUMBERS.

2. The Emergency Coordinator shall implement this Hazardous Waste Contingency Plan for spills or releases from any hazardous waste / material on site that has a potential to cause harm to human health or the environment, or that may potentially impact air, soil, or surface water. This includes releases that escape the secondary containment systems present in several of the T&S units on site. The Emergency Coordinator has the authority to commit the resources needed to carry out this plan.

3. The reason for the spill shall be determined as soon as possible by the Emergency Coordinator and corrective action taken to prevent a recurrence.

4. If the spill enters the surrounding soil, the soil shall be removed and evaluated for proper disposal.

5. Incompatible materials from spill clean up shall not be mixed.

6. Specific actions to be taken:

   a. Liquids

      1) Liquids spilled shall be absorbed with the absorbents present at the storage location. Special care shall be taken when dealing with flammable or combustible material incidents.

      2) The contaminated absorbents shall be placed into clean open head steel drums or equivalent.

      3) The drums shall be labeled and marked as to contents.

      4) Contaminated soil must be placed into open head steel drums or

      5) Contaminated soil clean up shall be verified, where appropriate, by chemical analysis.

      6) Residual structural contamination shall be cleaned up with detergent or other appropriate cleaning agent. The spent cleaning agent shall be placed into a sealed container that is compatible with the recovered materials. The environmental engineer shall arrange for proper disposal.

b. Open Burn Treatment Residue (Ash)

1) Solid spills shall be swept up or collected and placed into open head steel drums or equivalent.

2) Contaminated soil shall be shoveled into open head steel drums or equivalent. The soil shall be cleaned up sufficiently to ensure complete removal of all ash residue.

3) Appropriate sampling protocol, if required, should be followed to determine if the collected material is hazardous waste. The completeness of the cleanup effort should be documented in the operating log of the facility.

c. Explosives / Propellants

1) Spilled bulk explosives and propellants shall be collected to the extent practicable and then any affected soil must be flashed (burned) to destroy any residual energetic material. The contaminated soil must not to be collected before being flashed because of the potential hazard associated with loose bulk explosives and propellants.

2) Bulk explosives and propellants spilled on building floors or bituminous roadways shall be collected and treated at the OB / OD Treatment Area.

3) Contaminated soils resulting from the spill of explosive-laden water near a building or structure shall be removed as soon as possible before the area begins to dry. The low amount of explosive typically present in process water and because explosives are desensitized when wet make quick clean up necessary. If prompt clean up is not possible, the soil must be rewetted with water before it is shoveled.

4) Explosive-laden water spilled onto the ground in an area that is away from a building or structure shall be removed and placed into open head steel drums or equivalent. If the spill area has dried the soil shall be flashed (burned) to minimize the hazard before the residue is placed into a drum.

d. For ALL spills:

1) Contact the Emergency Spill Response Contractor, noted in SECTION II PERSONNEL ASSIGNMENTS & EMERGENCY NUMBERS, <u>if an incident cannot be properly controlled using on-site resources and it does **NOT** pose an imminent health/fire hazard</u>. Typically, the Emergency Coordinator will decide whether or not to call in the emergency response contractor.
2) If an incident poses an imminent health or fire hazard, local emergency authorities must be summoned. After the incident has been stabilized then the Emergency Coordinator will decide whether or not to call in the emergency response contractor to perform cleanup activities.

SECTION IV

INCIDENT NOTIFICATION, REPORTING & RECORD KEEPING

A. If the Emergency Coordinator determines that the incident requires implementation of this plan and it has resulted in a release or discharge of hazardous waste / material to the environment or that a fire or explosion has occurred at a hazardous waste or a hazardous material-handling facility, the following shall be done:

ORAL NOTIFICATION: Immediately notify the Minnesota Duty Officer, at (651) 649-5451, if there is a public safety or environmental threat and/or if a State Agency Notification for Reportable Spills is required. Also immediately notify the National Response Center, at 1-800-424-8802, if a federal notification is required. (For the purpose of this section, release or discharge does not include the permitted open burning or detonation of hazardous waste explosive material at the OB/OD Treatment Area.)

WRITTEN NOTIFICATION: Within 15 days after the incident, the Emergency Coordinator shall submit a written report describing the incident.

The oral and written descriptions of the incident shall include at a minimum:

1. The name, address, and telephone number of the facility owner and operator

   Alliant Techsystems Operations LLC
   Armament Systems
   4700 Nathan Lane North
   Plymouth, MN 55442
   (763) 744-5594

2. The name, address, and telephone number of the facility

   Alliant Techsystems Operations LLC
   The Proving Grounds
   23100 Sugarbush Road Northwest
   Elk River, MN 55330
   (763) 744-5594

3. The date, time, and type of incident

4. The name and quantity of materials involved

5. The extent of damage or injuries, if any

6. An assessment of the actual or potential hazards to the environment and hazards to human health including information regarding the following:

   a. Type and volume of material released

   b. Areal extent of land affected by the release

   c. Response actions taken to contain and recover hazardous materials, and

   d. The estimated quantity and disposition of recovered hazardous materials.

B. Following an incident where this plan is implemented the date, time and details of the incident must be noted in the Hazardous Waste Operating Log.

C. Post-Emergency Requirements

1. Before resuming operations following a release that required implementation of this plan, TPG will notify the MPCA that it is in compliance with Minnesota Rules 7045.0470, Subpart 1. This subpart provides for the complete cleanup of affected media resulting from the incident.

2. Operations may not be resumed until Item 1 above, is completed.

SECTION V

EMERGENCY EQUIPMENT

A. Fire Fighting Equipment

1. Fire extinguishers

   a. Fire extinguishers shall be inspected periodically to ensure proper operation.

   b. The inspection log is typically a punch card on the fire extinguishers.

   c. Fire extinguisher types & capabilities – refer to Figure 3.

   d. A fire extinguisher is maintained outdoors near the Flammable Storage Shed at the edge of the road; however, fires involving the shed must not be fought.

   e. Similarly fires must not be fought at other storage locations because of the hazard posed by energetic materials and chemicals. Fire extinguishers must not be used to fight grass fires. There are no fire extinguishers at waste storage locations other near the Flammable Storage Shed.

2. Fire vehicles typically equipped with water tanks and gas-powered pumps are available on site for use in fighting grass fires. These vehicles may be either trailers or trucks.

   a. The vehicles shall be inspected periodically (during the fire season, not winter) to ensure proper operation.

   b. The vehicles shall be maintained in a state of readiness for rapid deployment. (The storage location may be changed with the permission of the Facility Manager when it is prudent for quicker response times.)

   c. The number of operational fire vehicles required depends upon the level of fire risk posed by current conditions.

   d. Shovels, rakes, and fire flappers should be kept on the fire vehicles for ready access.

B. Emergency power supply

An emergency diesel generator is located adjacent to the Operations Building. It will furnish electrical power to the Operations Building if there is a disruption of service from the local utility. It is tested monthly to ensure that it is operating properly and it has a 500-gallon diesel fuel tank.

If a power failure occurs during normal work hours, trades personnel shall start the generator. If a power failure occurs during off hours, the Security Officer will start the generator.

C. Spill Control Equipment

Spill absorbents and hand tools are located indoors at each liquid waste storage unit and other appropriate buildings on site for use in managing liquid spills.

D. Text Pagers

Text pagers are provided to plant personnel so that emergency messages can be sent simultaneously to staff working at various locations on site.

E. Evacuation

Refer to the “Emergency Plan – TPG” for evacuation procedures to be used if a natural disaster occurs.

F. Natural Disasters

Refer to the “Emergency Plan – TPG” for procedures to be used if a natural disaster occurs.

G. Civil Disturbance

Refer to the “Emergency Plan – TPG” for procedures to be used if a civil disturbance occurs.

FIGURE 3

Fire Extinguisher Capabilities

Type of Extinguisher	Class A Ordinary Materials	Class B Ignitable Liquids	Class C Live Electrical	Class D Metals	How to Operate	Extinguishing Effect
Carbon Dioxide	Only small surface fires	Yes	Yes	No	Open valve at top <u>or</u> pull pin, squeeze grip	Smothering
Dry Chemical (B-C)	Only small surface fires	Yes	Yes	No	Open valve at top <u>or</u> pull pin, squeeze grip	Smothering
Multi-Purpose Dry Chemical	Yes	Yes	Yes	Some types	Pull pin, squeeze grip	Smothering
GI Powder	Especially compounded to control magnesium fires			Yes	Pour onto fires	Depletes oxygen to halt combustion

HAZARDOUS WASTE / MATERIAL INCIDENT SUMMARY
EMERGENCY RESPONSE

Alliant Techsystems Operations LLC – The Proving Grounds
23100 Sugar Bush Road NW
St. Francis, MN 55330

This list provides general information on the types of injuries or exposures that may result at TPG from an incident involving the hazardous wastes / materials typically managed on site:

A. Inhalation and/or ingestion

- Halogenated chemicals & gases such as: such as, trichloroethylene, Freon, methylene chloride, refrigerants
- Flammable solvents such as: toluene, xylene, acetone, mineral spirits, naphthalene
- Energetic compounds / materials such as: RDX, HMX, TNT, PETN, CL-20, nitroguanidine, nitrocellulose, nitroglycerin, lead styphnate, lead azide, pyrotechnics, lithium metal, tracer compositions, igniter compositions, ammonium perchlorate.
- Caustics such as: sodium and/or potassium hydroxide, hydrated lime, miscellaneous commercial products.
- Toxic Substances such as: isocyanates, heavy metal compounds.
- Oils such as: water soluble oil, mineral oil, hydraulic oil.
- Acids such as: hydrochloric acid, nitric acid, sulfuric acid.

B. Burns and skin/membrane irritation or damage

- Same chemicals as above
- Ionizing radiation from x-ray instruments.

C. Fragmentation trauma from energetic devices and possible contamination with

- Same chemicals as above.

D. Abrasions, contusions, and puncture wounds possibly including shrapnel.

E. Bone fractures, amputations, and related injuries.

EMERGENCY RESPONSE

Alliant Techsystems Operations LLC – The Proving Grounds (TPG)
23100 Sugar Bush Road NW
St. Francis, MN 55330*

The Anoka County Sheriff's Department confirms that it will provide emergency assistance if a hazardous waste / material incident occurs at the Alliant Techsystems Operations – The Proving Grounds (TPG), 23100 Sugar Bush Road NW, St. Francis, MN, and that it is aware of the general hazards associated with the operations at ATPG.

____
Authorized Signature

____
Title

____
Date

Comments:

Please
Return to: Steve Rauschendorfer
Alliant Techsystems Operations LLC
The Proving Grounds
23100 Sugar Bush Road NW
Elk River, MN 55330*

* Note that TPG is located in St. Francis, MN but its mailing address is Elk River, MN.

Appendix E

Hazardous Waste Contingency Plan

HAZARDOUS WASTE CONTINGENCY PLAN

ALLIANT TECHSYSTEMS OPERATIONS LLC

The Proving Grounds (TPG)

PLANT LOCATION

23100 SUGARBUSH ROAD NORTHWEST

ST. FRANCIS, MN 55070

ANOKA COUNTY

MAILING ADDRESS

23100 SUGARBUSH ROAD NORTHWEST

ELK RIVER, MN 55330

2016

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HAZARDOUS WASTE CONTINGENCY PLAN

Alliant Techsystems Operations LLC

The Proving Grounds (TPG)

Plant Location:
23100 Sugarbush Road Northwest
St. Francis, MN 55070 - Anoka County

Mailing Address:
23100 Sugarbush Road Northwest
Elk River, MN 55330

SECTION I

INTRODUCTION

A. This plan details measures that will be taken to minimize hazards to human health and the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste to the air, soil, or surface water per Minn. Rules Part 7045.0466.

The facility is located within the city limits of St. Francis, MN, Anoka County, at 23100 Sugarbush Road Northwest; however, its mailing address is 23100 Sugarbush Road, Elk River, MN 55330.

This plan is part of the Operating Record for the facility located in the Environmental Engineer’s files.

B. General Information

The Proving Grounds (TPG) is owned by Orbital ATK, Inc. and operated by an Alliant Techsystems Operations LLC, and is a facility for research and development, storage, assembly and test of ordnance located in the northwest corner of Anoka County, Minnesota. The facility is located approximately 40 miles northwest of Minneapolis-St. Paul.

TPG manages hazardous waste as a storage and treatment facility for waste explosives and as a storage facility for liquid and solid waste.

The contact and party responsible for the hazardous waste management activities at TPG is the Site Director:

Greg Filo

(763) 241-7531

Each permitted hazardous waste storage area on-site is described below and the general location of each is shown on Figure 1:

1. **<u>Non-Explosive Waste Storage Building (T&S 3) - Site 673</u>**

   Open burn treatment residue (ash) and drums of liquid and solid hazardous wastes are stored in this locked metal building having an epoxy-sealed concrete floor. Secondary containment for liquid spills is provided indoors by a recessed sump. This building also stores spill absorbents / equipment and empty containers.

   In case of a fire DO NOT attempt to extinguish instead immediately evacuate the area to protect personnel from explosion hazard. Control the spread of fire only at an appropriate distance.

2. **<u>Flammable Storage Shed (T&S 4)</u>**

   Waste ignitable solvents generated on-site are stored in containers in the front half of the building. The liquid-containing containers are located on spill containment pallets. The rear half of the building is used for heated storage of paint and adhesive products. The building has metal walls and ceiling with a concrete floor.

   In case of a fire DO NOT attempt to extinguish instead immediately evacuate the area to protect personnel from explosion hazard. Control the spread of fire only at an appropriate distance.

3. **<u>Explosive Waste Storage Magazines (T&S 6) – Site 680, Site 683, & Site 692</u>**

   Five (5) explosive waste storage magazine areas are located within four (4) buildings, i.e., Magazines 5A/5B, 6, 7, 14, and 18. The total explosive waste storage capacity for the combined magazine areas is 112,000 pounds NEW.

   In case of a fire DO NOT attempt to extinguish instead immediately evacuate the area to protect personnel from explosion hazard. Control the spread of fire only at an appropriate distance.

4. <u>Explosive Hazardous Waste Storage (T&S 10B) – Site 626</u>

This is a covered concrete loading dock with space for two (2) semi-trailers, which is used for storage of scrap medium caliber ammunition, other munitions and bulk energetic materials. The maximum storage capacity is 40,000 pounds NEW. No liquid hazardous waste is permitted for storage at this site.

In case of a fire DO NOT attempt to extinguish instead immediately evacuate the area to protect personnel from explosion hazard. Control the spread of fire only at an appropriate distance.

Each hazardous waste/material <u>treatment</u> area on site is described below and the general location of each is shown on Figure 1:

1. <u>Open Burn/Open Detonation (OB/OD) Treatment Area (T&S 5) – Site 675</u>

This area is used to open burn or open detonate waste explosives, propellants, and other components containing energetic materials. NO storage of hazardous waste is permitted at this unit. All waste taken to the burn grounds must be treated within 24 hours. If an unplanned detonation occurs, the Hazardous Waste Contingency Plan will be followed with the appropriate personnel notified immediately.

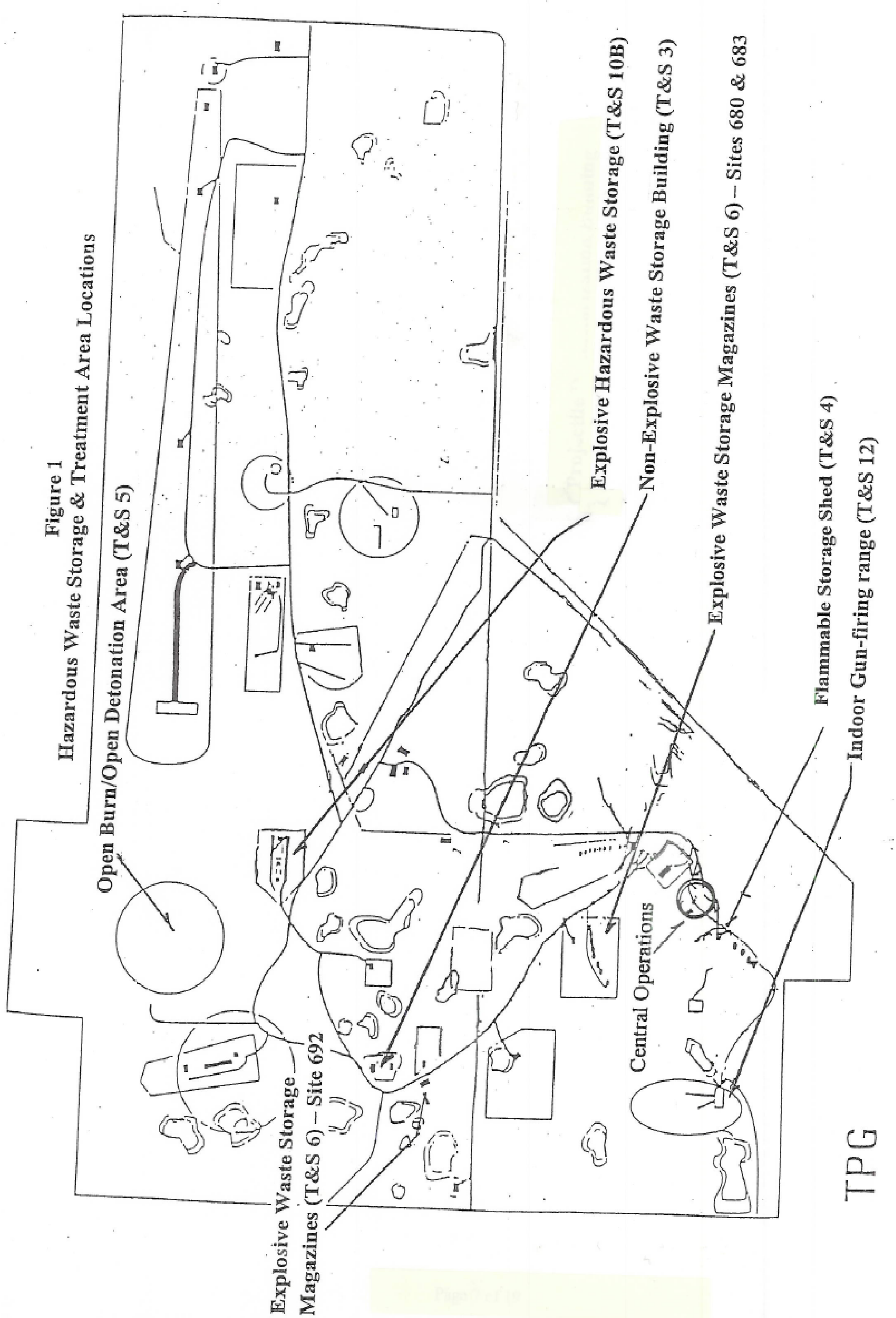
In case of a fire DO NOT attempt to extinguish instead immediately evacuate the area to protect personnel from explosion hazard. Control the spread of fire only at an appropriate distance. However, grass fires may be fought as discussed in Section III, A.5 of this Plan.

2. <u>Indoor Gun-firing Range (T&S 12) – Site 650</u>

This operation consists of an indoor structure with three (3) indoor gun firing ranges. Only intact cartridge cases, with or without projectiles, may be treated using gun firing. NO storage of hazardous waste is permitted at this unit. Photo wastewater is also processed at this site to remove silver below hazardous waste levels. Electrolytic recovery and/or steel wool canisters are used in this process.

In case of a fire DO NOT attempt to extinguish instead immediately evacuate the area to protect personnel from explosion hazard. Control the spread of fire only at an appropriate distance.

Figure 1
Hazardous Waste Storage & Treatment Area Locations



SECTION II

PERSONNEL ASSIGNMENTS & EMERGENCY NUMBERS

KEY PERSONNEL	TELEPHONE OFFICE/HOME	HOME CITY
Site Director		
G. Filo	(763) 241-7531 (office) (763) 441-7871 x7531 (pager)* (763) 331-1581 (cell)	Corcoran
Emergency Coordinators		
Steve Rauschendorfer (Primary)	(763) 744-5594 (office) (612) 219-3623 (cell) (763) 441-7871 x7538 (pager)* (612) 500-6568 (home)	Elk River
Casey Steiner (Alternate)	(763) 744-5575 (office) (763) 441-7871 x7520 (pager)* (651) 226-5541 (home) (763) 248-0538 (cell)	Anoka
M. Cypher (Alternate)	(763) 241-7540 (office) (763) 441-7871 x7540 (pager)* (320) 274-6456 (home) (612) 817-6047 (cell)	Annandale
Facility Services		
C. Steiner	See above	Anoka
Fire Support Leader		
T. Thompson	(763) 241-7513 (763) 441-7871 x7513 (pager)* (763) 441-1110 (home)	Elk River

Release of Information

Follow guidance provided in Section 3 “Release of Information and Incident Reporting” in the “Emergency Plan – TPG.”

*** NOTE**: The paging system has limited range and should only be considered effective if the designated employee is on site at TPG.

EMERGENCY NUMBERS

Fire Department (In Order of Preference)	
St. Francis Fire Department	911 or (763) 427-1212
Oak Grove Fire Department	911 or (763) 427-1212
Medical	
Mercy Medical Center (emergency room)	911 or (763) 236-7144
North Memorial Medical Center (emergency room)	911 or (763) 520-5542
Anoka County Emergencies	
Anoka County Dispatch	911 or (763) 427-1212
St. Francis Police	911 or (763) 427-1212
Connexus Energy (24-hour electrical emergency)	(763) 323-2660
Sherburne County Emergencies	
Sherburne County Dispatch	(763) 241-2500
External Reporting	
National Response Center	1-800-424-8802
State Duty Officer	(651) 649-5451
Emergency Response Contractor	
Bay West Inc. 5 Empire Drive St. Paul, MN	(651) 291-0456 (24-hour number)

SECTION III

ON-SITE INCIDENT RESPONSE ACTIONS

A. In the event of a Fire or Explosion:

1. **During operating hours**, immediately notify the Security Officer by dialing 7777, the Internal Emergency Number (automatically rings the Site Director and the Security Officer).

   Give the following information over the telephone:

   a. Name of person calling
   b. Type and location of emergency
   c. Number of individuals involved
   d. Extent of injury to personnel if possible, and
   e. Extent of physical damage and/or type and extent of incident.

2. If required, the Security Officer will then send a text message via pager to plant personnel about the emergency. During **normal work hours**, on-site management may direct the Security Officer to call the Fire Department (911). **During off hours**, the officer will immediately call (911). When calling 911 for fire, always specify that the St. Francis Fire Department should be the responding fire department. This will avoid any potential confusion as to which fire department is being requested. If there is personnel injury, the officer will immediately call for an ambulance (911). The Security Officer shall also notify location management, who will then contact the facility environmental engineer **if** the fire or explosion involves hazardous waste, materials or related processes.

3. **During off hours, or in the absence of location management personnel**, the Security Officer shall assume the duties of the Site Director until an individual from the TPG management team arrives on site. If an after-hours fire or explosion occurs, notify the following after the fire department has been called:

   a. Site Director
   b. Facility Manager
   c. Environmental Engineer or designated alternate (acts as the Emergency Coordinator if an incident involves hazardous waste or materials)
   d. Safety Engineer

4. Grass Fires: Attempt to extinguish grass fires only if no explosives are involved, but evacuate if personal safety is at risk.

   Fires within buildings or structures: Do not attempt to extinguish any fire occurring within a building or structure. Employees shall not enter buildings or structures that are on fire. Employees shall not be directed nor are they expected to use fire extinguishers to fight fires.

   If explosives are involved or threatened, NO attempt shall be made to extinguish the flames and the area shall be evacuated immediately.

5. When fire-fighting equipment is removed from a fire truck or vehicle, the equipment shall be cleaned or restored to operable condition before being returned to the vehicle after an incident has been controlled.
6. The incident site shall not be disturbed by any one until authorized by the Site Director. No information regarding the emergency shall be given out by anyone except Alliant Techsystems management. This is discussed in the "Emergency Plan – TPG."

Fire Department/Emergency Responder Instructions

This facility displays signs called "Department of Defense Fire Hazard Signs" on or adjacent to buildings and vehicles that contain explosives, as well as occasionally having vehicles, which display DOT explosives placards. The numbers on these signs and placards are from the United Nations hazard classification system for dangerous goods - the lower the number the greater the explosive hazard. This number, shown in black, is placed upon a sign with a bright orange background (Refer to Figure 2):

'**1'** is for UN hazard class 1.1 with the explosive hazard of **Mass Detonation**
'**2'** is for hazard class 1.2 with the hazard of **Explosion with Fragment Hazard**
'**3'** is hazard class 1.3 where the explosive hazard is **Mass Fire**
'**4'** is hazard class 1.4 where the explosive hazard is **Moderate Fire**.

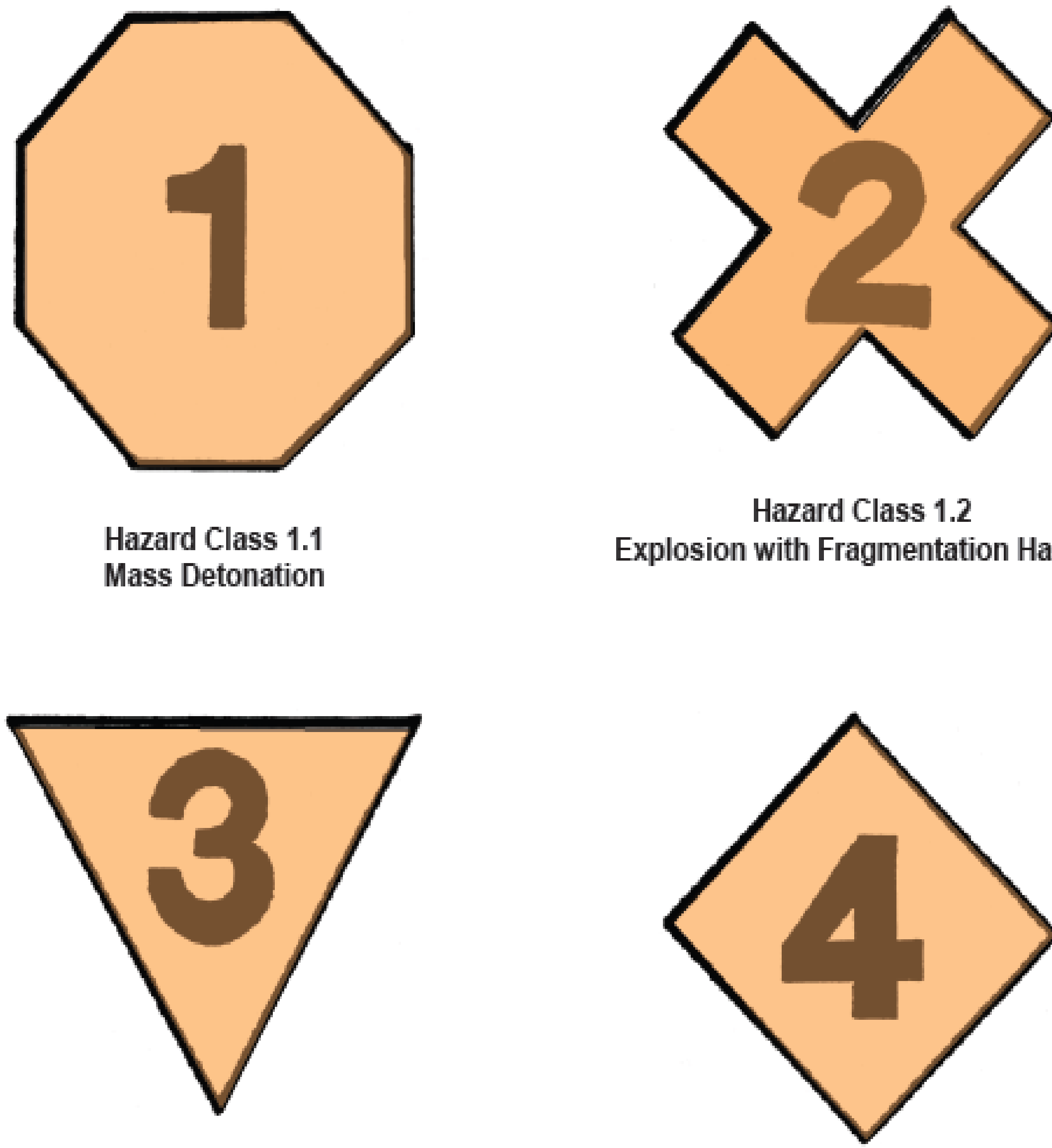
<u>DO NOT ATTEMPT</u> TO FIGHT ANY STRUCTURAL FIRE OR PERFORM RESCUE OPERATIONS WITHIN ANY STRUCTURE ON FIRE THAT DISPLAYS A FIRE HAZARD SIGN WITH AN ORANGE BACKGROUND AND BLACK NUMERAL. IF A GRASS FIRE THREATENS TO SPREAD TO A STRUCTURE LABELED WITH AN ORANGE FIRE HAZARD SIGN, EVACUATE THE AREA IMMEDIATELY.

Assume any structure or vehicle marked with a '1' on an octagonal sign; '2' on a cross sign, or '3' on an inverted triangle sign contain explosives that are heavily encased. Initially <u>isolate and evacuate an area of 1 mile (1600 meters) in all directions.</u> Consult with Alliant Techsystems management before moving in closer. Comply with the guidance provided in the DOT's Emergency Response Guidebook for 1.1, 1.2, and 1.3 Explosives (see Guide 112).

Assume a structure or vehicle marked with a '4' on a diamond contains DOT 1.4 explosives. Initially <u>isolate and evacuate an area of 1/3 mile (500 meters) in all directions</u>. Consult with Alliant Techsystems management before moving in closer. Comply with the guidance provided in the DOT's Emergency Response Guidebook for 1.4 Explosives (see Guide 114).

FIGURE 2

Department of Defense Fire Hazard Signs



Hazard Class 1.1
Mass Detonation

Hazard Class 1.2
Explosion with Fragmentation Hazard

Hazard Class 1.3
Mass Fire

Hazard Class 1.4
Moderate Fire

B. In the event of a Hazardous Waste Spill or Release:

1. Immediately contact the Emergency Coordinator (or alternate if the primary coordinator is not available) for guidance on how to respond to the chemical incident. The primary and alternate Emergency Coordinators are listed with their phone numbers and home city in SECTION II PERSONNEL ASSIGNMENTS & EMERGENCY NUMBERS.

2. The Emergency Coordinator shall implement this Hazardous Waste Contingency Plan for spills or releases from any hazardous waste / material on site that has a potential to cause harm to human health or the environment, or that may potentially impact air, soil, or surface water. This includes releases that escape the secondary containment systems present in several of the T&S units on site. The Emergency Coordinator has the authority to commit the resources needed to carry out this plan.

3. The reason for the spill shall be determined as soon as possible by the Emergency Coordinator and corrective action taken to prevent a recurrence.

4. If the spill enters the surrounding soil, the soil shall be removed and evaluated for proper disposal.

5. Incompatible materials from spill clean up shall not be mixed.

6. Specific actions to be taken:

   a. Liquids

      1) Liquids spilled shall be absorbed with the absorbents present at the storage location. Special care shall be taken when dealing with flammable or combustible material incidents.

      2) The contaminated absorbents shall be placed into clean open head steel drums or equivalent.

      3) The drums shall be labeled and marked as to contents.

      4) Contaminated soil must be placed into open head steel drums or

      5) Contaminated soil clean up shall be verified, where appropriate, by chemical analysis.

      6) Residual structural contamination shall be cleaned up with detergent or other appropriate cleaning agent. The spent cleaning agent shall be placed into a sealed container that is compatible with the recovered materials. The environmental engineer shall arrange for proper disposal.

b. Open Burn Treatment Residue (Ash)

1) Solid spills shall be swept up or collected and placed into open head steel drums or equivalent.

2) Contaminated soil shall be shoveled into open head steel drums or equivalent. The soil shall be cleaned up sufficiently to ensure complete removal of all ash residue.

3) Appropriate sampling protocol, if required, should be followed to determine if the collected material is hazardous waste. The completeness of the cleanup effort should be documented in the operating log of the facility.

c. Explosives / Propellants

1) Spilled bulk explosives and propellants shall be collected to the extent practicable and then any affected soil must be flashed (burned) to destroy any residual energetic material. The contaminated soil must not to be collected before being flashed because of the potential hazard associated with loose bulk explosives and propellants.

2) Bulk explosives and propellants spilled on building floors or bituminous roadways shall be collected and treated at the OB / OD Treatment Area.

3) Contaminated soils resulting from the spill of explosive-laden water near a building or structure shall be removed as soon as possible before the area begins to dry. The low amount of explosive typically present in process water and because explosives are desensitized when wet make quick clean up necessary. If prompt clean up is not possible, the soil must be rewetted with water before it is shoveled.

4) Explosive-laden water spilled onto the ground in an area that is away from a building or structure shall be removed and placed into open head steel drums or equivalent. If the spill area has dried the soil shall be flashed (burned) to minimize the hazard before the residue is placed into a drum.

d. For ALL spills:

1) Contact the Emergency Spill Response Contractor, noted in SECTION II PERSONNEL ASSIGNMENTS & EMERGENCY NUMBERS, <u>if an incident cannot be properly controlled using on-site resources and it does **NOT** pose an imminent health/fire hazard</u>. Typically, the Emergency Coordinator will decide whether or not to call in the emergency response contractor.
2) If an incident poses an imminent health or fire hazard, local emergency authorities must be summoned. After the incident has been stabilized then the Emergency Coordinator will decide whether or not to call in the emergency response contractor to perform cleanup activities.

SECTION IV

INCIDENT NOTIFICATION, REPORTING & RECORD KEEPING

A. If the Emergency Coordinator determines that the incident requires implementation of this plan and it has resulted in a release or discharge of hazardous waste / material to the environment or that a fire or explosion has occurred at a hazardous waste or a hazardous material-handling facility, the following shall be done:

ORAL NOTIFICATION: Immediately notify the Minnesota Duty Officer, at (651) 649-5451, if there is a public safety or environmental threat and/or if a State Agency Notification for Reportable Spills is required. Also immediately notify the National Response Center, at 1-800-424-8802, if a federal notification is required. (For the purpose of this section, release or discharge does not include the permitted open burning or detonation of hazardous waste explosive material at the OB/OD Treatment Area.)

WRITTEN NOTIFICATION: Within 15 days after the incident, the Emergency Coordinator shall submit a written report describing the incident.

The oral and written descriptions of the incident shall include at a minimum:

1. The name, address, and telephone number of the facility owner and operator

   Alliant Techsystems Operations LLC
   Armament Systems
   4700 Nathan Lane North
   Plymouth, MN 55442
   (763) 744-5594

2. The name, address, and telephone number of the facility

   Alliant Techsystems Operations LLC
   The Proving Grounds
   23100 Sugarbush Road Northwest
   Elk River, MN 55330
   (763) 744-5594

3. The date, time, and type of incident

4. The name and quantity of materials involved

5. The extent of damage or injuries, if any

6. An assessment of the actual or potential hazards to the environment and hazards to human health including information regarding the following:

   a. Type and volume of material released

   b. Areal extent of land affected by the release

   c. Response actions taken to contain and recover hazardous materials, and

   d. The estimated quantity and disposition of recovered hazardous materials.

B. Following an incident where this plan is implemented the date, time and details of the incident must be noted in the Hazardous Waste Operating Log.

C. Post-Emergency Requirements

1. Before resuming operations following a release that required implementation of this plan, TPG will notify the MPCA that it is in compliance with Minnesota Rules 7045.0470, Subpart 1. This subpart provides for the complete cleanup of affected media resulting from the incident.

2. Operations may not be resumed until Item 1 above, is completed.

SECTION V

EMERGENCY EQUIPMENT

A. Fire Fighting Equipment

1. Fire extinguishers

   a. Fire extinguishers shall be inspected periodically to ensure proper operation.

   b. The inspection log is typically a punch card on the fire extinguishers.

   c. Fire extinguisher types & capabilities – refer to Figure 3.

   d. A fire extinguisher is maintained outdoors near the Flammable Storage Shed at the edge of the road; however, fires involving the shed must not be fought.

   e. Similarly fires must <u>not</u> be fought at other storage locations because of the hazard posed by energetic materials and chemicals. Fire extinguishers must not be used to fight grass fires. There are no fire extinguishers at waste storage locations other near the Flammable Storage Shed.

2. Fire vehicles typically equipped with water tanks and gas-powered pumps are available on site for use in fighting grass fires. These vehicles may be either trailers or trucks.

   a. The vehicles shall be inspected periodically (during the fire season, not winter) to ensure proper operation.

   b. The vehicles shall be maintained in a state of readiness for rapid deployment. (The storage location may be changed with the permission of the Facility Manager when it is prudent for quicker response times.)

   c. The number of operational fire vehicles required depends upon the level of fire risk posed by current conditions.

   d. Shovels, rakes, and fire flappers should be kept on the fire vehicles for ready access.

B. Emergency power supply

An emergency diesel generator is located adjacent to the Operations Building. It will furnish electrical power to the Operations Building if there is a disruption of service from the local utility. It is tested monthly to ensure that it is operating properly and it has a 500-gallon diesel fuel tank.

If a power failure occurs during normal work hours, trades personnel shall start the generator. If a power failure occurs during off hours, the Security Officer will start the generator.

C. Spill Control Equipment

Spill absorbents and hand tools are located indoors at each liquid waste storage unit and other appropriate buildings on site for use in managing liquid spills.

D. Text Pagers

Text pagers are provided to plant personnel so that emergency messages can be sent simultaneously to staff working at various locations on site.

E. Evacuation

Refer to the “Emergency Plan – TPG” for evacuation procedures to be used if a natural disaster occurs.

F. Natural Disasters

Refer to the “Emergency Plan – TPG” for procedures to be used if a natural disaster occurs.

G. Civil Disturbance

Refer to the “Emergency Plan – TPG” for procedures to be used if a civil disturbance occurs.

FIGURE 3

Fire Extinguisher Capabilities

Type of Extinguisher	Class A Ordinary Materials	Class B Ignitable Liquids	Class C Live Electrical	Class D Metals	How to Operate	Extinguishing Effect
Carbon Dioxide	Only small surface fires	Yes	Yes	No	Open valve at top <u>or</u> pull pin, squeeze grip	Smothering
Dry Chemical (B-C)	Only small surface fires	Yes	Yes	No	Open valve at top <u>or</u> pull pin, squeeze grip	Smothering
Multi-Purpose Dry Chemical	Yes	Yes	Yes	Some types	Pull pin, squeeze grip	Smothering
GI Powder	Especially compounded to control magnesium fires			Yes	Pour onto fires	Depletes oxygen to halt combustion

Appendix F

Financial Assurance for Closure & Liability

Orbital ATK

February 19, 2015

Ms. Johnna Benke
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155

RE: EPA ID# MND081138604

Dear Ms. Benke,

Alliant Techsystems, Inc. has acquired Orbital Sciences Corporation and changed its name to Orbital ATK, Inc. Bond number K08052402 is attached for your files in support of the captioned corrective action/closure.

If you have any questions, please contact Tasha Gordon-Jackson at Hays Companies of Minneapolis. She can be reached at tjackson@hayscompanies.com or 612-758-8500.

Regards,

Charles Thornton
Director, Risk Management
703-406-5051
charles.thornton@orbitalatk.com

PERFORMANCE BOND

Date bond executed: 2/6/2015

Effective date: 2/9/2015

Principal: Orbital ATK, Inc., 45101 Warp Drive, Dulles, VA 20166

Type of organization: Corporation

State of incorporation: Delaware

Surety: Westchester Fire Insurance Company

Identification number, name, address, and corrective action, closure, and/or postclosure amount(s) for each facility guaranteed by this bond:

23100 Sugar Bush Road, Elk River, MN 55303 EPA ID# MND081138604; closure estimated cost: $937,286.98, post closure estimated cost: $0

Total penal sum of bond: $937,286.98

Surety's bond number: K08052402

Know All Persons By These Presents, That we, the Principal and Surety(ies) hereto are firmly bound to the Minnesota Pollution Control Agency (hereinafter called Agency), in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally; provided that, where the Surety(ies) are corporations acting as cosureties, we, the Sureties, bind ourselves in the sum "jointly and severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of the sum only as is set forth opposite the name of the Surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

Whereas said Principal is required to have a permit in order to own or operate each hazardous waste facility identified above, and

Whereas said Principal is required to provide financial assurance for closure; closure and postclosure care; closure and corrective action; or closure, postclosure care, and corrective action as a condition of the permit, and

Whereas said Principal shall establish a standby trust fund as is required when a surety bond is used to provide financial assurance,

Now, Therefore, the conditions of this obligation are such that if the Principal shall faithfully perform closure, whenever required to do so, of each facility for which this bond guarantees closure, in accordance with the closure plan and other requirements of the permit as the plan and permit may be amended, pursuant to all applicable laws, statutes, rules, and regulations, as these laws, statutes, rules, and regulations may be amended, And, if the Principal shall faithfully perform postclosure care of each facility for which this bond guarantees postclosure care, in accordance with the postclosure plan and other requirements of the permit, as the plan and permit may be amended, pursuant to all applicable laws, statutes, rules, and regulations, as these laws, statutes, rules, and regulations may be amended,

And, if the Principal shall faithfully perform corrective action for each facility for which this bond guarantees corrective action, when required by and in accordance with the corrective action plan and other requirements of the permit, as the plan and permit may be amended, pursuant to all applicable laws, statutes, rules, and regulations, as such laws, statutes, rules, and regulations may be amended,

Or, if the Principal shall provide alternate financial assurance as specified in Minnesota Rules, parts 7045.0498 to 7045.0524, and obtain the Agency Commissioner's written approval of the assurance, within 90 days after the date notice of cancellation is received by both the Principal and the Agency Commissioner from the Surety(ies), then this obligation shall be null and void, otherwise it is to remain in full force and effect.

The Surety(ies) shall become liable on this bond obligation only when the Principal has failed to fulfill the conditions described above.

Upon notification by the Agency Commissioner that the Principal has been found in violation of the closure requirements of Minnesota Rules, parts 7045.0450 to 7045.0551 for a facility for which this bond guarantees performance of closure, the Surety(ies) shall either perform closure in accordance with the closure plan and other permit requirements or place the closure amount guaranteed for the facility into the standby trust fund as directed by the Agency Commissioner.

Upon notification by the Agency Commissioner that the Principal has been found in violation of the postclosure requirements of Minnesota Rules, parts 7045.0450 to 7045.0551 for a facility for which this bond guarantees performance of postclosure care, the Surety(ies) shall either perform postclosure care in accordance with the postclosure plan and other permit requirements or place the postclosure amount guaranteed for the facility into the standby trust fund as directed by the Agency Commissioner.

Upon notification by the Agency Commissioner that the Principal has been found in violation of the corrective action requirements of Minnesota Rules, parts 7045.0450 to 7045.0551 for a facility for which this bond guarantees performance of corrective action, the Surety(ies) shall either perform corrective action in accordance with the corrective action plan and other permit requirements or place the corrective action amount guaranteed for the facility into the standby trust fund as directed by the Agency Commissioner.

Upon notification by the Agency Commissioner that the Principal has failed to provide alternate financial assurance as specified in Minnesota Rules, parts 7045.0498 to 7045.0524 and obtain written approval of the assurance from the Agency Commissioner during the 90 days following receipt by both the Principal and the Agency of a notice of cancellation of the bond, the Surety(ies) shall place funds in the amount guaranteed for the facility(ies) into the standby trust fund as directed by the Agency Commissioner.

The Surety(ies) hereby waive(s) notification of amendments to closure, postclosure, and corrective action plans, permits, applicable laws, statutes, rules, and regulations and agrees that no amendment shall in any way alleviate its (their) obligation on this bond.

The liability of the Surety(ies) shall not be discharged by any payment or succession of payments hereunder, unless and until the payment or payments shall amount in the aggregate to the penal sum of the bond, but in no event shall the obligation of the Surety(ies) hereunder exceed the amount of said penal sum.

The Surety(ies) may cancel the bond by sending notice of cancellation by certified mail to the owner or operator and to the Agency Commissioner, provided, however, that cancellation shall not occur during the 120 days beginning on the date of receipt of the notice of cancellation by both the Principal and the Agency Commissioner, as evidenced by the return receipts.

The Principal may terminate this bond by sending written notice to the Surety(ies), provided, however, that no notice shall become effective until the Surety(ies) receive(s) written authorization for termination of the bond by the Agency Commissioner.

[The following paragraph is an optional rider that may be included but is not required.]

Principal and Surety(ies) hereby agree to adjust the penal sum of the bond yearly so that it guarantees a new corrective action, closure, and/or postclosure amount, provided that the penal sum does not increase by more than 20 percent in any one year, and no decrease in the penal sum takes place without the written permission of the Agency Commissioner.

In Witness Whereof, the Principal and Surety(ies) have executed this Performance Bond and have affixed their seals on the date set forth above.

The persons whose signatures appear below hereby certify that they are authorized to execute this surety bond on behalf of the Principal and Surety(ies) and that the wording of this surety bond is identical to the wording specified in Minnesota Rules, part 7045.0524, subpart 3, as the part was constituted on the date this bond was executed.

Orbital ATK, Inc.
Principal

By: Jeffrey K. Wendel
Name & Title [corporate seal]

Orbital ATK, Inc. CORPORATE SEAL 1990 DELAWARE

Westchester Fire Insurance Company
Corporate Surety

State of incorporation: PA
Liability limit: $937,286.98

By: Tasha Gordon-Jackson
Tasha Gordon-Jackson, Attorney-in-Fact
[CORPORATE SEAL]

Bond premium: $11,716.00

Power of Attorney

WESTCHESTER FIRE INSURANCE COMPANY

Know all men by these presents: That **WESTCHESTER FIRE INSURANCE COMPANY**, a corporation of the Commonwealth of Pennsylvania pursuant to the following Resolution, adopted by the Board of Directors of the said Company on December 11, 2006, to wit:

"RESOLVED, that the following authorizations relate to the execution, for and on behalf of the Company, of bonds, undertakings, recognizances, contracts and other written commitments of the Company entered into the ordinary course of business (each a "Written Commitment"):

(1) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise.

(2) Each duly appointed attorney-in-fact of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise, to the extent that such action is authorized by the grant of powers provided for in such persons written appointment as such attorney-in-fact.

(3) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized, for and on behalf of the Company, to appoint in writing any person the attorney-in-fact of the Company with full power and authority to execute, for and on behalf of the Company, under the seal of the Company or otherwise, such Written Commitments of the Company as may be specified in such written appointment, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.

(4) Each of the Chairman, the President and Vice Presidents of the Company in hereby authorized, for and on behalf of the Company, to delegate in writing any other officer of the Company the authority to execute, for and on behalf of the Company, under the Company's seal or otherwise, such Written Commitments of the Company as are specified in such written delegation, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.

(5) The signature of any officer or other person executing any Written Commitment or appointment or delegation pursuant to this Resolution, and the seal of the Company, may be affixed by facsimile on such Written Commitment or written appointment or delegation.

FURTHER RESOLVED, that the foregoing Resolution shall not be deemed to be an exclusive statement of the powers and authority of officers, employees and other persons to act for and on behalf of the Company, and such Resolution shall not limit or otherwise affect the exercise of any such power or authority otherwise validly granted or vested.

Does hereby nominate, constitute and appoint Ann Higgins, Michele L Grogan, Robin Rutlin, Tasha Gordon-Jackson, Tim Boberg, all of the City of MINNEAPOLIS, Minnesota, each individually if there be more than one named, its true and lawful attorney-in-fact, to make, execute, seal and deliver on its behalf, and as its act and deed any and all bonds, undertakings, recognizances, contracts and other writings in the nature thereof in penalties not exceeding Twenty Five million dollars & zero cents ($25,000,000.00) and the execution of such writings in pursuance of these presents shall be as binding upon said Company, as fully and amply as if they had been duly executed and acknowledged by the regularly elected officers of the Company at its principal office,

IN WITNESS WHEREOF, the said Stephen M. Haney, Vice-President, has hereunto subscribed his name and affixed the Corporate seal of the said **WESTCHESTER FIRE INSURANCE COMPANY** this 24 day of September 2014.

WESTCHESTER FIRE INSURANCE COMPANY

WESTCHESTER FIRE INSURANCE CO.

Stephen M. Haney

Stephen M. Haney, Vice President

COMMONWEALTH OF PENNSYLVANIA
COUNTY OF PHILADELPHIA ss.

On this 24 day of September, AD. 2014 before me, a Notary Public of the Commonwealth of Pennsylvania in and for the County of Philadelphia came Stephen M. Haney ,Vice-President of the **WESTCHESTER FIRE INSURANCE COMPANY** to me personally known to be the individual and officer who executed the preceding instrument, and he acknowledged that he executed the same, and that the seal affixed to the preceding instrument is the corporate seal of said Company; that the said corporate seal and his signature were duly affixed by the authority and direction of the said corporation, and that Resolution, adopted by the Board of Directors of said Company, referred to in the preceding instrument, is now in force.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal at the City of Philadelphia the day and year first above written.

KAREN E. BRANDT COMMONWEALTH

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
KAREN E. BRANDT, Notary Public
City of Philadelphia, Phila. County
My Commission Expires Sept. 26, 2018

Karen E Brandt

Notary Public

I, the undersigned Assistant Secretary of the **WESTCHESTER FIRE INSURANCE COMPANY**, do hereby certify that the original POWER OF ATTORNEY, of which the foregoing is a substantially true and correct copy, is in full force and effect.

In witness whereof, I have hereunto subscribed my name as Assistant Secretary, and affixed the corporate seal of the Corporation, this 6th day of February, 2015

WESTCHESTER FIRE INSURANCE CO.

William L. Kelly

William L. Kelly, Assistant Secretary

THIS POWER OF ATTORNEY MAY NOT BE USED TO EXECUTE ANY BOND WITH AN INCEPTION DATE AFTER September 24, 2016.

ACKNOWLEDGMENT BY SURETY

STATE OF Minnesota
County of Hennepin } ss.

On this 6th day of February, 2015, before me personally appeared Tasha Gordon-Jackson, known to, me to be the Attorney-in-Fact of Westchester Fire Insurance Company, the corporation that executed the within instrument, and acknowledged to me that such corporation executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, at my office in the aforesaid County, the day and year in this certificate first above written.

Notary Public in the State of Minnesota
County of Hennepin

DAVID ROBERT STEPHENS
NOTARY PUBLIC - MINNESOTA
MY COMMISSION EXPIRES 01/31/18

Increase PENALTY RIDER

BOND NO. K08052402

To be attached and form a part of Bond No. K08052402 dated the 9th day of February, 2015, executed by Westchester Fire Insurance Company as surety, on behalf of Orbital ATK, Inc. as current principal of record, and in favor of Minnesota Pollution Control Agency, as Obligee, and in the amount of Nine Hundred Thirty Seven Thousand Two Hundred Eighty Six Dollars and 98/100 ($937,286.98).

In consideration of the agreed premium charged for this bond, it is understood and agreed that Westchester Fire Insurance Company hereby consents that effective from the 9th day of February, 2016, said bond shall be amended as follows:

THE BOND PENALTY SHALL BE Increased:

FROM: Nine Hundred Thirty Seven Thousand Two Hundred Eighty Six Dollars and 98/100 ($937,286.98)

TO: Nine Hundred Forty Five Thousand Five Hundred Thirty Five Dollars and 10/100 ($945,535.10)

The Increase of said bond penalty shall be effective as of the 9th day of February, 2016, and does hereby agree that the continuity of protection under said bond subject to changes in penalty shall not be impaired hereby, provided that the aggregate liability of the above mentioned bond shall not exceed the amount of liability assumed by it at the time the act and/or acts of default were committed and in no event shall such liability be cumulative.

Signed, sealed and dated this 19th day of February, 2016.

Orbital ATK, Inc.
PRINCIPAL

BY:______________________________

Westchester Fire Insurance Company
SURETY

BY: ______________________________
Tasha Gordon-Jackson, ATTORNEY-IN-FACT

Power of Attorney

WESTCHESTER FIRE INSURANCE COMPANY

Know all men by these presents: That **WESTCHESTER FIRE INSURANCE COMPANY,** a corporation of the Commonwealth of Pennsylvania pursuant to the following Resolution, adopted by the Board of Directors of the said Company on December 11, 2006, to wit:

"RESOLVED, that the following authorizations relate to the execution, for and on behalf of the Company, of bonds, undertakings, recognizances, contracts and other written commitments of the Company entered into the ordinary course of business (each a "Written Commitment"):

(1) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise.

(2) Each duly appointed attorney-in-fact of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise, to the extent that such action is authorized by the grant of powers provided for in such persons written appointment as such attorney-in-fact.

(3) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized, for and on behalf of the Company, to appoint in writing any person the attorney-in-fact of the Company with full power and authority to execute, for and on behalf of the Company, under the seal of the Company or otherwise, such Written Commitments of the Company as may be specified in such written appointment, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.

(4) Each of the Chairman, the President and Vice Presidents of the Company in hereby authorized, for and on behalf of the Company, to delegate in writing any other officer of the Company the authority to execute, for and on behalf of the Company, under the Company's seal or otherwise, such Written Commitments of the Company as are specified in such written delegation, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.

(5) The signature of any officer or other person executing any Written Commitment or appointment or delegation pursuant to this Resolution, and the seal of the Company, may be affixed by facsimile on such Written Commitment or written appointment or delegation.

FURTHER RESOLVED, that the foregoing Resolution shall not be deemed to be an exclusive statement of the powers and authority of officers, employees and other persons to act for and on behalf of the Company, and such Resolution shall not limit or otherwise affect the exercise of any such power or authority otherwise validly granted or vested.

Does hereby nominate, constitute and appoint Alaina E Anderson, Ann Higgins, Michele L Grogan, Robin Rutlin, Tasha Gordon-Jackson, Tim Boberg, all of the City of MINNEAPOLIS, Minnesota, each individually if there be more than one named, its true and lawful attorney-in-fact, to make, execute, seal and deliver on its behalf, and as its act and deed any and all bonds, undertakings, recognizances, contracts and other writings in the nature thereof in penalties not exceeding Twenty Five million dollars & zero cents ($25,000,000.00) and the execution of such writings in pursuance of these presents shall be as binding upon said Company, as fully and amply as if they had been duly executed and acknowledged by the regularly elected officers of the Company at its principal office,

IN WITNESS WHEREOF, the said Stephen M. Haney, Vice-President, has hereunto subscribed his name and affixed the Corporate seal of the said **WESTCHESTER FIRE INSURANCE COMPANY** this 9 day of November 2015.

WESTCHESTER FIRE INSURANCE COMPANY

WESTCHESTER FIRE INSURANCE CO.

Stephen M. Haney

Stephen M. Haney , Vice President

COMMONWEALTH OF PENNSYLVANIA
COUNTY OF PHILADELPHIA ss.

On this 9 day of November, AD. 2015 before me, a Notary Public of the Commonwealth of Pennsylvania in and for the County of Philadelphia came Stephen M. Haney ,Vice-President of the **WESTCHESTER FIRE INSURANCE COMPANY** to me personally known to be the individual and officer who executed the preceding instrument, and he acknowledged that he executed the same, and that the seal affixed to the preceding instrument is the corporate seal of said Company; that the said corporate seal and his signature were duly affixed by the authority and direction of the said corporation, and that Resolution, adopted by the Board of Directors of said Company, referred to in the preceding instrument, is now in force.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal at the City of Philadelphia the day and year first above written.

KAREN E. BRANDT COMMONWEALTH OF PENNSYLVANIA NOTARY PUBLIC

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
KAREN E. BRANDT, Notary Public
City of Philadelphia, Phila. County
My Commission Expires Sept. 26, 2018

Karen E Brandt

Notary Public

I, the undersigned Assistant Secretary of the **WESTCHESTER FIRE INSURANCE COMPANY,** do hereby certify that the original POWER OF ATTORNEY, of which the foregoing is a substantially true and correct copy, is in full force and effect.

In witness whereof, I have hereunto subscribed my name as Assistant Secretary, and affixed the corporate seal of the Corporation, this 19th day of February, 2016

WESTCHESTER FIRE INSURANCE CO.

William L. Kelly

William L. Kelly, Assistant Secretary

THIS POWER OF ATTORNEY MAY NOT BE USED TO EXECUTE ANY BOND WITH AN INCEPTION DATE AFTER November 09, 2017.

ACKNOWLEDGMENT BY SURETY

STATE OF Minnesota
County of Hennepin } ss.

On this 19th day of February, 2016, before me personally appeared Tasha Gordon-Jackson, known to, me to be the Attorney-in-Fact of Westchester Fire Insurance Company, the corporation that executed the within instrument, and acknowledged to me that such corporation executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, at my office in the aforesaid County, the day and year in this certificate first above written.

MICHAEL B RIPLEY
NOTARY PUBLIC - MINNESOTA
MY COMMISSION EXPIRES 01/31/17

Notary Public in the State of Minnesota
County of Hennepin

S-0230/GE 10/99

XDP

Orbital ATK

November 19, 2015

Ms. Johnna M. Benke
Financial Assurance Coordinator
RMA Division
MPCA
520 Lafayette Road North
St. Paul, MN 55155-4194

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Dear Ms. Benke:

Subj: Facility Hazardous Waste Permit – Updated Standby Trust Agreement
Alliant Techsystems Operations LLC / Proving Ground (EPA ID No. MND 081 138 604)

As discussed, I am submitting an updated standby trust agreement dated October 20, 2015, which complies with Minnesota Rules Part 7045.0524, Subpart 1, Item A, for the Facility Hazardous Waste Permit held by Alliant Techsystems Operations LLC / Proving Ground. This update is due to a name change of our parent company from Alliant Techsystems Inc. to Orbital ATK, Inc. The attached trust agreement with original signatures and certification also has updated information in Schedules A & B and Exhibit A.

Feel free to contact me at 763/241-7538 if further information is required.

Sincerely,

ALLIANT TECHSYSTEMS OPERATIONS LLC

David L. Rastetter
Principal Environmental Engineer

Enc. / Standby Trust Agreement, dated October 20, 2015 (original copy)

Enc/cc: Greg Filo, Alliant Techsystems Operations LLC	MN32
G. Krug, Alliant Techsystems Operations LLC	MN07-GE16
D. Shead, Orbital ATK, Inc.	MN05-1E

TRUST AGREEMENT

Trust Agreement, the "Agreement," entered into as of October 20, 2015 by and between Orbital ATK, Inc, a Delaware corporation, the "Grantor," and U.S. Bank, National Association, incorporated in the State of Ohio, the "Trustee."

Whereas, the Minnesota Pollution Control Agency (Agency), an agency of the state of Minnesota has established certain rules applicable to the Grantor, requiring that an owner or operator of a hazardous waste facility shall provide assurance that funds will be available when needed for closure and/or postclosure care of, and/or corrective action for the facility,

Whereas, the Grantor has elected to establish a trust to provide all or part of the financial assurance for the facilities identified herein,

Whereas, the Grantor, acting through its duly authorized officers, has selected the Trustee to be the trustee under this agreement, and the Trustee is willing to act as trustee,

Now, Therefore, the Grantor and the Trustee agree as follows:

Section 1. Definitions. As used in this Agreement:

a. The term "Grantor" means the owner or operator who enters into this Agreement and any successors or assigns of the Grantor.

b. The term "Trustee" means the Trustee who enters into this Agreement and any successor Trustee.

Section 2. Identification of Facilities and Cost Estimates. This Agreement pertains to the facilities and cost estimates identified on attached Schedule A.

Section 3. Establishment of Fund. The Grantor and the Trustee hereby establish a trust fund, the "Fund," for the benefit of the Agency. The Grantor and the Trustee intend that no third party have access to the Fund except as herein provided. The Fund is established initially as consisting of the property, which is acceptable to the Trustee, described in Schedule B attached hereto. This property and any other property subsequently transferred to the Trustee is referred to as the Fund, together with all earnings and profits thereon, less any payments or distributions made by the Trustee pursuant to this Agreement. The Fund shall be held by the Trustee, **IN TRUST,** as hereinafter provided. The Trustee shall not be responsible nor shall it undertake any responsibility for the amount or adequacy of, nor any duty to collect from the Grantor, any payments necessary to discharge any liabilities of the Grantor established by the Agency.

Section 4. Payment for Corrective Action, Closure, and Postclosure Care. The Trustee shall make payments from the Fund as the Agency Commissioner shall direct, in writing, to provide for the payment of the costs of corrective action, closure, and/or postclosure care of the facilities covered by this Agreement. The Trustee shall reimburse the Grantor or other persons as specified by the Agency Commissioner from the Fund for corrective action, closure, and postclosure expenditures in amounts as the Agency Commissioner shall direct in writing. In addition, the Trustee shall refund to the Grantor the amounts as the Agency Commissioner specifies in writing. Upon refund, these funds shall no longer constitute part of the Fund as defined herein.

Section 5. Payments Comprising the Fund. Payments made to the Trustee for the Fund shall consist of cash or securities acceptable to the Trustee.

Section 6. Trustee Management. The Trustee shall invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which the Grantor may communicate in writing to the Trustee from time to time, subject, however, to the provisions of this Section. In investing, reinvesting, exchanging, selling, and managing the Fund, the Trustee shall discharge duties with respect to the trust fund solely in the interest of the beneficiary and with the care, skill, prudence, and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims; **except that:**

a. securities or other obligations of the Grantor, or any other owner or operator of the facilities, or any of their affiliates as defined in the Investment Company Act of 1940, United States Code, title 15, section 80a-2.(a), as amended, shall not be acquired or held, unless they are securities or other obligations of the federal or state government;

b. the Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent insured by an agency of the federal or state government; and

c. the Trustee is authorized to hold cash awaiting investment or distribution uninvested for a reasonable time and without liability for the payment of interest thereon.

Section 7. Commingling and Investment. The Trustee is expressly authorized in its discretion:

a. to transfer from time to time any or all of the assets of the Fund to any common, commingled, or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and

b. to purchase shares in any investment company registered under the Investment Company Act of 1940, United States Code, title 15, sections 80a-1 et seq., as amended, including one which may be created, managed, underwritten, or to which investment advice is rendered or the shares of which are sold by the Trustee. The Trustee may vote such shares in its discretion.

Section 8. Express Powers of Trustee. Without in any way limiting the powers and discretions conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is expressly authorized and empowered:

a. To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale. No person dealing with the Trustee may be bound to see to the application of the purchase money or to inquire into the validity or expediency of a sale or other disposition;

b. To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;

c. To register any securities held in the Fund in its own name or in the name of a nominee and to hold any security in bearer form or in book entry, or to combine certificates representing the securities with certificates of the same issue held by the Trustee in other fiduciary capacities, or to deposit or arrange for the deposit of the securities in a qualified central depository even though, when so deposited, the securities may be merged and held in bulk in the name of the nominee of the depository with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the United States Government, or any agency or instrumentality thereof, with a federal reserve bank, but the books and records of the Trustee shall at all times show that all these securities are part of the Fund;

d. To deposit any cash in the Fund in interest bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the federal or state government; and

e. To compromise or otherwise adjust all claims in favor of or against the Fund.

Section 9. Taxes and Expenses. All taxes of any kind that may be assessed or levied against or in respect of the Fund and all brokerage commissions incurred by the Fund shall be paid from the Fund. All other expenses incurred by the Trustee in connection with the administration of this Trust, including fees for legal services rendered to the Trustee, the compensation of the Trustee to the extent not paid directly by the Grantor, and all other proper charges and disbursements of the Trustee shall be paid from the Fund.

Section 10. Annual Valuation. The Trustee shall annually, at least 30 days prior to the anniversary date of establishment of the Fund, furnish to the Grantor and to the Agency Commissioner a statement confirming the value of the Trust. Any securities in the Fund shall be valued at market value as of no more than 60 days prior to the anniversary date of establishment of the Fund. The failure of the Grantor to object in writing to the Trustee within 90 days after the statement has been furnished to the Grantor and the Agency Commissioner shall constitute a conclusively binding assent by the Grantor, barring the Grantor from asserting any claim or liability against the Trustee with respect to matters disclosed in the statement.

Section 11. Advice of Counsel. The Trustee may from time to time consult with counsel, who may be counsel to the Grantor, with respect to any question arising as to the construction of this Agreement or any action to be taken hereunder. The Trustee shall be fully protected, to the extent permitted by law, in acting upon the advice of counsel.

Section 12. Trustee Compensation. The Trustee shall be entitled to reasonable compensation for its services as agreed upon in writing from time to time with the Grantor.

Section 13. Successor Trustee. The trustee may resign or the Grantor may replace the Trustee, but the resignation or replacement shall not be effective until the Grantor has appointed a successor trustee and this successor accepts the appointment. The successor trustee shall have the same powers and duties as those conferred upon the Trustee hereunder. Upon the successor trustee's acceptance of the appointment, the Trustee shall assign, transfer, and pay over to the successor trustee the funds and properties then constituting the Fund. If for any reason the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment of a successor trustee or for instructions. The successor trustee shall specify the date on which it assumes administration of the trust in a writing sent to the Grantor, the Agency Commissioner and the present Trustee by certified mail ten days before the change becomes effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this Section shall be paid as provided in Section 9.

Section 14. Instructions to the Trustee. All orders, requests, and instructions by the Grantor to the Trustee shall be in writing, signed by the persons as are designated in the attached Exhibit A or other designees as the Grantor may designate by amendment to Exhibit A. The Trustee shall be fully protected in acting without inquiry in accordance with the Grantor's orders, requests, and instructions. All orders, requests, and instructions by the Agency to the Trustee shall be in writing, signed by the Agency Commissioner; and the Trustee shall act and shall be fully protected in acting in accordance with the orders, requests, and instructions. The Trustee shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the Grantor or the Agency hereunder has occurred. The Trustee shall have no duty to act in the absence of orders, requests, and instructions from the Grantor and/or the Agency Commissioner, except as provided for herein.

Section 15. Notice of Nonpayment. The Trustee shall notify the Grantor and the Agency Commissioner by certified mail within ten days following the expiration of the 30-day period after the anniversary of the establishment of the Trust, if no payment is received from the Grantor during that period. After the pay-in period is completed, the Trustee shall not be required to send a notice of nonpayment.

Section 16. Amendment of Agreement. This Agreement may be amended by an instrument in writing executed by the Grantor, the Trustee, and the Agency Commissioner, or by the Trustee and the Agency Commissioner, if the Grantor ceases to exist.

Section 17. Irrevocability and Termination. Subject to the right of the parties to amend this Agreement as provided in Section 16, this Trust shall be irrevocable and shall continue until terminated at the written agreement of the Grantor, the Trustee, and the Agency Commissioner, or by the Trustee and the Agency Commissioner, if the Grantor ceases to exist. Upon termination of the Trust, all remaining trust property, less final trust administration expenses, shall be delivered to the Grantor.

Section 18. Immunity and Indemnification. The Trustee shall not incur personal liability of any nature in connection with any act or omission, made in good faith, in the administration of this Trust, or in carrying out any directions by the Grantor or the Agency Commissioner issued in accordance with this Agreement. The Trustee shall be indemnified and saved harmless by the Grantor or from the Trust Fund, or both, from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the Grantor fails to provide a defense.

Section 19. Choice of Law. This Agreement shall be administered, construed, and enforced according to the laws of the state of Minnesota.

Section 20. Interpretation. As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each Section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement.

In Witness Whereof the parties have caused this Agreement to be executed by their respective officers duly authorized and their corporate seals to be hereunto affixed and attested as of the date first above written. The parties below certify that the wording of this Agreement is identical to the wording specified in Minnesota Rules, part 7045.0524, subpart 1, item A, as such rules were constituted on the date first above written.

Jeffrey K. Windland

Jeffrey K. Windland
Assistant Treasurer
Jeff.windland@orbitalatk.com
703-406-5695 (Office)
Attest: Blair Clause

Elizabeth A Boyd 11/4/15

Elizabeth A. Boyd
Vice President
elizabeth.boyd@usbank.com
804-343-1564 (Office)
Attest:

CERTIFICATION OF ACKNOWLEDGMENT

State of Virginia

County of Loudoun

On this 29th day of October, 2015 before me personally came Jeffrey K. Windland to me known, who, being by me duly sworn, did depose and say that he is the Assistant Treasurer of Orbital ATK, Inc., the corporation described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to the instrument is the corporate seal; that it was so affixed by order of the Board of Directors of said corporation, and that he signed his name thereto by like order.

Julie Anne Winship

Notary Public

My Commission Expires: 9-30-17

JULIE ANNE WINSHIP
NOTARY PUBLIC
Commonwealth of Virginia
Reg. #162153
My Commission Expires Sept. 30, 2017

Schedule A

Facility:	Alliant Techsystems Operations LLC 23100 Sugar Bush Road NW Elk River, MN 55330
EPA ID:	MND081138604
Closure Cost Estimate:	$937,286.98
Post Closure Cost Estimate:	$0

Schedule B

To Trust Agreement dated __October 20, 2015__by and between Orbital ATK, Inc., the Grantor, and U.S. Bank, National Association, the Trustee

Collateral for this Trust Agreement consists of a Surety Bond (see attached), issued Westchester Fire Insurance Company, P.O. Box 1000 436 Walnut Street, Routing WB04H Philadelphia, PA 19106, in the amount of $937,286.98. The Surety Bond is for closure/post- closure costs at Orbital ATK, Inc.; Minnesota locations (see Schedule A for details).

EXHIBIT A

Designated signatory for GRANTOR:	Jeffrey K. Windland Assistant Treasurer, Orbital ATK, Inc. 45101 Warp Drive Dulles, VA 20166 jeff.windland@orbitalatk.com (703)406-5695
Designated Signatory for Beneficiary:	Commissioner Minnesota Pollution Control Agency Postal service: Commissioner, Minnesota Pollution Control Agency 520 Lafayette Road N. St. Paul, MN 55155-4194
Designated Signatory for TRUSTEE:	Beth Boyd Vice President, U.S. Bank National Association 1021 E. Cary Street, Suite 1850 Richmond, VA 23219 Elizabeth.boyd@usbank.com (804) 343-1564

HAZARDOUS WASTE FACILITY CERTIFICATE OF LIABILITY INSURANCE

1. AIG Specialty Insurance Company (the "insurer"), of 175 Water Street, New York, NY 10038, hereby certifies that it has issued liability insurance covering bodily injury and property damage to Orbital ATK, Inc, (the "insured"), of 45101 Warp Drive, Dulles, VA 20166, in connection with the insured's obligation to demonstrate financial responsibility under Minnesota Rules, part 7045.0518 or 7045.0620. The coverage applies at MND081138604, Alliant Launch Systems, Inc., 23100 Sugarbush Road, Elk River, MN 55330 for sudden accidental occurrences. The limits of liability are $1,000,000 each occurrence and $2,000,000 aggregate, exclusive of legal defense costs. The coverage is provided under policy number PLS 12456928, issued on April 27, 2015. The effective date of the policy is April 27, 2015.

2. The insurer further certifies the following with respect to the insurance described in 1.:

a. Bankruptcy or insolvency of the insured shall not relieve the insurer of its obligations under the policy.

b. The insurer is liable for the payment of amounts within any deductible applicable to the policy with a right of reimbursement by the insured for any such payment made by the insurer. This provision does not apply with respect to that amount of any deductible for which coverage is demonstrated as specified in Minnesota Rules, part 7045.0518, subpart 6 or 7045.0620, subpart 5.

c. Whenever requested by the Minnesota Pollution Control Agency (Agency) Commissioner, the insurer agrees to furnish to the Agency Commissioner a signed duplicate original of the policy and all endorsements.

d. Cancellation of the insurance, whether by the insurer or the insured, will be effective only upon written notice and only after the expiration of 60 days after a copy of written notice is received by the Agency Commissioner.

e. Any other termination of the insurance will be effective only upon written notice and only after the expiration of 30 days after a copy of written notice is received by the Agency Commissioner.

I hereby certify that the wording of this instrument is identical to the wording specified in Minnesota Rules, part 7045.0524, subpart 10, as the rule was constituted on the date first above written, and that the insurer is licensed to transact the business of insurance, or eligible to provide insurance as an excess or surplus lines insurer, in one or more states.

Martine Houston

Sr. Underwriting Specialist, Authorized Representative of AIG Specialty Insurance Company

500 W. Madison Street, Suite 2100, Chicago, IL 60661

Appendix G

Test Procedures for Explosive Residues and Wastes

METHOD 8330

NITROAROMATICS AND NITRAMINES BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC)

1.0 SCOPE AND APPLICATION

1.1 Method 8330 is intended for the trace analysis of explosives residues by high performance liquid chromatography using a UV detector. This method is used to determine the concentration of the following compounds in a water, soil, or sediment matrix:

Compound	Abbreviation	CAS No[a]
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	HMX	2691-41-0
Hexahydro-1,3,5-trinitro-1,3,5-triazine	RDX	121-82-4
1,3,5-Trinitrobenzene	1,3,5-TNB	99-35-4
1,3-Dinitrobenzene	1,3-DNB	99-65-0
Methyl-2,4,6-trinitrophenylnitramine	Tetryl	479-45-8
Nitrobenzene	NB	98-95-3
2,4,6-Trinitrotoluene	2,4,6-TNT	118-96-7
4-Amino-2,6-dinitrotoluene	4-Am-DNT	1946-51-0
2-Amino-4, 6-dinitrotoluene	2-Am-DNT	355-72-78-2
2,4-Dinitrotoluene	2,4-DNT	121-14-2
2,6-Dinitrotoluene	2,6-DNT	606-20-2
2-Nitrotoluene	2-NT	88-72-2
3-Nitrotoluene	3-NT	99-08-1
4-Nitrotoluene	4-NT	99-99-0

a Chemical Abstracts Service Registry number

1.2 Method 8330 provides a salting-out extraction procedure for low concentration (parts per trillion, or nanograms per liter) of explosives residues in surface or ground water. Direct injection of diluted and filtered water samples can be used for water samples of higher concentration (See Table 1).

1.3 All of these compounds are either used in the manufacture of explosives or are the degradation products of compounds used for that purpose. When making stock solutions for calibration, treat each explosive compound with caution. See NOTE in Sec. 5.3.1 and Sec. 11 on Safety.

1.4 The estimated quantitation limits (EQLs) of target analytes determined by Method 8330 in water and soil are presented in Table 1.

1.5 This method is restricted to use by or under the supervision of analysts experienced in the use of HPLC, skilled in the interpretation of chromatograms, and experienced in handling explosive materials. (See Sec. 11.0 on SAFETY.) Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 Method 8330 provides high performance liquid chromatographic (HPLC) conditions for the detection of ppb levels of certain explosives residues in water, soil and sediment matrix. Prior to use of this method, appropriate sample preparation techniques must be used.

2.2 Low-Level Salting-out Method With No Evaporation: Aqueous samples of low concentration are extracted by a salting-out extraction procedure with acetonitrile and sodium chloride. The small volume of acetonitrile that remains undissolved above the salt water is drawn off and transferred to a smaller volumetric flask. It is back-extracted by vigorous stirring with a specific volume of salt water. After equilibration, the phases are allowed to separate and the small volume of acetonitrile residing in the narrow neck of the volumetric flask is removed using a Pasteur pipet. The concentrated extract is diluted 1:1 with reagent grade water. An aliquot is separated on a C-18 reverse phase column, determined at 254 nm, and confirmed on a CN reverse phase column.

2.3 High-level Direct Injection Method: Aqueous samples of higher concentration can be diluted 1/1 (v/v) with methanol or acetonitrile, filtered, separated on a C-18 reverse phase column, determine at 254 nm, and confirmed on a CN reverse phase column. If HMX is an important target analyte, methanol is preferred.

2.4 Soil and sediment samples are extracted using acetonitrile in an ultrasonic bath, filtered and chromatographed as in Sec. 2.3.

3.0 INTERFERENCES

3.1 Solvents, reagents, glassware and other sample processing hardware may yield discrete artifacts and/or elevated baselines, causing misinterpretation of the chromatograms. All of these materials must be demonstrated to be free from interferences.

3.2 2,4-DNT and 2,6-DNT elute at similar retention times (retention time difference of 0.2 minutes). A large concentration of one isomer may mask the response of the other isomer. If it is not apparent that both isomers are present (or are not detected), an isomeric mixture should be reported.

3.3 Tetryl decomposes rapidly in methanol/water solutions, as well as with heat. All aqueous samples expected to contain tetryl should be diluted with acetonitrile prior to filtration and acidified to pH <3. All samples expected to contain tetryl should not be exposed to temperatures above room temperature.

3.4 Degradation products of tetryl appear as a shoulder on the 2,4,6-TNT peak. Peak heights rather than peak areas should be used when tetryl is present in concentrations that are significant relative to the concentration of 2,4,6-TNT.

4.0 APPARATUS AND MATERIALS

4.1 HPLC system

4.1.1 HPLC - equipped with a pump capable of achieving 4000 psi, a 100 μl loop injector and a 254 nm UV detector (Perkin Elmer Series 3, or equivalent). For the low concentration option, the detector must be capable of a stable baseline at 0.001 absorbance units full scale.

4.1.2 Recommended Columns:

4.1.2.1 Primary column: C-18 Reverse phase HPLC column, 25 cm x 4.6 mm (5 μm), (Supelco LC-18, or equivalent).

4.1.2.2 Secondary column: CN Reverse phase HPLC column, 25 cm x 4.6 mm (5 μm), (Supelco LC-CN, or equivalent).

4.1.3 Strip chart recorder.

4.1.4 Digital integrator (optional).

4.1.5 Autosampler (optional).

4.2 Other Equipment

4.2.1 Temperature controlled ultrasonic bath.

4.2.2 Vortex mixer.

4.2.3 Balance, $\pm$ 0.0001 g.

4.2.4 Magnetic stirrer with stirring pellets.

4.2.5 Water bath - Heated, with concentric ring cover, capable of temperature control (± 5°C). The bath should be used in a hood.

4.2.6 Oven - Forced air, without heating.

4.3 Materials

4.3.1 High pressure injection syringe - 500 μL, (Hamilton liquid syringe or equivalent).

4.3.2 Disposable cartridge filters - 0.45 μm Teflon filter.

4.3.3 Pipets - Class A, glass, Appropriate sizes.

4.3.4 Pasteur pipets.

4.3.5 Scintillation Vials - 20 mL, glass.

4.3.6 Vials - 15 mL, glass, Teflon-lined cap.

4.3.7 Vials- 40 mL, glass, Teflon-lined cap.

4.3.8 Disposable syringes - Plastipak, 3 mL and 10 mL or equivalent.

4.3.9 Volumetric flasks - Appropriate sizes with ground glass stoppers, Class A.

NOTE: The 100 mL and 1 L volumetric flasks used for magnetic stirrer extraction must be round.

4.3.10 Vacuum desiccator - Glass.

4.3.11 Mortar and pestle - Steel.

4.3.12 Sieve - 30 mesh.

4.3.13 Graduated cylinders - Appropriate sizes.

4.4 Preparation of Materials

4.4.1 Prepare all materials to be used as described in Chapter 4 for semivolatile organics.

5.0 REAGENTS

5.1 Reagent grade inorganic chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lowering the accuracy of the determination.

5.1.1 Acetonitrile, CH_3CN - HPLC grade.

5.1.2 Methanol, CH_3OH - HPLC grade.

5.1.3 Calcium chloride, $CaCl_2$ - Reagent grade. Prepare an aqueous solution of 5 g/L.

5.1.4 Sodium chloride, NaCl, shipped in glass bottles - reagent grade.

5.2 Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Stock Standard Solutions

5.3.1 Dry each solid analyte standard to constant weight in a vacuum desiccator in the dark. Place about 0.100 g (weighed to 0.0001 g) of a single analyte into a 100 mL volumetric flask and dilute to volume with acetonitrile. Invert flask several times until dissolved. Store in refrigerator at 4°C in the dark. Calculate the concentration of the stock solution from the actual weight used (nominal concentration = 1,000 mg/L). Stock solutions may be used for up to one year.

> NOTE: The HMX, RDX, Tetryl, and 2,4,6-TNT are explosives and the neat material should be handled carefully. See SAFETY in Sec. 11 for guidance. HMX, RDX, and Tetryl reference materials are shipped under water. Drying at ambient temperature requires several days. DO NOT DRY AT HEATED TEMPERATURES!

5.4 Intermediate Standards Solutions

5.4.1 If both 2,4-DNT and 2,6-DNT are to be determined, prepare two separate intermediate stock solutions containing (1) HMX, RDX, 1,3,5-TNB, 1,3-DNB, NB, 2,4,6-TNT, and 2,4-DNT and (2) Tetryl, 2,6-DNT, 2-NT, 3-NT, and 4-NT. Intermediate stock standard solutions should be prepared at 1,000 µg/L, in acetonitrile when analyzing soil samples, and in methanol when analyzing aqueous samples.

5.4.2 Dilute the two concentrated intermediate stock solutions, with the appropriate solvent, to prepare intermediate standard solutions that cover the range of 2.5 - 1,000 µg/L. These solutions should be refrigerated on preparation, and may be used for 30 days.

5.4.3 For the low-level method, the analyst must conduct a detection limit study and devise dilution series appropriate to the desired range. Standards for the low level method must be prepared immediately prior to use.

5.5 Working standards

5.5.1 Calibration standards at a minimum of five concentration levels should be prepared through dilution of the intermediate standards solutions by 50% (v/v) with 5 g/L calcium chloride solution (Sec. 5.1.3). These solutions must be refrigerated and stored in the dark, and prepared fresh on the day of calibration.

5.6 Surrogate Spiking Solution

5.6.1 The analyst should monitor the performance of the extraction and analytical system as well as the effectiveness of the method in dealing with each sample matrix by spiking each sample, standard and reagent water blank with one or two surrogates (e.g., analytes not expected to be present in the sample).

5.7 Matrix Spiking Solutions

5.7.1 Prepare matrix spiking solutions in methanol such that the concentration in the sample is five times the Estimated Quantitation Limit (Table 1). All target analytes should be included.

5.8 HPLC Mobile Phase

5.8.1 To prepare 1 liter of mobile phase, add 500 mL of methanol to 500 mL of organic-free reagent water.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 Follow conventional sampling and sample handling procedures as specified for semivolatile organics in Chapter Four.

6.2 Samples and sample extracts must be stored in the dark at 4°C. Holding times are the same as for semivolatile organics.

7.0 PROCEDURE

7.1 Sample Preparation

7.1.1 Aqueous Samples: It is highly recommended that process waste samples be screened with the high-level method to determine if the low level method (1-50 μg/L) is required. Most groundwater samples will fall into the low level method.

7.1.1.1 Low-Level Method (salting-out extraction)

7.1.1.1.1 Add 251.3 g of sodium chloride to a 1 L volumetric flask (round). Measure out 770 mL of a water sample (using a 1 L graduated cylinder) and transfer it to the volumetric flask containing the salt. Add a stir bar and mix the contents at maximum speed on a magnetic stirrer until the salt is completely dissolved.

7.1.1.1.2 Add 164 mL of acetonitrile (measured with a 250 mL graduated cylinder) while the solution is being stirred and stir for an additional 15 minutes. Turn off the stirrer and allow the phases to separate for 10 minutes.

7.1.1.1.3 Remove the acetonitrile (upper) layer (about 8 mL) with a Pasteur pipet and transfer it to a 100 mL volumetric flask (round). Add 10 mL of fresh acetonitrile to the water sample in the 1 L flask. Again stir the contents of the flask for 15 minutes followed by 10 minutes for phase separation. Combine the second acetonitrile portion with the initial extract. The inclusion of a few drops of salt water at this point is unimportant.

7.1.1.1.4 Add 84 mL of salt water (325 g NaCl per 1000 mL of reagent water) to the acetonitrile extract in the 100 mL volumetric flask. Add a stir bar and stir the contents on a magnetic stirrer for 15 minutes, followed by 10 minutes for phase separation. Carefully transfer the acetonitrile phase to a 10 mL graduated cylinder using a Pasteur pipet. At this stage, the amount of water transferred with the acetonitrile must be minimized. The water contains a high concentration of NaCl that produces a large peak at the beginning of the chromatogram, where it could interfere with the HMX determination.

7.1.1.1.5 Add an additional 1.0 mL of acetonitrile to the 100 mL volumetric flask. Again stir the contents of the flask for 15 minutes, followed by 10 minutes for phase separation. Combine the second acetonitrile portion with the initial extract in the 10 mL graduated cylinder (transfer to a 25 mL graduated cylinder if the volume exceeds 5 mL). Record the total volume of acetonitrile extract to the nearest 0.1 mL. (Use this as the volume of total extract [V_t] in the calculation of concentration after converting to μL). The resulting extract, about 5 - 6 mL, is then diluted 1:1 with organic-free reagent water (with pH <3 if tetryl is a suspected analyte) prior to analysis.

7.1.1.1.6 If the diluted extract is turbid, filter it through a 0.45 - μm Teflon filter using a disposable syringe. Discard the first 0.5 mL of filtrate, and retain the remainder in a Teflon-capped vial for RP-HPLC analysis as in Sec. 7.4.

7.1.1.2 High-Level Method

7.1.1.2.1 Sample filtration: Place a 5 mL aliquot of each water sample in a scintillation vial, add 5 mL of acetonitrile, shake thoroughly, and filter through a 0.45-μm Teflon filter using a disposable syringe. Discard the first 3 mL of filtrate, and retain the remainder in a Teflon-capped vial for RP-HPLC analysis as in Sec. 7.4. HMX quantitation can be improved with the use of methanol rather than acetonitrile for dilution before filtration.

7.1.2 Soil and Sediment Samples

7.1.2.1 Sample homogenization: Dry soil samples in air at room temperature or colder to a constant weight, being careful not to expose the samples to direct sunlight. Grind and homogenize the dried sample thoroughly in an acetonitrile-rinsed mortar to pass a 30 mesh sieve.

NOTE: Soil samples should be screened by Method 8515 prior to grinding in a mortar and pestle (See Safety Sec. 11.2).

7.1.2.2 Sample extraction

7.1.2.2.1 Place a 2.0 g subsample of each soil sample in a 15 mL glass vial. Add 10.0 mL of acetonitrile, cap with

Teflon-lined cap, vortex swirl for one minute, and place in a cooled ultrasonic bath for 18 hours.

7.1.2.2.2 After sonication, allow sample to settle for 30 minutes. Remove 5.0 mL of supernatant, and combine with 5.0 mL of calcium chloride solution (Sec. 5.1.3) in a 20 mL vial. Shake, and let stand for 15 minutes.

7.1.2.2.3 Place supernatant in a disposable syringe and filter through a 0.45-μm Teflon filter. Discard first 3 mL and retain remainder in a Teflon-capped vial for RP-HPLC analysis as in Sec. 7.4.

7.2 Chromatographic Conditions (Recommended)

Primary Column:	C-18 reverse phase HPLC column, 25-cm x 4.6-mm, 5 μm, (Supelco LC-18 or equivalent).
Secondary Column:	CN reverse phase HPLC column, 25-cm x 4.6-mm, 5 μm, (Supelco LC-CN or equivalent).
Mobile Phase:	50/50 (v/v) methanol/organic-free reagent water.
Flow Rate:	1.5 mL/min
Injection volume:	100-μL
UV Detector:	254 nm

7.3 Calibration of HPLC

7.3.1 All electronic equipment is allowed to warm up for 30 minutes. During this period, at least 15 void volumes of mobile phase are passed through the column (approximately 20 min at 1.5 mL/min) and continued until the baseline is level at the UV detector's greatest sensitivity.

7.3.2 Initial Calibration. Injections of each calibration standard over the concentration range of interest are made sequentially into the HPLC in random order. Peak heights or peak areas are obtained for each analyte. Experience indicates that a linear calibration curve with zero intercept is appropriate for each analyte. Therefore, a response factor for each analyte can be taken as the slope of the best-fit regression line.

7.3.3 Daily Calibration. Analyze midpoint calibration standards, at a minimum, at the beginning of the day, singly at the midpoint of the run, and singly after the last sample of the day (assuming a sample group of 10 samples or less). Obtain the response factor for each analyte from the mean peak heights or peak areas and compare it with the response factor obtained for the initial calibration. The mean response factor for the daily calibration must agree within ±15% of the response factor of the initial calibration. The same criteria is required for subsequent standard responses compared to the mean response of the triplicate standards beginning the day. If this criterion is not met, a new initial calibration must be obtained.

7.4 HPLC Analysis

7.4.1 Analyze the samples using the chromatographic conditions given in Sec. 7.2. All positive measurements observed on the C-18 column must be confirmed by injection onto the CN column.

7.4.2 Follow Sec. 7.0 in Method 8000 for instructions on the analysis sequence, appropriate dilutions, establishing daily retention time windows, and identification criteria. Include a mid-level standard after each group of 10 samples in the analysis sequence. If column temperature control is not employed, special care must be taken to ensure that temperature shifts do not cause peak misidentification.

7.4.3 Table 2 summarizes the estimated retention times on both C-18 and CN columns for a number of analytes analyzable using this method. An example of the separation achieved by Column 1 is shown in Figure 1.

7.4.4 Record the resulting peak sizes in peak heights or area units. The use of peak heights is recommended to improve reproducibility of low level samples.

7.4.5 Calculation of concentration is covered in Sec. 7.0 of Method 8000.

8.0 QUALITY CONTROL

8.1 Refer to Chapter One for specific quality control procedures. Quality control to validate sample extraction is covered in Method 3500.

8.2 Quality control required to validate the HPLC system operation is found in Method 8000, Sec. 8.0.

8.3 Prior to preparation of stock solutions, acetonitrile, methanol, and water blanks should be run to determine possible interferences with analyte peaks. If the acetonitrile, methanol, or water blanks show contamination, a different batch should be used.

9.0 METHOD PERFORMANCE

9.1 Table 3 presents the single laboratory precision based on data from the analysis of blind duplicates of four spiked soil samples and four field contaminated samples analyzed by seven laboratories.

9.2 Table 4 presents the multilaboratory error based on data from the analysis of blind duplicates of four spiked soil samples and four field contaminated samples analyzed by seven laboratories.

9.3 Table 5 presents the multilaboratory variance of the high concentration method for water based on data from nine laboratories.

9.4 Table 6 presents multilaboratory recovery data from the analysis of spiked soil samples by seven laboratories.

9.5 Table 7 presents a comparison of method accuracy for soil and aqueous samples (high concentration method).

9.6 Table 8 contains precision and accuracy data for the salting-out extraction method.

10.0 REFERENCES

1. Bauer, C.F., T.F. Jenkins, S.M. Koza, P.W. Schumacher, P.H. Miyares and M.E. Walsh (1989). Development of an analytical method for the determination of explosive residues in soil. Part 3. Collaborative test results and final performance evaluation. USA Cold Regions Research and Engineering Laboratory, CRREL Report 89-9.

2. Grant, C.L., A.D. Hewitt and T.F. Jenkins (1989) Comparison of low concentration measurement capability estimates in trace analysis: Method Detection Limits and Certified Reporting Limits. USA Cold Regions Research and Engineering Laboratory, Special Report 89-20.

3. Jenkins, T.F., C.F. Bauer, D.C. Leggett and C.L. Grant (1984) Reversed-phased HPLC method for analysis of TNT, RDX, HMX and 2,4-DNT in munitions wastewater. USA Cold Regions Research and Engineering Laboratory, CRREL Report 84-29.

4. Jenkins, T.F. and M.E. Walsh (1987) Development of an analytical method for explosive residues in soil. USA Cold Regions Research and Engineering Laboratory, CRREL Report 87-7.

5. Jenkins, T.F., P.H. Miyares and ME. Walsh (1988a) An improved RP-HPLC method for determining nitroaromatics and nitramines in water. USA Cold Regions Research and Engineering Laboratory, Special Report 88-23.

6. Jenkins, T.F. and P.H. Miyares (1992) Comparison of Cartridge and Membrane Solid-Phase Extraction with Salting-out Solvent Extraction for Preconcentration of Nitroaromatic and Nitramine Explosives from Water. USA Cold Regions Research and Engineering Laboratory, Draft CRREL Special Report.

7. Jenkins, T.F., P.W. Schumacher, M.E. Walsh and C.F. Bauer (1988b) Development of an analytical method for the determination of explosive

residues in soil. Part II: Further development and ruggedness testing. USA Cold Regions Research and Engineering Laboratory, CRREL Report 88-8.

8. Leggett, D.C., T.F. Jenkins and P.H. Miyares (1990) Salting-out solvent extraction for preconcentration of neutral polar organic solutes from water. Analytical Chemistry, 62: 1355-1356.

9. Miyares, P.H. and T.F. Jenkins (1990) Salting-out solvent extraction for determining low levels of nitroaromatics and nitramines in water. USA Cold Regions Research and Engineering Laboratory, Special Report 90-30.

11.0 SAFETY

11.1 Standard precautionary measures used for handling other organic compounds should be sufficient for the safe handling of the analytes targeted by Method 8330. The only extra caution that should be taken is when handling the analytical standard neat material for the explosives themselves and in rare cases where soil or waste samples are highly contaminated with the explosives. Follow the note for drying the neat materials at ambient temperatures.

11.2 It is advisable to screen soil or waste samples using Method 8515 to determine whether high concentrations of explosives are present. Soil samples as high as 2% 2,4,6-TNT have been safely ground. Samples containing higher concentrations should not be ground in the mortar and pestle. Method 8515 is for 2,4,6-TNT, however, the other nitroaromatics will also cause a color to be developed and provide a rough estimation of their concentrations. 2,4,6-TNT is the analyte most often detected in high concentrations in soil samples. Visual observation of a soil sample is also important when the sample is taken from a site expected to contain explosives. Lumps of material that have a chemical appearance should be suspect and not ground. Explosives are generally a very finely ground grayish-white material.

TABLE 1
ESTIMATED QUANTITATION LIMITS

Compounds	Water (μg/L) Low-Level	Water (μg/L) High-Level	Soil (mg/kg)
HMX	-	13.0	2.2
RDX	0.84	14.0	1.0
1,3,5-TNB	0.26	7.3	0.25
1,3-DNB	0.11	4.0	0.25
Tetryl	-	4.0	0.65
NB	-	6.4	0.26
2,4,6-TNT	0.11	6.9	0.25
4-Am-DNT	0.060	-	-
2-Am-DNT	0.035	-	-
2,6-DNT	0.31	9.4	0.26
2,4-DNT	0.020	5.7	0.25
2-NT	-	12.0	0.25
4-NT	-	8.5	0.25
3-NT	-	7.9	0.25

TABLE 2
RETENTION TIMES AND CAPACITY FACTORS ON LC-18 AND LC-CN COLUMNS

	Retention time (min)		Capacity factor (k)*	
Compound	LC-18	LC-CN	LC-18	LC-CN
HMX	2.44	8.35	0.49	2.52
RDX	3.73	6.15	1.27	1.59
1,3,5-TNB	5.11	4.05	2.12	0.71
1,3-DNB	6.16	4.18	2.76	0.76
Tetryl	6.93	7.36	3.23	2.11
NB	7.23	3.81	3.41	0.61
2,4,6-TNT	8.42	5.00	4.13	1.11
4-Am-DNT	8.88	5.10	4.41	1.15
2-Am-DNT	9.12	5.65	4.56	1.38
2,6-DNT	9.82	4.61	4.99	0.95
2,4-DNT	10.05	4.87	5.13	1.05
2-NT	12.26	4.37	6.48	0.84
4-NT	13.26	4.41	7.09	0.86
3-NT	14.23	4.45	7.68	0.88

* Capacity factors are based on an unretained peak for nitrate at 1.71 min on LC-18 and at 2.00 min on LC-CN.

TABLE 3
SINGLE LABORATORY PRECISION OF METHOD FOR SOIL SAMPLES

	Spiked Soils			Field-Contaminated Soils		
	Mean Conc. (mg/kg)	SD	%RSD	Mean Conc. (mg/kg)	SD	%RSD
HMX	46	1.7	3.7	14	1.8	12.8
				153	21.6	14.1
RDX	60	1.4	2.3	104	12	11.5
				877	29.6	3.4
1,3,5-TNB	8.6	0.4	4.6	2.8	0.2	7.1
	46	1.9	4.1	72	6.0	8.3
1,3-DNB	3.5	0.14	4.0	1.1	0.11	9.8
Tetryl	17	3.1	17.9	2.3	0.41	18.0
2,4,6-TNT	40	1.4	3.5	7.0	0.61	9.0
				669	55	8.2
2,4-DNT	5.0	0.17	3.4	1.0	0.44	42.3

TABLE 4
MULTILABORATORY ERROR OF METHOD FOR SOIL SAMPLES

	Spiked Soils			Field-Contaminated Soils		
	Mean Conc. (mg/kg)	SD	%RSD	Mean Conc. (mg/kg)	SD	%RSD
HMX	46	2.6	5.7	14	3.7	26.0
				153	37.3	24.0
RDX	60	2.6	4.4	104	17.4	17.0
				877	67.3	7.7
1,3,5-TNB	8.6	0.61	7.1	2.8	0.23	8.2
	46	2.97	6.5	72	8.8	12.2
1,3-DNB	3.5	0.24	6.9	1.1	0.16	14.5
Tetryl	17	5.22	30.7	2.3	0.49	21.3
2,4,6-TNT	40	1.88	4.7	7.0	1.27	18.0
				669	63.4	9.5
2,4-DNT	5.0	0.22	4.4	1.0	0.74	74.0

TABLE 5
MULTILABORATORY VARIANCE OF METHOD FOR WATER SAMPLES[a]

Compounds	Mean Conc. (μg/L)	SD	%RSD
HMX	203	14.8	7.3
RDX	274	20.8	7.6
2,4-DNT	107	7.7	7.2
2,4,6-TNT	107	11.1	10.4

[a] Nine Laboratories

TABLE 6
MULTILABORATORY RECOVERY DATA FOR SPIKED SOIL SAMPLES

	Concentration (µg/g)						
Laboratory	HMX	RDX	1,3,5-TNB	1,3-DNB	Tetryl	2,4,6-TNT	2,4-DNT
1	44.97	48.78	48.99	49.94	32.48	49.73	51.05
3	50.25	48.50	45.85	45.96	47.91	46.25	48.37
4	42.40	44.00	43.40	49.50	31.60	53.50	50.90
5	46.50	48.40	46.90	48.80	32.10	55.80	49.60
6	56.20	55.00	41.60	46.30	13.20	56.80	45.70
7	41.50	41.50	38.00	44.50	2.60	36.00	43.50
8	52.70	52.20	48.00	48.30	44.80	51.30	49.10
True Conc	50.35	50.20	50.15	50.05	50.35	50.65	50.05
Mean	47.79	48.34	44.68	47.67	29.24	49.91	48.32
Std Dev	5.46	4.57	3.91	2.09	16.24	7.11	2.78
% RSD	11.42	9.45	8.75	4.39	55.53	14.26	5.76
% Diff*	5.08	3.71	10.91	4.76	41.93	1.46	3.46
Mean % Recovery	95	96	89	95	58	98	96

* Between true value and mean determined value.

TABLE 7
COMPARISON OF METHOD ACCURACY FOR SOIL AND AQUEOUS SAMPLES
(HIGH CONCENTRATION METHOD)

	Recovery (%)	
Analyte	Soil Method*	Aqueous Method**
2,4-DNT	96.0	98.6
2,4,6-TNT	96.8	94.4
RDX	96.8	99.6
HMX	95.4	95.5

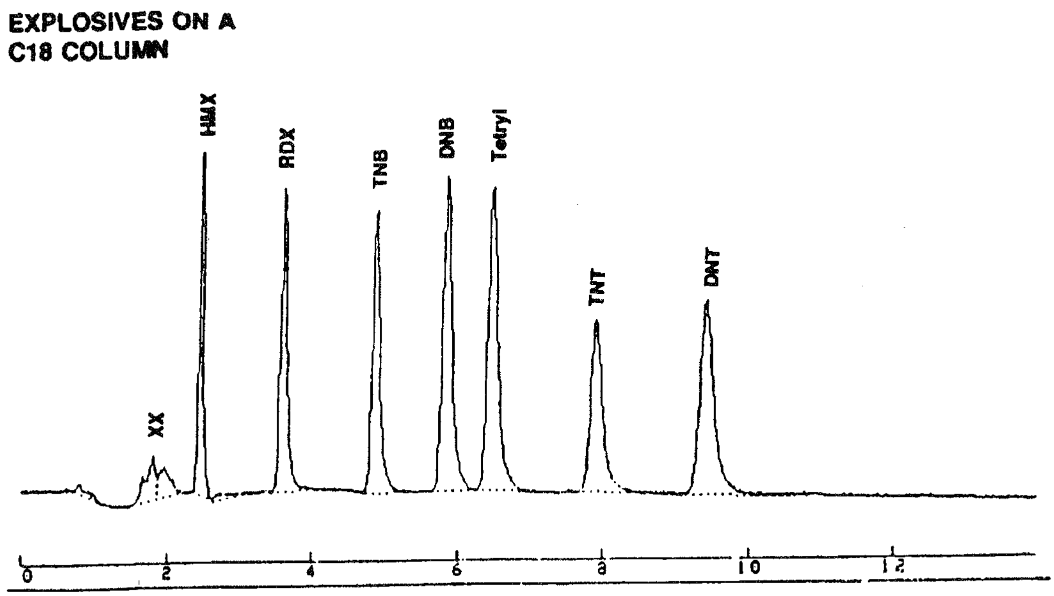
* Taken from Bauer et al. (1989), Reference 1.
** Taken from Jenkins et al. (1984), Reference 3.

TABLE 8

PRECISION AND ACCURACY DATA FOR THE SALTING-OUT EXTRACTION METHOD

Analyte	No. of Samples[1]	Precision (% RSD)	Ave. Recovery (%)	Conc. Range (μg/L)
HMX	20	10.5	106	0-1.14
RDX	20	8.7	106	0-1.04
1,3,5-TNB	20	7.6	119	0-0.82
1,3-DNB	20	6.6	102	0-1.04
Tetryl	20	16.4	93	0-0.93
2,4,6-TNT	20	7.6	105	0-0.98
2-Am-DNT	20	9.1	102	0-1.04
2,4-DNT	20	5.8	101	0-1.01
1,2-NT	20	9.1	102	0-1.07
1,4-NT	20	18.1	96	0-1.06
1,3-NT	20	12.4	97	0-1.23

[1]Reagent water



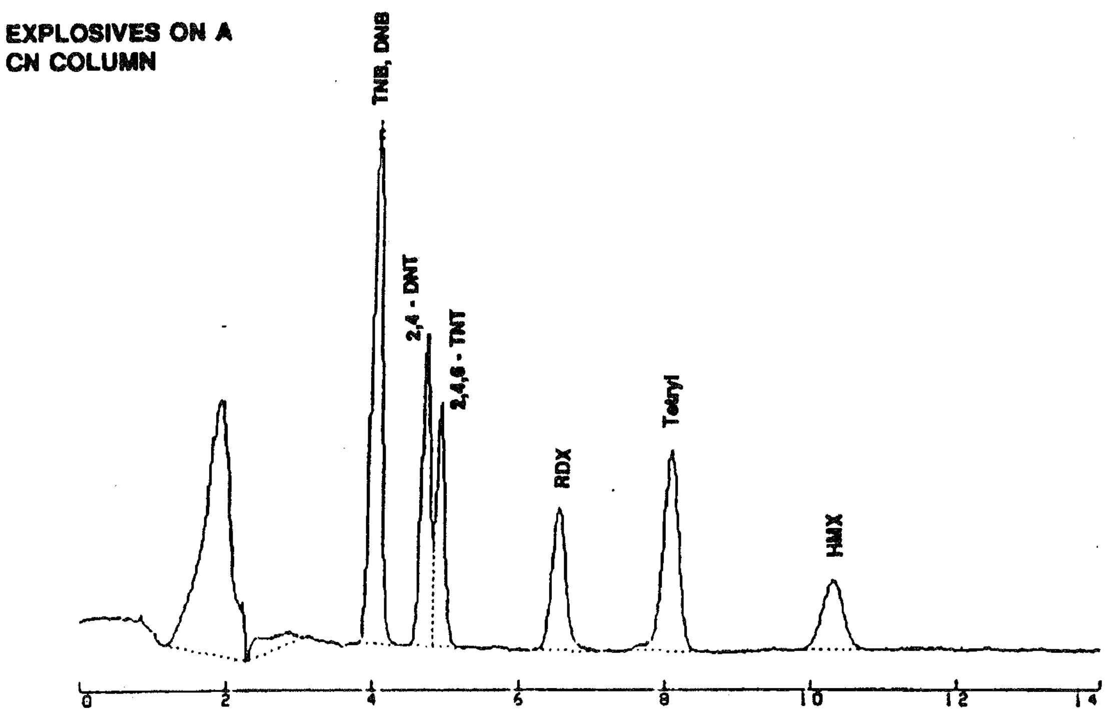
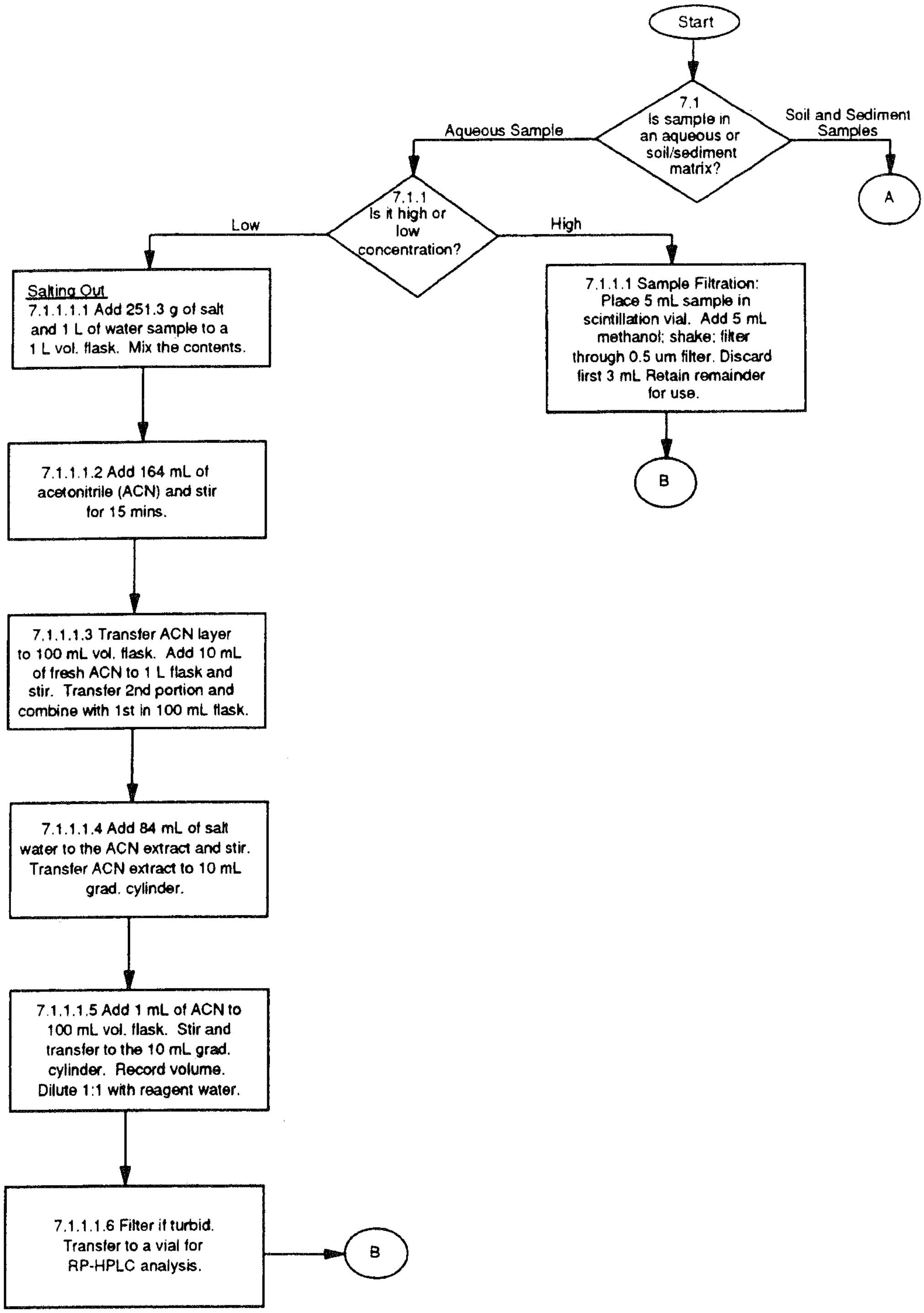
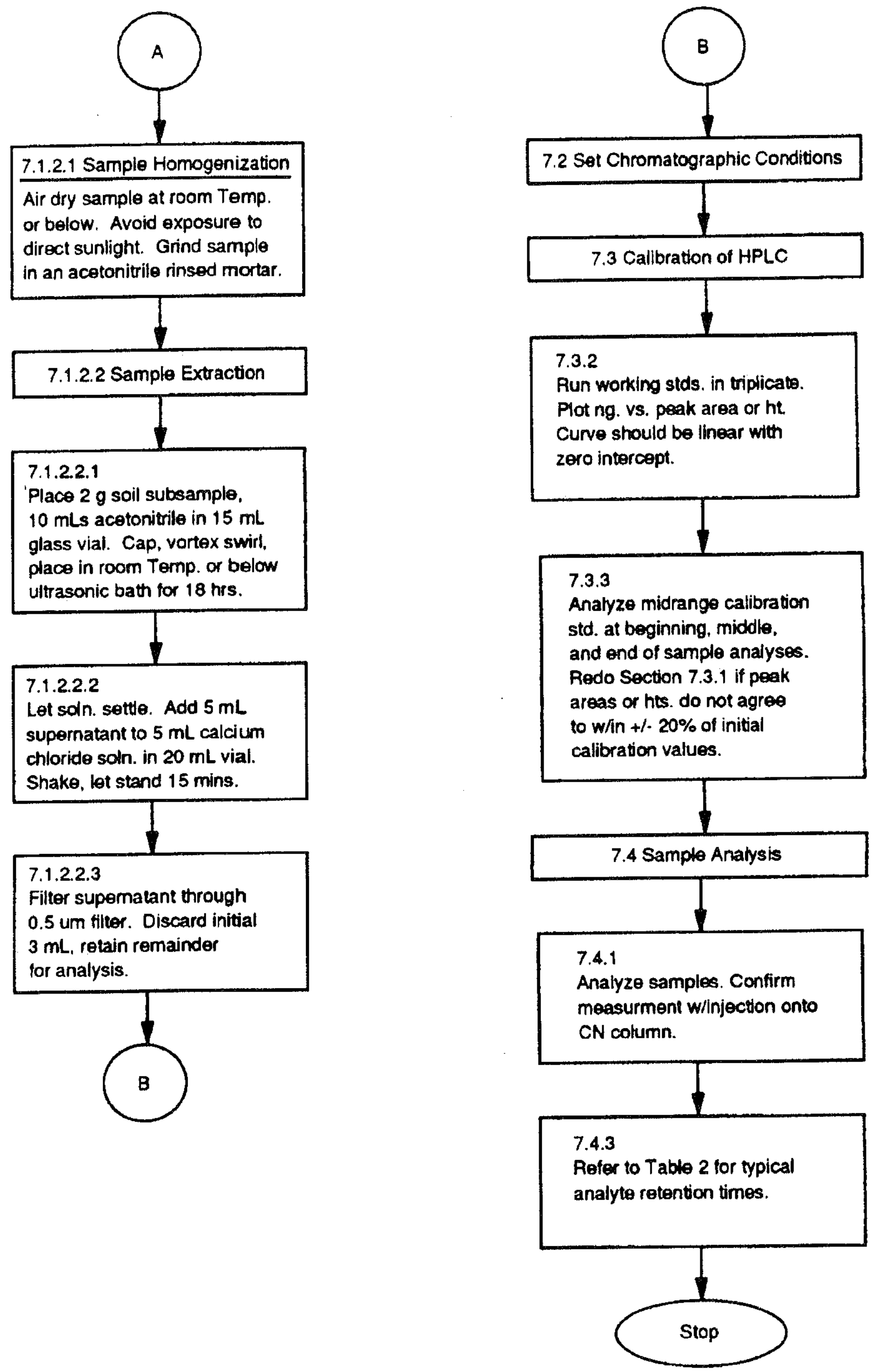


FIGURE 1
CHROMATOGRAMS FOR COLUMNS DESCRIBED IN Sec. 4.1.2.
COURTESY OF U.S. ARMY CORPS OF ENGINEERS, OMAHA, NE.


Start
7.1
Is sample in an aqueous or soil/sediment matrix?
Aqueous Sample
Soil and Sediment Samples
A
7.1.1
Is it high or low concentration?
Low
High
Salting Out
7.1.1.1.1 Add 251.3 g of salt and 1 L of water sample to a 1 L vol. flask. Mix the contents.
7.1.1.1.2 Add 164 mL of acetonitrile (ACN) and stir for 15 mins.
7.1.1.1.3 Transfer ACN layer to 100 mL vol. flask. Add 10 mL of fresh ACN to 1 L flask and stir. Transfer 2nd portion and combine with 1st in 100 mL flask.
7.1.1.1.4 Add 84 mL of salt water to the ACN extract and stir. Transfer ACN extract to 10 mL grad. cylinder.
7.1.1.1.5 Add 1 mL of ACN to 100 mL vol. flask. Stir and transfer to the 10 mL grad. cylinder. Record volume. Dilute 1:1 with reagent water.
7.1.1.1.6 Filter if turbid. Transfer to a vial for RP-HPLC analysis.
B
7.1.1.1 Sample Filtration: Place 5 mL sample in scintillation vial. Add 5 mL methanol; shake; filter through 0.5 um filter. Discard first 3 mL Retain remainder for use.
B


A
7.1.2.1 Sample Homogenization
Air dry sample at room Temp. or below. Avoid exposure to direct sunlight. Grind sample in an acetonitrile rinsed mortar.
7.1.2.2 Sample Extraction
7.1.2.2.1
Place 2 g soil subsample, 10 mLs acetonitrile in 15 mL glass vial. Cap, vortex swirl, place in room Temp. or below ultrasonic bath for 18 hrs.
7.1.2.2.2
Let soln. settle. Add 5 mL supernatant to 5 mL calcium chloride soln. in 20 mL vial. Shake, let stand 15 mins.
7.1.2.2.3
Filter supernatant through 0.5 um filter. Discard initial 3 mL, retain remainder for analysis.
B
B
7.2 Set Chromatographic Conditions
7.3 Calibration of HPLC
7.3.2
Run working stds. in triplicate. Plot ng. vs. peak area or ht. Curve should be linear with zero intercept.
7.3.3
Analyze midrange calibration std. at beginning, middle, and end of sample analyses. Redo Section 7.3.1 if peak areas or hts. do not agree to w/in +/- 20% of initial calibration values.
7.4 Sample Analysis
7.4.1
Analyze samples. Confirm measurment w/injection onto CN column.
7.4.3
Refer to Table 2 for typical analyte retention times.
Stop

DEPARTMENT OF THE ARMY
HEADQUARTERS US ARMY MATERIEL DEVELOPMENT AND READINESS COMMAND
5001 EISENHOWER AVENUE, ALEXANDRIA, VA. 22333

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DRCIS-A

2 MAR 1984

SUBJECT: Test Procedures for Munition Residue and Waste

SEE DISTRIBUTION

1. Reference:

a. Title 40 Code of Federal Regulations 261 thru 265.

b. Federal Register Vol. 46, No. 221, P 56593, dated 17 Nov 81.

2. For several years, DARCOM installations have been required to manage hazardous waste residue such as ash from Deactivation Furnaces and Open Burning Grounds, and munition related sludges from lagoons and manufacturing processes. A test protocol has not existed for analyzing residue for the hazardous waste (HW) characteristic of reactivity. These residues of a treated HW must be managed as a HW until laboratory analysis demonstrates the material is no longer a HW. Therefore, the installations could not leave residue on the ground because Open Burning Grounds do not satisfy the 40 CFR 265.250 wastepile requirements. In addition, installations could not place the material into a landfill because 40 CFR 265.281 forbids depositing a HW with the characteristic of reactivity into in a landfill.

3. There is now a procedure available to test residue, for the hazardous waste characteristic of reactivity (Encl 1). The installation may use this test to demonstrate that Open Burning ground residue, incinerator ash, lagoon and industrial sludges no longer exhibit the characteristic of reactivity and can therefore be placed in a landfill. Note, if the original material exhibited additional HW characteristic(s) (i.e. EP toxicity) then the residue must also be tested for the additional characteristic(s).

4. The explanation in 40 CFR 261 for justifying this testing and disposal action is somewhat complex. In brief, a treated HW is assumed to be a HW until analysis proves it no longer exhibits the original characteristic. The burden of proof is upon the generator (installation). The regulatory argument from the Code of Federal Regulations is as follows: 40 CFR 261.3(c)(a) states that waste generated from treatment of a HW remains a HW. 40 CFR 262.11 states that the generator of a solid waste must determine if a material is a HW; and 40 CFR 261.3(a)(2)(iii) states that a HW because of characteristic (i.e

Encl 1

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reactivity) remains a HW until it no longer exhibits the characteristic which originally caused it to be classified as a HW. The preamble in the federal register referenced in 1b is very helpful in understanding EPA's intent with this mixture rule.

5. If the residue does not exhibit the characteristic of a HW, then the material does not need to be managed as a HW. However, where small volumes of residue are involved, installations may consider sending this residue to a protected or HW landfill. The additional cost may be worth avoiding any potential future claim that this residue created a contamination problem.

6. The directions for sample collection and shipment to the analytical laboratory is at enclosure 2.

7. Note, the analysis of reactive material may be new or unique to some regulatory personnel, and they may be reluctant to accept this protocol. Installations having problems presenting this argument to the regulators should contact the MSC environmental office for assistance.

8. Point of Contact, HQ DARCOM, is Maj Thies, AUTOVON 284-9016.

FOR THE COMMANDER:

William N. Hasselkus

2 Encl
as

WILLIAM N. HASSELKUS
Chief, Environmental Quality Division
Directorate for Installations
and Services

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HQDA (DAEN-ZCE/ZCF-U)

PROCEDURES FOR THE CLASSIFICATION OF EXPLOSIVE SUBSTANCES

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U.S. Bureau of Mines
Department of the Interior
Pittsburgh, PA 15236

3/78

ABSTRACT

For the past five years, the Bureau of Mines has been developing test procedures for application in the classification of explosive substances. This effort has been conducted in cooperation with the Department of Transportation with the aim of assisting the United Nations Group of Experts on Explosives in preparing recommendations for the international transport of dangerous goods. This paper presents a flow chart that identifies sensitivity tests considered important for classifying explosive substances. The application of the test scheme generally leads to the "proper" classification of substances based on their known hazard potential.

INTRODUCTION

For the past five years, the Bureau of Mines has been engaged in the development of procedures applicable to the classification of explosive substances. This effort has been conducted in cooperation with the U.S. Department of Transportation (DOT) with the aim of assisting the UN Group of Experts on Explosives in preparing recommendations for the international transport of dangerous goods. Previous work of the group[1] had established five subdivisions under the major explosive category--Class 1 - Explosives.

The subdivisions are as follows:

Class 1

Division 1.1 Substances and articles that have a mass explosion hazard.
Division 1.2 Substances and articles that have a projection hazard but not a mass explosion hazard.
Division 1.3 Substances and articles that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.
Division 1.4 Substances and articles that present no significant hazard.
Division 1.5 Very insensitive substances that have a mass explosion hazard.

The main thrust of our work was in designing a test scheme for the proper assignment of substances (not articles) into the proper division of Class 1 with special emphasis on Divisions 1.1, 1.3, and 1.5, which roughly correspond to our DOT Class A, Class B, and Blasting Agent categories, respectively. Another principal objective was the selection of tests for deciding whether a material had explosive properties; i.e., whether it should be considered for inclusion in Class 1 - Explosives. Some consideration was also given to the selection of tests for determining whether or not a substance was too dangerous to transport. This paper describes the current status of this work.

CLASSIFICATION PROCEDURE

Classification of substances is based on six series of tests as outlined in Figure 1. The first four test series determine whether the substance in question should be included in Class 1. Once a substance is classified as Class 1, the final two test series determine the division in which it belongs.

TEST SERIES 1

The intent of Test Series 1 is to determine whether the substance is explosive. Two tests are used to determine the response of the substance under test to a strong shock wave and to a strong thermal stimulus: The Bureau of Mines Gap Test and the Bureau's Deflagration/Detonation Transition (DDT) Test. (All tests referred to in this section are described in detail later in this paper but will be described here briefly to permit a better understanding of the procedures.) The Gap Test subjects the substance to a strong shock from a pentolite donor charge and indicates whether the substance is able to propagate the detonation. In the DDT tests, the substance is ignited inside a steel pipe bomb and an observation is made of whether it will continue to burn or will transit to detonation.

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[1]United Nations. Transport of Dangerous Goods, Recommendations prepared by the Committee of Experts on the Transport of Dangerous Goods. International Regulations Publishing and Distributing Organization, Chicago, 1981.

Encl 1 to Encl 1

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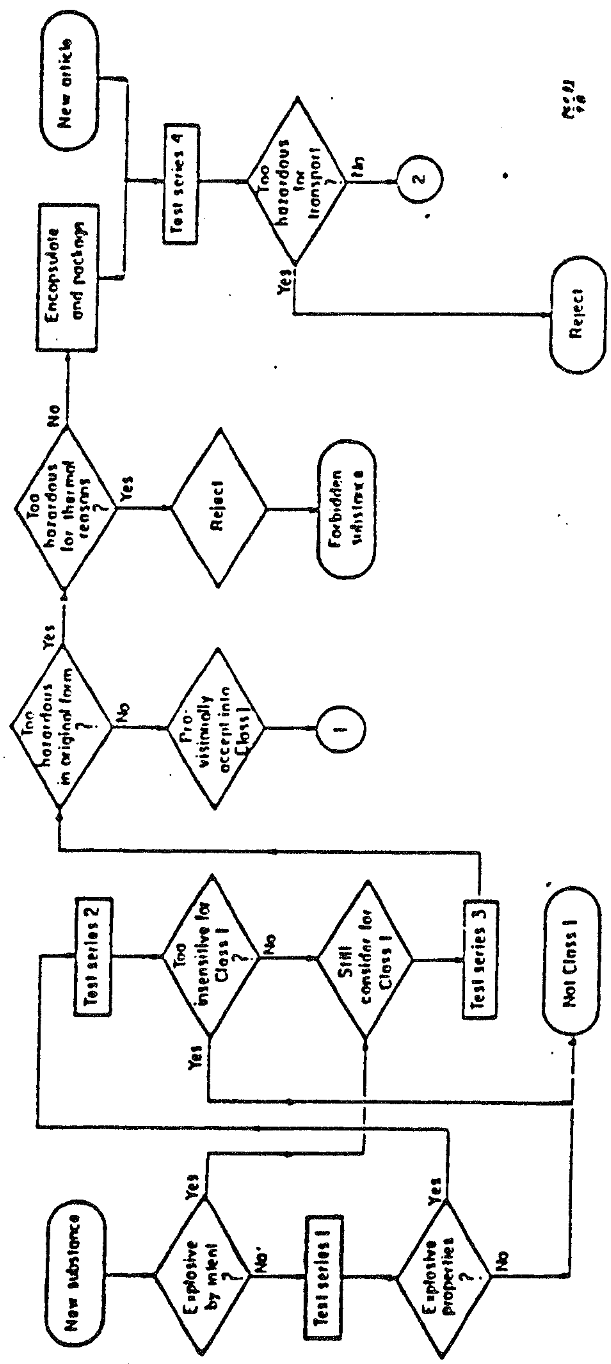

Figure 1A. Acceptance Procedure.

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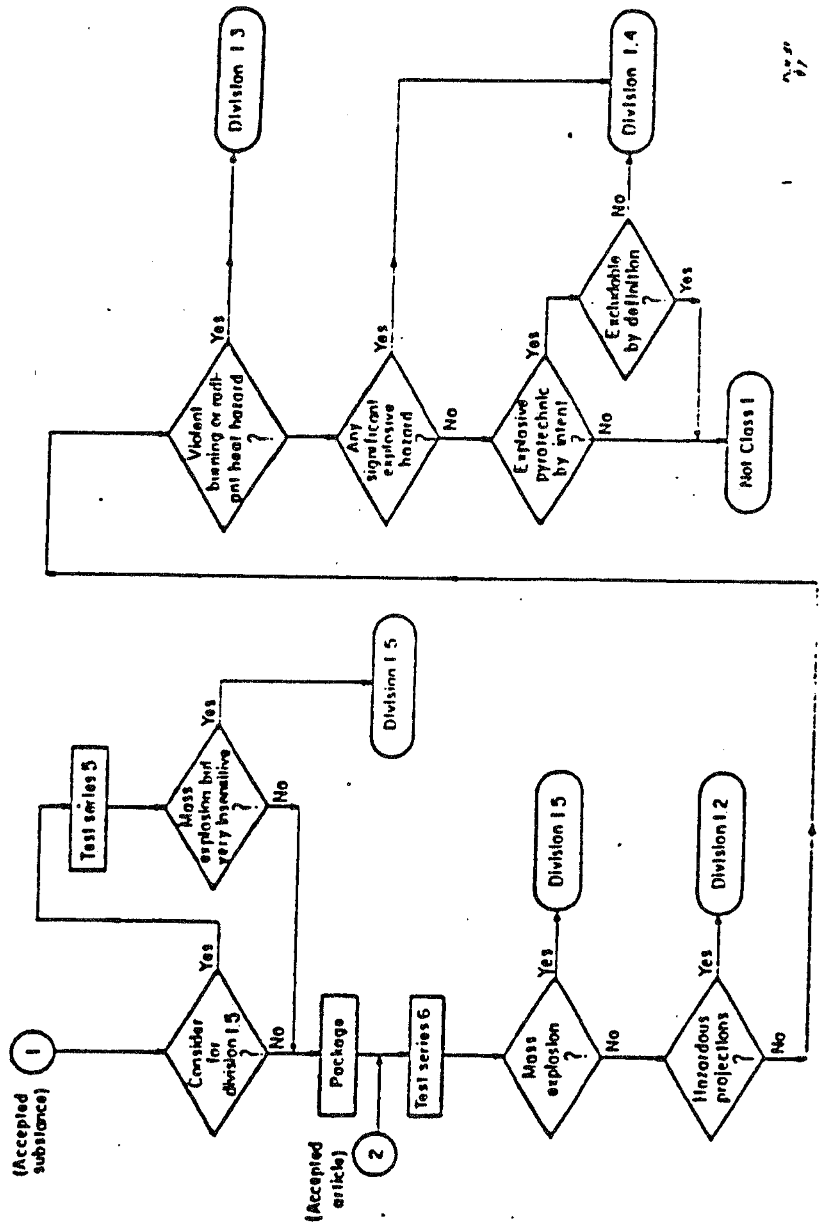

Figure 1B. Division Assignment.

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TEST SERIES 2

Test Series 2 is based on the same two tests used in Test Series 1. Here, however, the tests are modified to provide weaker stimuli in order to determine whether the substance is too insensitive for inclusion in Class 1 even though it may exhibit explosive tendencies.

TEST SERIES 3

Test Series 3 is used to identify those substances that are too hazardous for transport. Four tests are used in this determination. In the first test, the Bureau of Explosives Impact Machine indicates the sensitivity of the substances to mechanical stimuli; this is a drop weight impact test. The second test utilizes the BAM[2] Friction Machine to determine the sensitivity to frictional stimuli. Here the substance is rubbed between a porcelain pin and porcelain plate and any reaction is noted. The third test determines the physical and chemical stability of the substance when subjected to a thermal stimulus through the use of the Thermal Stability Test. In this test, the substance is heated and any reaction is noted. The fourth test uses the Small Scale Fire Test to determine whether the substance shows a tendency to detonate when a small sample is burned unconfined.

TEST SERIES 4

Test Series 4 is used to determine whether a packaged substance is safe to transport. This involves substances that had been classified as too hazardous to transport but have been made safer through proper packaging. Specific tests for this series have not been determined.

TEST SERIES 5

Test Series 5 is used to determine whether a substance should be included in Division 1.5, roughly corresponding to DOT's Blasting Agent category. In this series, the Cap Test is used to determine whether the substance can be detonated by a standard blasting cap, the DDT test is used to determine the tendency for the substance to transit from deflagration to detonation, and the Spark Sensitivity Test is used to determine the sensitivity of the material to electrostatic sparks. A large-scale bonfire test to determine the tendency for the total contents of a package of explosive products to explode may also be included, but this is uncertain at present.

TESTS SERIES 6

Test Series 6 is used to assign an explosive substance to Divisions 1.1, 1.2, 1.3, and 1.4 or to exclude a packaged substance or article from Class 1 as not significantly hazardous. Divisions 1.1 and 1.3 roughly correspond to DOT Class A and Class B explosives, respectively. Three tests are used in this determination. In the Single Package Test, one explosive unit in a package is initiated and an observation is made as to whether burning or explosion is propagated through the entire package and whether the surroundings are endangered by these effects. In the Stack Test, one package in a stack of packages is initiated and the tendency for the burning or explosion to propagate between packages is observed. In the External-Fire Tests, a stack of explosive packages is exposed to a fire and their behavior and effect on the surroundings are observed.

DESCRIPTION OF TESTS

* GAP TEST FOR SOLID MATERIALS

The experimental arrangement used for the gap test is shown in Figure 2. The test sample is contained in a cylinder consisting of a 40.64-cm (16-inch) length of cold-drawn seamless carbon steel "mechanical" tubing 4.76 cm (1.875 inches) in outside diameter with a wall thickness of 0.56 cm (0.219 inch) and an inside diameter of 3.65 cm (1.438 inches). The sample in this test is normally either a gel or a granular solid at room temperature that is loaded to the density attained by tapping the cylinder until further settling becomes imperceptible. The bottom of the cylinder is closed with two layers of 0.0076-cm (0.003-inch) thick polyethylene sheet tied on with gum rubber bands and polyvinyl chloride electrical insulating tape. The sample is subjected to the shock wave generated by the detonation of a cast pentolite density 1.65 g/cm^3 (50/50 pentaerythritol tetranitrate PETN/TNT) pellet 5.08 cm (2 inches) in diameter and 5.08 cm (2 inches) thick. The pellet may be either in direct contact with the bottom of the sample tube ("zero gap"), or separated from it by a cylinder of material that provides shock attenuation (see below). As applied in Test Series 1, this test uses the zero-gap mode. The pentolite pellet is initiated by a U.S. Army Engineers special detonator having a base charge of 0.935 gram (14.4 grains) of PETN and a primary charge of 0.35 gram (5.4 grains) of diazo dinitrophenol which is butted against the bottom surface of the pentolite pellet

[2] Bundesanstalt fur Materialprufung, Berlin, Federal Republic of Germany.

and held in place by a cylinder of cork. Instrumentation consists of a continuous rate probe made of a thin aluminum tube with an inner diameter of 0.051 cm (0.02 inch) and a wall thickness of 0.0038 cm (0.0015 inch) with an axial enamel-coated resistance wire of 0.0079-cm (0.0031-inch) diameter, having a resistance of 3.0 ohms/cm (7.62 ohms/inch) (1). The outer tubing is crimped against the inner wire at the lower end, forming a resistor. When this assembly is inserted in a medium that transmits a shock wave, the outer wall crushes against the inner wire as the wave moves up the tubing, shortening the effective length and changing the resistance. If a constant current (usually 0.06 ampere) is made to flow between the outer and inner conductors, the voltage between them is proportional to the effective length and can be recorded as a function of time using an oscilloscope. The slope of the oscilloscope trace is thus proportional to the velocity of the shock wave.

Criteria Results of this test are considered to be positive if a stable propagation velocity greater than 1.5 km/sec is observed. Additional diagnostic information is provided by a mild steel witness plate 15.24 cm (6 inches) square and 0.3175 cm (0.125 inch) thick, mounted at the upper end of the sample tubing and separated from it by spacers 0.16 cm (0.063 inch) thick. In the original version of this test, the witness plate was 0.952 cm (0.375 inch) thick, but in the application of this test to low-density, low-energy materials, i.e., marginally explosive granular solids, it was found that detonation in many of these materials could not punch a hole through the plate (the desired indication of a positive result). With some materials, even the thinner plate is not punched through (benzoyl peroxide is an example), but the above thickness represents the best compromise that could be found. (If the plate is made too thin, even a non-reactive shock wave generated by the pentolite booster in the sample material can punch the plate, generating false positive results.)

A third source of diagnostic information is the fragmentation of the sample tube. The results of the test are considered to be positive only if the tube is fragmented along its entire length. The fragments range, depending on the material tested, from a few long strips to nearly a hundred small fragments; bulging, cracking, or "banana-peeling" of the acceptor is not considered a positive result.

In most cases, the results of the above three diagnostic methods agree. In some they do not, particularly with low-energy, low-density materials, e.g., benzoyl peroxide, in which the witness plate is not punched through, but the tube is fragmented; also with certain propellants, the witness plate is punched, but little damage is done to the tube, evidently indicating a localized explosion at the upper end of the tube. In such cases, since there are essentially three criteria (witness plate, tube fragmentation, and rate probe), the result is assessed on the basis of the two criteria that agree; i.e., if any two criteria indicate a detonation, the result is considered positive, but not so if only one indicates a detonation. Some cases of doubtful propagation can also be resolved by using a longer sample tube. As applied in Test Series 1 (zero gap), a negative result in this test and in the other tests in Series 1 is interpreted to mean that the substance does not have significant explosive properties.

For Test Series 2, the test is modified by the placement of a 5.08 cm (2 inch) diameter by 5.08-cm (2-inch) long cylindrical Lucite[3] spacer between the pentolite pellet and the sample. A negative result in this modified test and in the other tests in Series 2 means the substance is too insensitive to be included in Class 1.

GAP TEST FOR LIQUIDS

The Gap Test for true liquid substances (as distinct from slurries), e.g., nitroparaffins, nitrate esters, solutions of amine nitrates, etc., is essentially the same as that for solid substances. However, provisions are made for the introduction of bubbles into the sample since it is believed that certain accidents involving high-energy liquids, which were thought to be very insensitive, were due to the well-known sensitizing effect of bubbles (which can be introduced by sloshing, etc.) (2, 3). It is therefore considered appropriate to test potentially explosive liquids under this condition. The bubbles are injected by means of a 2.35-cm (0.925-inch) diameter loop of vinyl plastic tubing of the type used for medical catheterization with an outside diameter of 0.18 cm (0.07 inch) and a wall thickness of 0.038 cm (0.015 inch) located at the bottom of the sample. This loop is perforated with two rows of holes diametrically opposite each other with the holes in each row spaced 0.32 cm (0.125 inch) apart; the holes are made by inserting a 0.127-cm (0.05-inch) diameter needle through the tubing. Due to the elastic nature of the tubing, the holes contract almost completely when the needle is withdrawn, so that the actual hole diameter is much smaller than 0.1 cm (0.04 inch). The tubing is sealed at one end of the loop with epoxy cement, and a length of the tubing from the other end of the loop is led outside to the air supply through a hole in the steel tubing, which is sealed with epoxy cement. Air is supplied at a pressure of 30 to 100 kilopascals (4 to 15 pounds per square inch) to obtain a flow rate of 1.2 liters/minute (2.5 standard cubic feet per hour). Some of the materials to be tested are not liquids at ambient temperature, but are transported in the liquid state at elevated temperature (usually less than 60°C) and accordingly should be heated

[3]Reference to specific products does not imply endorsement by the Bureau of Mines.

for testing. For this purpose, the sample tube is also heated by means of nickel-chromium alloy electrical resistance ribbon, insulated with glass-fiber insulating sleeving, which is wrapped around the tube. The ribbon used is 0.48 cm (0.19 inch) wide and 0.008 cm (0.003 inch) thick; normally, 20 wraps of the heater ribbon, evenly spaced along the length of the tube, are used. Electrical power is supplied to the heater by means of an adjustable autotransformer. The temperature of the sample is monitored using a Chromel-Alumel thermocouple. (The heater circuit is disconnected while the blasting cap is being inserted.) When temperatures higher than 80° C are used, it is not considered desirable to use less than a 1.27-cm (0.5-inch) gap because of the possibility of melting the booster charge; the gap material provides some thermal insulation. Also, for high temperature, a polytetrafluoroethylene diaphragm is used instead of polyethylene for closure of the tube bottom; this is held in place with an adjustable flexible hose clamp. When it is suspected that the sample may react with the steel tube, the inside of the tube is sprayed with a fluorocarbon resin coating.

Instrumentation and criteria for positive and negative results are the same as those used in the Gap Test for solids.

DDT TEST

The experimental arrangement for the DDT Test is shown in Figure 4. The sample of material to be tested is contained in a 45.7-cm (18-inch) length of 3-inch-diameter schedule 80 carbon steel pipe with inside diameter of 7.37 cm (2.9 inches) and wall thickness of 0.76 cm (0.30 inch), capped at both ends with "3000 pound" forged steel pipe caps.

The sample is subjected to the thermal and pressure stimulus generated by an igniter consisting of a mixture of 50 percent RDX and 50 percent grade FFF_g black powder located at the center of the sample vessel. The igniter assembly consists of a cylindrical container 2.06 cm (0.81 inch) in diameter and of variable length, which is made from 0.0254-cm (0.01-inch) thick cellulose acetate held together by two layers of nylon-filament-reinforced cellulose acetate tape. The length of the igniter capsule is 0.32 cm (0.125 inch) for each gram of igniter material. The igniter capsule contains a small loop formed from a 2.54-cm (1-inch) length of nickel-chromium alloy resistance wire 0.03 cm (0.012 inch) in diameter having a resistance of 0.343 ohm. This loop is attached to two insulating copper tinned lead wires 0.066 cm (0.026 inch) in diameter; the overall wire diameter including insulation is 0.127 cm (0.05 inch). These lead wires are fed through small holes in a brass disc approximately 1 cm (0.4 inch) in diameter and 0.08 cm (0.03 inch) thick, which is soldered to the end of a 23-cm (9-inch) length of "1/8-inch" steel pipe having a diameter of 1.03 cm (0.405 inch); this pipe is threaded at the other end and screwed into a threaded hole on the inside of one of the pipe caps. This pipe supports the igniter capsule and serves as a channel for the igniter wires. The igniter is fired by a current of 15 amperes obtained from a 20-volt transformer.

Criteria The criterion currently used in the interpretation of this test is that for a positive result either the pipe or at least one of the end caps be fragmented into at least two distinct pieces, i.e., results in which the pipe is merely split or laid open or in which the pipe or caps are distorted to the point at which the caps are blown off are considered to be negative results. Although it may be argued that a small number of fragments does not indicate the development of a detonation, it at least indicates a very rapidly rising pressure which in a larger sample could lead to development of detonation.

Test Series 1 is based on DDT Testing using a 20-gram (308-grain) igniter to provide a strong thermal stimulus. Substances that yield a negative result with a 20-gram (308-grain) igniter and in other tests in Series 1 are interpreted to have no significant explosive properties. For Test Series 2, a weaker 10-gram (154-grain) igniter is used; substances that yield a negative result with the 10-gram (154-grain) igniter and in other tests in Series 1 are considered too insensitive to be included in Class 1.

BUREAU OF EXPLOSIVES IMPACT MACHINE

The apparatus is designed so that a weight of 3.63 kg (8 lb), which is free to fall between two parallel cylindrical guide rods from heights up to 118 cm (46.5 inches), strikes a plunger-and-plug assembly which is in contact with the sample, which in turn is placed on a die-and-anvil assembly and confined in a cylindrical casing whose inside diameter is just sufficient to permit free movement of the plunger and plug. A photo of the apparatus is shown in Figure 5. The plunger, plug, die, casing, and anvil are hardened tool steel of hardness 50-55 on the Rockwell C scale, and the mating surfaces and the surfaces in contact with the sample have a finish of 0.8 micrometer (32 microinches). The sample diameter is 0.51 cm (0.2 inch), and the sample weight is 10 milligrams (0.15 grain).

Criteria A test result is considered positive if either an audible report or flame is observed; otherwise the result is considered negative. The test may be used in any of three ways: (1) if the desired information is merely to determine the response of the sample at a fixed stimulus, a given number of tests (usually 10) is performed at the specified drop height; if a positive result is

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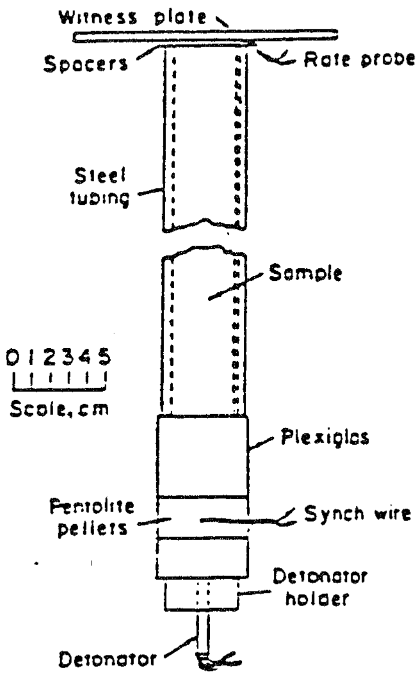

Figure 2. Experimental arrangement for gap test.

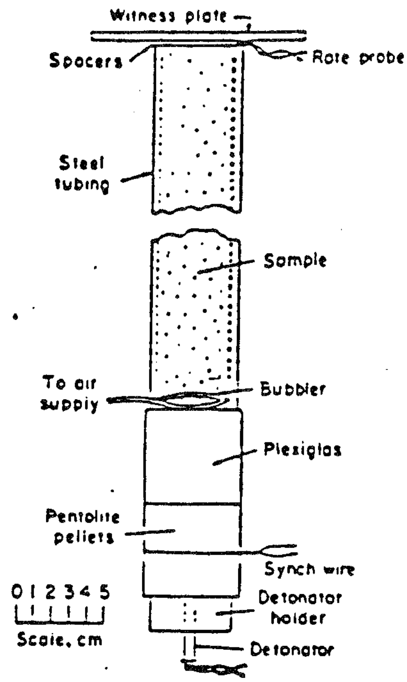

Figure 3. Experimental arrangement for gap test for liquids.

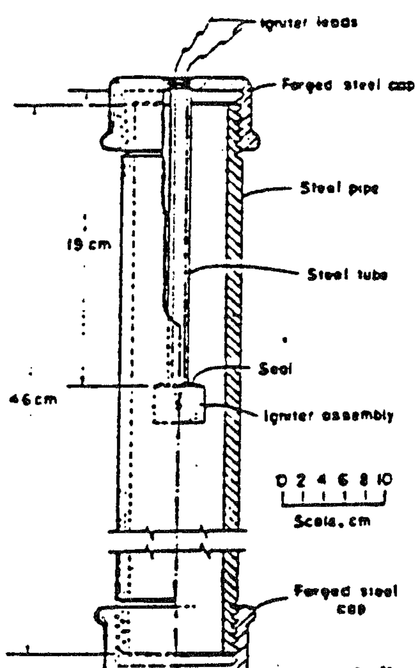

Figure 4. Experimental arrangement for deflagration-detonation transition test.

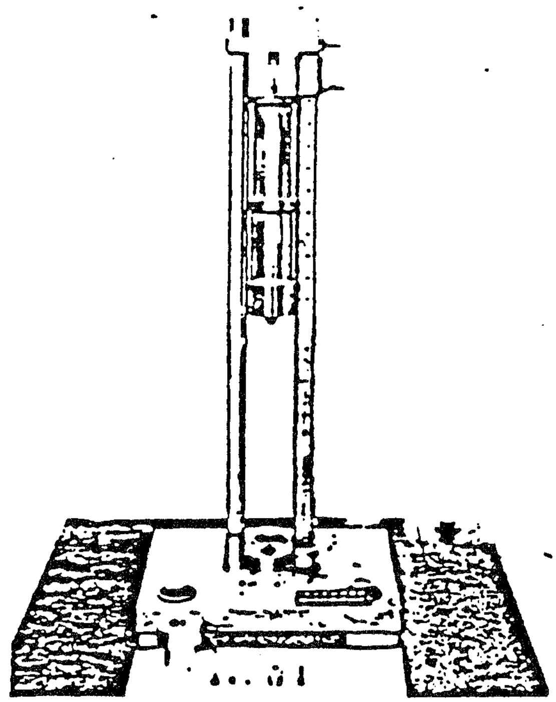

Figure 5. Bureau of Explosives impact machine.

obtained in any trial at the given drop height, the sample fails the test. (2) In many cases it is desirable to determine the sample sensitivity in a quantitative manner. For this case an initial drop height and drop height interval are chosen based on the expected sensitivity and the degree of precision desired; if the sample gives a positive result, the drop height is reduced by the interval chosen and another trial is made; if the initial result is negative, the drop height is increased until a positive result is obtained, and then subsequently reduced. This procedure is repeated until a drop height is found at which a given number (usually 10) of negative results with no positive results is obtained. This is called the Threshold Initiation Level (TIL). (3) A more precise alternative to (2) above is the Bruceton up-and-down test, which is similar to the TIL level determination except that each time a positive result is obtained, the drop height is reduced by the chosen interval, and each time a negative result is obtained, the drop height is increased by the chosen interval. The drop height that corresponds to a 50-percent probability of a positive result (H_{50}) is extracted from the distribution of results by standard statistical methods [4]. Specific criteria for the application of this test in Test Series 3 have not been determined, but the Bureau has suggested that TIL values of less than 10 cm (3.9 inches) indicate a substance whose transportation, in the form in which it was tested, is not acceptable and must be modified by composition, physical nature, or packaging. The test series to be used for acceptance is determined by the nature of the change.

BAM FRICTION MACHINE

The BAM friction machine consists of a reciprocating sample table which holds a porcelain sample plate, and a lever arm to which is attached a porcelain pin and from which various weights can be suspended at various distances to adjust the force applied between the porcelain pin and plate. The machine is shown in Figure 6. The sample is placed between the pin and the plate. The sample table is driven by an eccentric arm attached to a geared-down electric motor which executes one revolution of the eccentric arm (one full cycle of reciprocating motion in the horizontal direction) when the motor is actuated.

The porcelain pin is 1.5 cm (0.59 inch) long and 1.0 cm (0.39 inch) in diameter, with rounded ends of approximately 1 cm (0.39 inch) radius of curvature; the porcelain plates are 2.5 cm (1 inch) square and 0.5 cm (0.2 inch) thick. The total (peak to peak) displacement of the horizontal motion is 1.0 cm (0.39 inch) and a full cycle of the motion occurs in approximately 1 second. The weights supplied provide a force on the pin of 0.5, 1, 2, 3, 4, 6, 8, 12, and 18 kg (1.1, 2.2, 4.4, 6.6, 8.8, 13.2, 17.6, 26.4, and 39.7 lb) when suspended from the position nearest the pin; this can be increased by factors of 1.2, 1.4, 1.6, 1.8, and 2.0 by suspending from successively more distant positions.

In conducting the test, the porcelain plate is secured on the sample table with the surface striations perpendicular to the direction of motion. The sample, if solid, is broken up and screened through a sieve with a 500-micrometer (0.02-inch) opening; the sample size used is 50 mg (0.77 grain). The sample is placed on a portion of the porcelain plate (by shifting the plate a few millimeters, in the direction perpendicular to the motion, between one trial and another, each plate can be used four times; each pin can be used twice by reversing ends); the pin is placed in the pin holder; the arm is lowered so that the pin is in contact with the sample; and the weight chosen is suspended at the distance chosen. The apparatus is turned on, and the motor is actuated by pressing a pushbutton on the front of the apparatus.

Criteria A positive result in this test is said to have occurred if significant sparking, flame, audible report, or loud crackling occurs. Discoloration of the plate by itself and/or crepitation (subdued crackling due to crumbing of the sample) or a slight odor are not considered evidence of positive reaction (unless the extent and color of the discoloration are markedly different from what would be expected from the sample being ground into the pores of the plate or the odor is marked). At very high stimulus levels there can even be some sparking without a sample present, but this is rarely a problem since the more sensitive materials of concern here do not require testing at these levels. This test is usually run to determine the threshold initiation level (TIL) in kilograms. This is the highest level of load at which a given number (usually 10) of negative results, with no positive results, is obtained.

A given value of load is initially chosen: If the result is positive, the load is reduced by an increment (chosen in consideration of the desired precision of the result) and the trial is repeated, as above, reducing the level until 10 negative results with no positive results are obtained at the same level. (If the initial result is negative, the load is increased until a positive result is obtained, and then reduced as above.) Specific criteria for this test as applied in Test Series 3 have not been set, but the Bureau has suggested that TIL values less than 5 Kg should indicate a substance that is not acceptable and must be modified by composition, physical nature, or packaging. The test series to be used for acceptance is determined by the nature of the change.

THERMAL STABILITY TEST

The test requires an oven with sufficient capacity to contain a 35-mm (1.4-inch) diameter, 50-mm (2-inch) high lipless beaker with a watchglass cover. The oven should have a thermostatic control adequate to maintain the temperature at 75 ± 0.5°. It is desirable that the oven should have dual thermostats or some kind of protection against running away to high temperatures if the thermostat malfunctions. The test requires a dessicator of sufficient capacity to contain the sample beaker and an indicating dessicant, and a balance or scale capable of determining the sample weight to 0.5 mg (0.008 grain). The test requires a 10-gram (154-grain) sample.

In preparation for the test, the sample is transferred to the beaker, covered and weighed, placed in the oven, and heated at 75° C for 48 hours; the sample is then removed from the oven, cooled in the dessicator, and reweighed; the volatility (weight loss as a percent of the sample weight) is calculated.

Criteria The sample is considered to have failed the test if it ignites, explodes, swells, or is markedly discolored, if colored fumes are observed in the beaker, if an odor indicating acidity is noted, or if the weight loss is distinctly greater than the moisture content of the sample (separately determined).

Note: (1) The presence of acid fumes or nitrogen oxides can be verified if desired by inserting a strip of moist pH indicator paper or potassium iodide-starch paper in the beaker, but the human olfactory sense is usually more sensitive. (2) Some samples, e.g., ammonium nitrate-fuel oil blasting agents, lose weight due to volatility of the oil; for such samples, the oil content, in addition to or instead of the moisture content, should be considered in judging whether the weight loss is excessive.

SMALL SCALE FIRE TEST

One hundred twenty five grams of the substance under test (liquid or solid) is placed in a fibreboard or plastic container which offers minimal confinement and is compatible with the test substance. This container is then placed on a bed of kerosene-soaked sawdust which is ignited with the appropriate electric igniter. The test is performed three times.

Criteria The substance is judged to be too hazardous for transport (in the form in which it is tested, if any test results in detonation of the test sample.

CAP TEST

The cap sensitivity test is shown in Figure 7 and consists of a 8.57-cm (3.375-inch) diameter, 16.19-cm (6.375-inch) long cardboard container of nominal 946-cm^3 (1-quart) capacity filled with the explosive to be tested; a No. 8 electric blasting cap is imbedded coaxially in the top of the explosive to a depth equal to its length. If the sample is a gel-type material, it is carefully hand-packed to eliminate voids; if it is a free-flowing granular material, it is loaded to the density attained by tapping the container. In both cases, the final densities are reasonably close to the normal shipping densities. With some packaged blasting agents, the required insensitivity is achieved by high packing densities which are difficult to achieve in repacking; these items may be tested in their original form. This arrangement is set on top of a 5.08-cm (2-inch) diameter, 10.16-cm (4-inch) long cylinder of common (soft) lead which is in turn supported by a 2.54-cm (1-inch) thick, 15.24-cm (6-inch) square steel plate. The lead cylinder serves as a witness for detonation.

The electric blasting cap used in this test is the standard Du Pont No. 8 strength, instantaneous cap having an aluminum shell (outer case); it contains a main (base) explosive charge of 0.45 grams (6.9 grains) of PETN. This cap also contains about 0.15 grams (2.3 grains) of a priming charge.

Criteria A positive result in this test is said to have occurred if the lead cylinder is compressed from its initial length by 0.318 cm (0.125 inch) or greater, in accordance with recommendations of the U.S. Department of Transportation.

SPARK SENSITIVITY TEST

The electrostatic spark test apparatus is shown in Figures 8 and 9. A 60-milligram (0.92-grain) sample of the explosive to be tested is placed in a 0.95-cm (0.37-inch) diameter hole in a Lucite plate measuring 5 by 5 by 0.16 cm (2 x 2 x 0.063 inches), which is in turn placed atop a copper base plate. A steel needle positioned above the sample acts as an electrode for the discharge of a capacitor, thereby producing a spark which passes through the sample to the copper base plate. Prior to testing, the needle is positioned well above the sample and is disconnected from the charged capacitor. For conduction of the test, the needle is connected to the charged capacitor through a vacuum relay switch, and a solenoid simultaneously lowers the needle to within 0.32 cm (0.125 inch) of the base plate. When the needle gets sufficiently close to the sample (a few millimeters), the intervening air breaks down and the resulting spark passes through the sample. This is called the "approach-gap" mode of operation, and is more convenient to use than a fixed gap distance. The spark passing through the sample may or may not cause an initiation, depending on the spark sensitivity of the material and the energy of the spark. The energy may be varied from 0.005 joule to 3.125 joules

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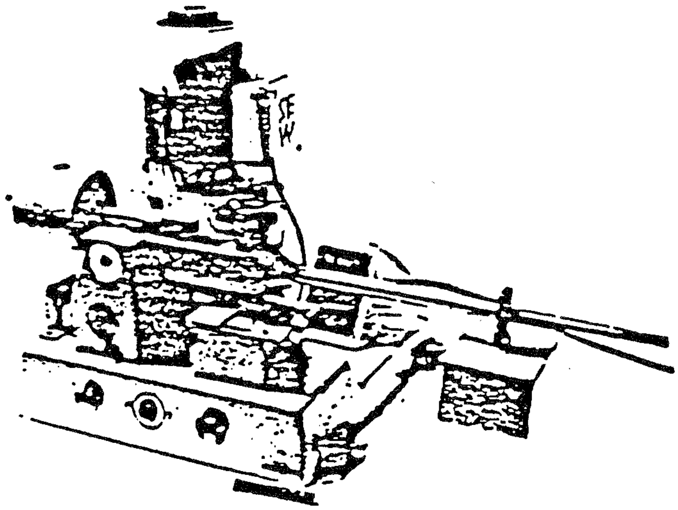

Figure 6. BAM friction machine.

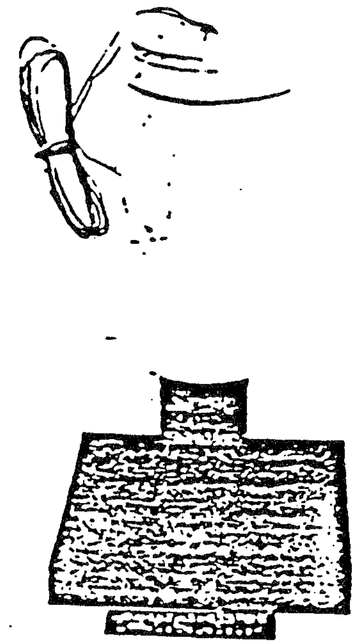

Figure 7. Cap sensitivity test.

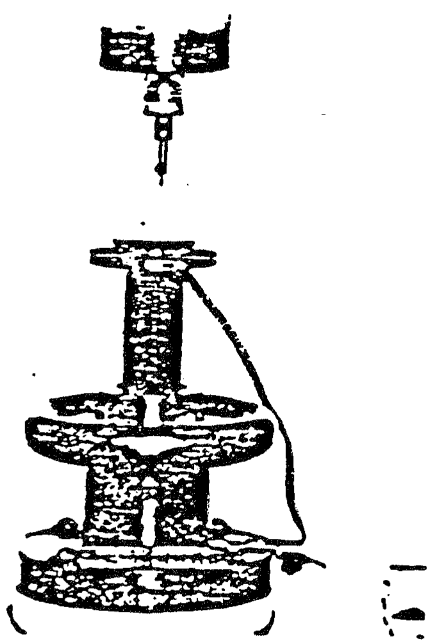

Figure 8. Electrostatic spark tester.

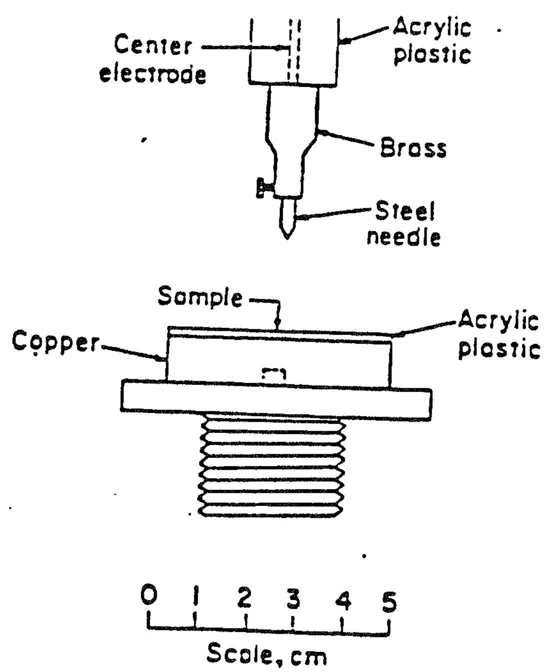

Figure 9. Experimental arrangement for electrostatic spark tester.

by the selection of 1 of 10 capacitors varying from 200 picofarads to 0.25 microfarad at a constant potential of 5000 volts. Higher voltages are available but are not recommended for the "approach-cap" mode due to corona losses from the electrode; at higher voltages, the fixed gap is to be preferred.

Testing is begun at an intermediate spark energy level. If the sample initiates, the next test is conducted at the next lower spark energy level; if the sample does not initiate, the next test is conducted at the next higher spark energy level. This procedure is continued until it is possible to identify the maximum energy level at which no initiation occurs in 10 successive trials.

Criteria The primary indicators of positive reaction are a visible flash or shooting sparks from the sample, or visibly burned areas in the residual sample. Certain samples contain volatile flammable liquids whose vapors may produce a weak ignition above the sample, which must be distinguished from ignition of the sample itself. Since the spark sometimes scatters the (usually finely powdered) sample about, even when there is no reaction, sample consumption is not a reliable indicator.

The test result is reported as the threshold initiation level (TIL), the maximum spark energy level at which no initiation occurs in 10 successive trials. The Bureau has suggested that a TIL value of less than 0.125 joule would be a good indicator of those materials that are spark sensitive.

SINGLE PACKAGE TEST, STACK TEST, AND EXTERNAL-FIRE TEST

For the Single Package Test, a package of explosive is placed on the ground and confined by boxes or bags filled with earth or sand placed on all sides and on top. The thickness of the confinement is not less than 0.5 m (20 inches), except in the case of packages with dimensions exceeding 1 m (40 inches), in which case thickness of the confinement must not be less than 1 m (40 inches). A standard detonator or an igniter is initiated in the center of the package, and the degree of propagation and effect on the surroundings are noted.

The Stack Test is similar to the Single Package Test. Not fewer than five packages are stacked on the ground and confined by not less than 1 m (40 inches) of sand or dirt. A package in the center is initiated, and the effects are noted.

In the External-Fire Test, five packages are placed on a steel grid and a wood or oil fire is started beneath the grid.

Criteria If in the Stack Test or External-Fire Test virtually the entire contents explodes practically instantaneously, the article or packaged substance is assigned to Division 1.1. If in these two tests only a few items explode at one time and the major hazard is from projectiles, it is assigned to Division 1.2. If in all three tests it burns violently with only minor blast or projectiles, it is assigned to Division 1.3. If it burns with low intensity in the Stack Test and External-Fire Test, it is assigned to Division 1.4. If no significant explosive hazard is demonstrated, the article or packaged substance is excluded from Class 1.

RESULTS

The results of the application of Test Series 1 to a wide variety of substances are presented in Table 1. It will be noted that the materials are not well characterized in the table. This is due in some cases to the proprietary nature of the items and in others simply to the fact that complete characterization would consume a great deal of space in the paper. These results are for illustrative purposes and are not to be interpreted as generic to the materials as described. On examining the results of Table 1 for Test Series 1, it can be seen that a number of substances not ordinarily classified as explosive were observed to react in either the gap test or the internal ignition test or both. The results of the gap test with benzoyl peroxide were uncertain in that trials at "zero" gap resulted in fragmentation of the steel sample container but the reaction was not energetic enough to puncture the steel witness plate used to record the occurrence of detonation. For this reason a judgement concerning the explosive properties of benzoyl peroxide was not made. It should be noted that all substances currently classified as explosives were observed to react in one or both of the two tests in Test Series 1. The combined results lead to the conclusion that the specific tests suggested for Test Series 1 are adequate for determining if a substance is potentially explosive.

The results of the application of Test Series 2 and 5 to the same substances evaluated for explosive properties under Test Series 1 are also presented in Table 1. As can be seen, the application of Test Series 2 and 5, with very few exceptions, leads to "proper" classification of substances by division. (No information was available for Test Series 6 to separate explosives into Divisions 1.1 to 1.4 so an earlier method for making this differentiation will be used here for illustrative purposes.) All of the high explosives tested were cap sensitive and were subsequently relegated to Division 1.1. All of the blasting agents tests were cap insensitive, but nevertheless gave positive results in the 5.08-cm (2.0-inch) gap test, indicating some shock sensitivity. All but one of the blasting agents passed the 5.0-gram (77-grain) DDT criterion for Division 1.5 substances and were so assigned. The blasting agent that failed the 5.0-gram (77-grain) DDT criterion was assigned to Division 1.1 as called for in the flow chart; it was sensitized with an explosive substance. In test with propellants, one was found to be shock sensitive in the 5.08-cm (2.0-inch) gap test and this, coupled with its positive response in the 5.0-gram (77-grain) DDT test, resulted in its assignment to Division 1.1. The other propellants passed the 5.08-cm (2.0-inch) gap criterion, and all but two gave positive results in the 10-gram (154-grain) DDT test and were assigned to Division 1.3. The two propellants that were insensitive in both the 5.08-cm (2.0-inch) gap test and the 10-gram (154-grain) DDT test met the criteria of being too insensitive for consideration as Class 1. It is anticipated that problems of this sort could be resolved by considering the intended use of the substance (a propellant in this case), which would automatically relegate it to Division 1.3.

The application of Test Series 5 to marginally explosive substances also led to a proper assignment, except in two instances. Laboratory dried m-dinitrobenzene was found to be cap sensitive and was assigned to Division 1.1. It should be noted that the "as shipped" material, which contained roughly 30% moisture (water and some unidentified solvent), gave negative results in all of the Series 2 tests and was deemed too insensitive for Class 1. Ammonium perchlorate gave a positive result in the 10-gram (154-grain) DDT test and would be assigned to Division 1.3 on the basis of its thermal sensitivity as a substance; in the packaged state, however, this and other materials would be subjected to the tests of Test Series 6, possibly resulting in a less restrictive classification, determined by the mass of the substance and the nature of the packaging.

CONCLUSIONS

The tests recommended for Test Series 1 appear to be capable of identifying the explosive properties of substances to the degree necessary for defining their hazards potential in transport; these procedures are currently under review by the U.S. delegate to the UN Group of Experts on Explosives for possible inclusion in the UN list of accepted tests. The application of the specific tests outlined for Test Series 2 and 5 generally led to a proper divisional assignment of substances. In view of this success, it appears that the explosive classification procedure being developed in cooperation with the UN and DOT will become a useful tool.

REFERENCES

1. Ribovich, J., R. W. Watson, and F. G. Gibson, Instrumented Card-Gap Test, AAIA Journal, Vol. 6, No. 7, 1968, pp. 1260-1263.

2. Hay, J. E. and R. W. Watson, Initiation of Detonation in Insensitive Liquid Explosives by Low-Amplitude Compression Waves, Proceedings, Sixth Symposium (International) On Detonation, Coronado, California, 1976, pp. 115-123.

3. Mohan, V. K. and J. E. Hay, Effect of Cavitation on the Shock Sensitivity of Liquid Explosives, Preprint, Seventh Symposium (International) On Detonation, Annapolis, Maryland, 1981, pp. 190-199.

4. Dixon, W. J. and F. J. Massey, Introduction to Statistical Analysis, McGraw Hill Book Co., Inc., 1957, pp. 319-327.

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Table 1. Results of Test Series 1, 2, and 5

Key No.	Substance	Test Series 1: 0 in Gap	Test Series 1: DDT 20 g Igniter	Test Series 1: Explosive Properties	Test Series 2: 2 in Gap	Test Series 2: DDT 5 g Igniter	Test Series 2: DDT 10 g Igniter	Test Series 5: Cap	Test Series 5: DDT 5 g Igniter	Indicated Division
		Positive Test Result			Positive Test Result			Positive Test Result		
P-1914	Dynamite	Yes	Yes	Yes	-	Yes	-	Yes	Yes	1.1
X-901	TNT (Crystalline)	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes	1.1
X-1267	TNT (Granular)	Yes	Yes	Yes	Yes	No	Yes	Yes	No	1.1
X-1782	Water Gel	Yes	Yes	Yes	Yes	No	Yes	Yes	No	1.1
X-1985	Water Gel	Yes	Yes	Yes	-	Yes	-	Yes	Yes	1.1
X-2074	Water Gel	Yes	Yes	Yes	-	No	Yes	Yes	No	1.1
X-2076	Water Gel	Yes	Yes	Yes	-	No	Yes	Yes	No	1.1
X-2077	Water Gel	Yes	Yes	Yes	-	Yes	-	Yes	Yes	1.1
X-2107	Nitroguanidine	Yes	Yes	Yes	No	-	Yes	Yes	-	1.1
X-1843	ANFO (Experimental)	Yes	Yes	Yes	Yes	No	Yes	No	No	1.5
X-1035	ANFO (Commercial)	Yes	Yes	Yes	Yes	No	Yes	No	No	1.5
X-1624	Granular NCN	Yes	Yes	Yes	Yes	No	Yes	No	No	1.5
X-1842	Slurry	Yes	No	Yes	Yes	No	No	No	No	1.5
X-2072	Slurry	Yes	-	Yes	Yes	No	No	No	No	1.5
X-2073	Slurry	Yes	Yes	Yes	Yes	No	Yes	No	No	1.5
X-1877	Slurry	Yes	Yes	Yes	Yes	Yes	-	No	Yes	1.1
-	Smokeless Powder	Yes	Yes	Yes	Yes	Yes	-	No	Yes	1.1
X-2091	Propellant (Single base)	-	Yes	Yes	No	-	No	-	-	Not 1
X-2092	Propellant (Single base)	-	Yes	Yes	No	-	Yes	-	-	1.3
X-2093	Propellant (Double base)	-	Yes	Yes	No	-	Yes	-	-	1.3
X-2094	Propellant (Triple base)	-	Yes	Yes	No	-	Yes	-	-	1.3
X-2095	Propellant (Triple base)	-	Yes	Yes	No	-	Yes	-	-	1.3
X-2104	Propellant (Double base)	-	Yes	Yes	No	-	Yes	-	-	1.3
X-2105	Propellant (Single base)	-	Yes	Yes	No	-	No	-	-	Not 1
X-1847	Ammonium Nitrate	Yes	No	Yes	No	-	No	No	-	Not 1
-	Benzoyl Peroxide	?	No	?	No	-	No	No	-	Not 1
-	Guanidine Nitrate	Yes	No	Yes	No	-	No	No	-	Not 1
-	m-Dinitrobenzene (as shipped)	Yes	-	Yes	No	-	No	No	-	Not 1
-	m-Dinitrobenzene (dried)	Yes	Yes	Yes	Yes	No	No	Yes	No	1.1
-	2,4 Dinitrotoluene	Yes	Yes	Yes	No	-	No	No	-	Not 1
-	2,4 Dinitrophenol	Yes	No	Yes	No	-	No	No	-	Not 1
-	Ammonium Perchlorate	Yes	Yes	Yes	No	-	No	No	-	1.3

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DEPARTMENT OF THE ARMY Mr. Newell/bjs/AUTOVON
U.S. ARMY ENVIRONMENTAL HYGIENE AGENCY 584-3651
ABERDEEN PROVING GROUND, MARYLAND 21010

REPLY TO ATTENTION OF

HSHB-ES-H

1 FEB 1984

SUBJECT: Suggested Procedures for Sampling Explosive Residues at Open Burning and Open Detonation (OB/OD) Sites for Reactivity Testing

Commander
US Army Materiel Development
and Readiness Command
ATTN: DRCIS-A (MAJ Thies)
5001 Eisenhower Avenue
Alexandria, VA 22314

1. REFERENCE: FONECON 9 Jan 1984 with MAJ Paul Thies, DARCOM Environmental Office, subject: AEHA Support to Develop Open Burning/Open Detonation Ground, Explosive Residue Sampling Procedure for Reactivity Testing.

2. BACKGROUND.

a. At most OB grounds, residues will take the form of either discrete piles of ash or merely veneers of ash dispersed over the soil. The color of the ash usually ranges from white to black. In terms of texture, the ash residues appear in a variety of forms from light flakes to solid char and often will be seen in crumbly granular "cake", fused to the subsurface soil. Metal parts are also found infused in the residue/soil matrix.

b. Many OB grounds have been in use for up to 40 years, often at the same pad, trench or localized area. The intense burning action has in many cases changed the immediate subsurface soil structure, to the point where it is difficult to clearly determine where residue stops and where the soil begins. Therefore, color and physical texture are the best guides. Prior to sampling, OB/OD operations personnel should be consulted to determine the most active burning site.

c. Because of the inherent difference in the nature of OB and OD operations, OD sites will usually have neither discrete piles nor veneers of ash to sample. The detonation/deflagration process tends to more completely combust and aerosolize the explosive components leaving only minute and generally non-visible traces in the resultant craters and surrounding soils. If these areas are to be sampled for reactivity, then only surface soils should be taken at no more than 2-3 inches maximum depth.

d. The Bureau of Mines test protocol for reactivity includes the "Gap Test" and the "Deflagration/Detonation Transition" test. These two tests, to be performed in three replicates for reproducibility, call for a total volume of approximately two gallons of residue.

3. FIELD PROCEDURE.

a. In selecting a major site for residue sampling, contact the OB/OD ground operator to determine the site(s) most recently used.

b. A major site would consist of a large burn pad, a cluster of small burn pads, a burn trench, a flashing pile or pit, burn cage area, or a demolition crater or trench.

c. Because all residues collected from each major site will be "homogenized" in the lab, there is no requirement to sample a site in any particular grid pattern. Consider all residues collected from each major site as one sample.

d. Obvious piles of ash should be sampled first. Any lumps of fused plastic, glass, metal, paper, cardboard, wood or other extraneous objects should be removed from the sample.

e. Fine ash, scattered as a surface veneer, should then be sampled down to the residue/soil interface (usually less than two inches in depth). (See para 2b).

f. All residue samples should be lightly compressed in the sample container to reduce the volume of material, thereby increasing sample density.

g. Samples collected should be shipped via the certified installation packer as merely "soil/residue" samples. This designation will allow shipping by any contract trucking company. This method of shipping has worked satisfactorily for many of the OB/OD ground samples.

4. SOURCES.

a. The sample container chosen for shipment of the residues is in the Federal Supply System cited as:

8110-00-281-8618
Can, tinned finish, inside and out
Double friction top, round
1 gal. capacity
Fed. Spec. RR-C-96
Class A FREUND No. 1837 or equal

b. Two gallons of consolidated residue per major site would be the usage rate.

c. The gallon can be easily overpacked in either a heavy cardboard container (for small lots of samples) or in a wooden crate (preferred for large quantities of samples).

(1) The disposable plastic scoop used to gather the residue sample is also in the Federal Supply System.

6840-NSN
Scoop, plastic
Size 100CC
Cat. #F36750
4 dozen/case

5. Point of contact for further information is Mr. Edward Newell, Jr., Waste Disposal Engineering Division, this Agency, AUTOVON 584-3651.

FOR THE COMMANDER:

Nelson H. Lund

NELSON H. LUND, P.E.
Colonel, MSC
Director, Environmental Quality

Appendix H

Air Emission Characterization Data

Indoor Gun-Firing Range (T&S 12) Site 650

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RUST Rust Environment & Infrastructure Inc.

A Rust International Company
3033 Campus Drive North
Suite 175
Minneapolis, MN 55441

Phone 612.551.1001
Fax 612.551.2499

October 8, 1996

Mr. Jon Bode
Alliant Techsystems Proving Grounds
23100 Sugar Bush Road Northwest
Elk River, Minnesota 55330

Re: SCREEN Modeling for Indoor Firing at the Proving Grounds

Dear Jon:

Concentrations associated with Indoor Firing at the Proving Grounds were predicted for three scenarios with the SCREEN3 EPA model. Modeled concentrations associated with each of the three scenarios are below the applicable ambient air quality standards. This letter describes the modeling input and the resulting modeled concentrations. Attachments to the letter include calculations and the SCREEN3 modeling output.

BACKGROUND

SCREEN3 is an EPA model which performs rough calculations to obtain worst case concentrations. The model uses a default meteorological data set. For each distance from the stack selected, SCREEN3 uses the meteorological data that predicts the highest concentrations. Using the worst case meteorological data results in worst case concentrations that are independent of direction.

Inputs to the SCREEN3 model include stack parameters, building dimensions, ambient temperature, classification of terrain surrounding the facility (urban or rural), receptor height, and distance to receptors. The SCREEN3 model predicts 1-hour concentrations that may be converted to other averaging periods with default EPA conversion factors.

APPROACH

Concentrations for indoor firing were predicted for three scenarios. Emissions from each scenario exhaust through the same stacks, but have different emission rates. The scenario emission rates were calculated for firing rates associated with the existing inventory, worst case activities, and typical activities. The emission estimates for these scenarios were provided by Alliant in your September 30, 1996, facsimile to Rust Environment & Infrastructure.

An emission rate of 1.0 g/s was modeled. Concentrations predicted by SCREEN3 are directly proportional to the emission rate. Therefore, pollutant specific concentrations can be obtained with the following equation.

$$\text{Pollutant Specific Concentration } \left(\frac{\mu g}{m^3}\right) = \frac{\text{Pollutant Specific Emission Rate } \left(\frac{g}{s}\right) \cdot \text{Unit Modeled Concentration } \left(\frac{\mu g}{m^3}\right)}{\text{Modeled Emission Rate } \left(1.0\ \frac{g}{s}\right)}$$

At the facility there are three indoor firing ranges which each have two exhaust stacks. The SCREEN3 model can predict emissions from only one stack. Therefore, all emissions were assumed to exhaust through one of the six stacks. This is a conservative assumption which will provide higher modeled concentrations than assuming emissions exhaust through more than one stack simultaneously.

A single building houses all three firing ranges. The building is shaped somewhat like a fan, with one central area that has access to the three firing ranges. After the central area, each firing range is enclosed within its own structure. To predict the effects of building downwash on emissions, the width of the central area and the length of the longest firing range were input as building dimensions.

INPUT

Modeled input parameters are included below in Table 1 in both English and metric units. Emission rates and calculations are enclosed in Attachment A.

Table 1
Modeled Input Parameters

Parameter	Stack Height		Stack Diameter		Exhaust Flowrate (acfm)	Exhaust Temperature		Building Dimensions					
								Height		Minimum Width		Maximum Length	
	(ft)	(m)	(ft)	(m)		(°F)	(K)	(ft)	(m)	(ft)	(m)	(ft)	(m)
Same stack for each scenario	15	4.6	2.5	0.76	24,000	60	289	13	4.0	70	21	200	61

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Rural dispersion coefficients were selected for the modeling, since the area surrounding the proving grounds is agricultural or low density residential housing. The SCREEN3 default ambient air temperature of 293 K was used. Modeling with the default ambient temperature results in overestimated concentrations during winter months, but is representative of summer conditions.

OUTPUT

Concentrations are provided below by pollutant and averaging period. Calculations performed to predict the concentrations are enclosed in Attachment A. The SCREEN3 modeling output is also enclosed in Attachment B.

Table 2
Predicted Modeled Concentrations[1]

Scenario	PM/PM_{10}		CO		NO_x	SO_2				Pb	Cd
	24-hr ($\mu g/m^3$)	Annual ($\mu g/m^3$)	1-hr ($\mu g/m^3$)	8-hr ($\mu g/m^3$)	Annual ($\mu g/m^3$)	1-hr ($\mu g/m^3$)	3-hr ($\mu g/m^3$)	24-hr ($\mu g/m^3$)	Annual ($\mu g/m^3$)	Quarterly ($\mu g/m^3$)	Annual ($\mu g/m^3$)
Existing Inventory	1.5	0.045	27	2.4	0.036	88	26	1.5	0.043	0.02	0.0010
Worst Case	5.2	0.091	177	15	0.032	188	56	3.1	0.055	0.34	0.0019
Realistic	2.1	0.036	52	4.5	0.022	100	30	1.7	0.029	0.07	0.0006
Standard	150	50	40,000	10,000	100	1300	915	365	60	5	0.0060[2]

1 Concentrations are presented for indoor firing only. Concentrations associated with background sources and natural background levels are not included in the scenario concentrations.

2 The cadmium standard is the current draft Minnesota Department of Health, Health Risk Value as of October 1996. This value is subject to change.

SCREEN3 is an unrefined model which predicts concentrations using worst case meteorological data. All emissions were assumed to exhaust through a single stack in the modeling. Although a conservative model and conservative assumptions were used to predict concentrations, the modeled concentrations are below the applicable ambient air quality standards.

If you have any questions with the modeling, please call me at (612) 551-2466.

Sincerely,

Stephanie L. Kuphal

Stephanie L. Kuphal
Air Quality Engineer

Enclosures: Attachment A Indoor Firing Calculations
Attachment B SCREEN3 Modeling Output File

c: Don Duffy, Rust

W:\43637\LETTERS\RESULTS.SLK

ATT. .MENT A
INDOOR FIRING CALCULATIONS

Conversion Factors from 1-hr to Other Averaging Periods

Time	Factor[1]
3-hr	0.9
8-hr	0.7
24-hr	0.4
Quarterly[2]	0.1
Annual	0.08

SCREEN3 OUTPUT		
Unit Maximum Hourly Concentration:	157.9	$(ug/m^3)/(g/s)$

[1] Conversion factors obtained from "Screening Procedures for Estimating Air Quality Impact of Stationary Source", October 1992, EPA-454/R-92-019.

[2] No conversion factor was provided for the quarterly averaging period. The annual conversion factor is 0.08+or- 0.02, therefore the quarterly averaging period was estimated as the high annual conversion factor of 0.08+0.02 or 0.10.

Average Emission Rates by Scenario and Pollutant

Scenario	PM/PM10		CO		NOx	SO2				Pb	Cd
	24-hr (lb/hr)	Annual (lb/hr)	1-hr (lb/hr)	8-hr (lb/hr)	Annual (lb/hr)	1-hr (lb/hr)	3-hr (lb/hr)	24-hr (lb/hr)	Annual (lb/hr)	Quarterly (lb/hr)	Annual (lb/hr)
Existing Inventory	0.189	0.0280	1.37	0.171	0.0227	4.41	1.47	0.184	0.0272	0.0088	0.00069
Worst Case	0.653	0.0573	8.89	1.111	0.0202	9.45	3.15	0.394	0.0345	0.1696	0.00121
Realistic	0.259	0.0227	2.61	0.326	0.0138	5.02	1.67	0.209	0.0183	0.0339	0.00040

[3] Maximum emissions were provided by Mr. Jon Bode of Alliant Techsystems. The average emission rate is calculated as the maximum emissions for each time period and scenarion (in units of pounds) divided by the number of hours in the averaging period.

Maximum Off-Property Modeled Concentrations

Scenario	PM/PM10PM/PM	0	CO		NOx	SO2				Pb	Cd
	24-hr (ug/m^3)	Annual (ug/m^3)	1-hr (ug/m^3)	8-hr (ug/m^3)	Annual (ug/m^3)	1-hr (ug/m^3)	3-hr (ug/m^3)	24-hr (ug/m^3)	Annual (ug/m^3)	Quarterly (ug/m^3)	Annual (ug/m^3)
Existing Inventory	1.5	0.045	27	2.4	0.036	88	26	1.5	0.043	0.02	0.0011
Worst Case	5.2	0.091	177	15.5	0.032	188	56	3.1	0.055	0.34	0.0019
Realistic	2.1	0.036	52	4.5	0.022	100	30	1.7	0.029	0.07	0.0006
Standard	150	50	40,000	10,000	100	1,300	915	365	60	5	0.006 [5]

[4] Concentrations are presented for activities associated with indoor firing only. Concentrations associated with background sources and natural background levels are not included in the scenario concentrations.

[5] Cadmium standard based on Minnesota Dept. of Health draft Health Risk Values as of October 1996. This value is subject to change.

Sample Calculation:

24-hr PM/PM10 Existing Inventory Concentration (ug/m^3) = 0.189 lb/hr x 453.59 g/lb x hr/3600 s x 157.9 $(ug/m^3)/(g/s)$ x 0.4

Where: 0.4 is the conversion factor from 1-hr average concentrations to 24-hr average concentrations and 157.9 $(ug/m^3)/(g/s)$ is 1-hr average unit concentration

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EMISSION FACTOR REFERENCES

PM/PM(10)

Emission factors used for these pollutants were taken from the Bang Box results that were used in the Combustion Characterization Review (ATK/RUST, 1995) completed in December 1995. For propellant, the worst-case or highest emission factor was used. In this case, triple-base (TP) was used. For explosives, the highest available emission factor (0.073) for TNT was used. Initiators/primers and pyrotechnics (tracers) were not evaluated in the Bang Box studies. Based on their behavior, initiators and pyrotechnics were assigned the emission factors from explosives and propellants; respectively.

Carbon Monoxide (CO)

The worst-case available emission factor from the Bang Box studies was used for CO emissions. For propellant and pyrotechnics, the value for M1 propellant (0.0009) was used. For explosives and initiators, the value for TNT (0.054) was used.

Nitrogen Oxides (NOx)

The Bang Box studies evaluated both NO and NO_2. For NOx, the largest sum of NO and NO_2 for propellant and explosive was used for this evaluation.. For propellant/pyrotechnic, the value of 0.025 was used from double-base (DB) propellant. Explosives/initiators used 0.0041 from Composition B (Comp B) explosive.

Sulfur Oxides (SOx)

No data was available from the Bang Box studies for SOx emissions. AP-42 was researched and a value for the open burning of dynamite for SOx emissions (0.0265 pounds SOx/pound source material) was found (AP-42, Sec. 13.3, Table 13.3-1). Since there was no additional information for propellants, this value was used for propellants/pyrotechnics also.

Non-Methane Organics (VOCs)

It was assumed that the Bang Box data for non-methane organics could be used for VOC emission calculations. Again, the worst-case in the propellant and explosives category was used for these calculations. For propellant/pyrotechnics, a value of 0.002 from M1 Prop was used. For explosives/initiators, a value of 0.11 from TNT was used.

DERIVATION OF LEAD AND CADMIUM CONTENT

Lead

The round in the ATPG inventory which contained the most primer (and therefore lead) was used as the basis for the calculations. The GAU8 primer round contains the most primer material of any round with an N.E.W. of 0.735 g. The lead-containing compounds in this round are lead azide (PbAz) and lead styphnate (PbSty). PbAz contains 71% lead by weight. PbSty contains 44% lead by weight. The example round contains EQUAL portions of both compounds. Thus, the AVERAGE lead content for PbAz and PbSty combinations is **57.5%** by weight.

The GAU8-primer round weighs 150 g total with 0.4% of that amount as PbAz/PbSty. Thus, the total lead in one round equals: 0.4% x 150 g x 57.5% = 0.345 g. Relative to the N.E.W., which is primer (initiator) only, the amount of lead per N.E.W. is 0.345/0.735 = **46% lead by weight.**

The 46% lead by weight for initiating material forms the basis of all lead emission calculations. The sole source of lead from an emission standpoint is the initiating or primer material. The contribution from fuzes is considered insignificant as demonstrated in Table 2.1B. An average MCA fuze weighs 30 g with 0.02% lead by weight. This translates into 1.32 E-5 pounds lead/fuze.

Cadmium

Cadmium makes up approximately 1% by weight of the typical MCA fuze. This equates to 0.3 g or **0.0006 pounds** cadmium per round. It is important to note that not all rounds contain fuzes. Approximately **1/3 of the existing MCA inventory** contain fuzes. For the emissions and modeling for that wastestream, 1/3 of the rounds were assumed to have fuzes. For the emissions and modeling of the third scenario, future realistic wastestream, 1/3 of the rounds were assumed to be fuzed. For the worst-case future modeling, scenario 2, ALL rounds were considered fuzed.

ATTACHMENT B
SCREEN3 MODELING OUTPUT FILE

```
10/07/96                                                          10:36:15

  ***  SCREEN3 MODEL RUN  ***
  *** VERSION DATED 96043 ***

 Alliant Techsystems Indoor Firing Modeling

 SIMPLE TERRAIN INPUTS:
    SOURCE TYPE            =        POINT
    EMISSION RATE (G/S)    =      1.00000
    STACK HEIGHT (M)       =       4.5720
    STK INSIDE DIAM (M)    =        .7620
    STK EXIT VELOCITY (M/S)=      24.8373
    STK GAS EXIT TEMP (K)  =     293.0000
    AMBIENT AIR TEMP (K)   =     293.0000
    RECEPTOR HEIGHT (M)    =        .0000
    URBAN/RURAL OPTION     =        RURAL
    BUILDING HEIGHT (M)    =       3.9600
    MIN HORIZ BLDG DIM (M) =      21.3000
    MAX HORIZ BLDG DIM (M) =      61.0000

 THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

    STACK EXIT VELOCITY WAS CALCULATED FROM
    VOLUME FLOW RATE =   24000.000     (ACFM)

 BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =   89.549 M**4/S**2.

 *** FULL METEOROLOGY ***

 **********************************
 *** SCREEN AUTOMATED DISTANCES ***
 **********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

   DIST     CONC              U10M   USTK  MIX HT   PLUME   SIGMA   SIGMA
    (M)   (UG/M**3)    STAB   (M/S)  (M/S)    (M)   HT (M)  Y (M)   Z (M)  DWASH
 -------  ----------   ----   -----  -----  ------  ------  ------  ------  -----
    213.    157.9        4     8.0    8.0  2560.0    9.26   16.49    8.98    SS
    300.    116.6        4     5.0    5.0  1600.0   14.22   22.61   12.09    SS
    400.    108.4        5     5.0    5.0 10000.0   14.53   22.01   10.81    SS
    500.    131.4        5     1.0    1.0 10000.0   27.26   27.78   14.35    NO
    600.    144.0        5     1.0    1.0 10000.0   27.26   32.58   16.06    NO
    700.    147.5        5     1.0    1.0 10000.0   27.26   37.34   17.74    NO
    800.    145.3        5     1.0    1.0 10000.0   27.26   42.05   19.38    NO
    900.    148.7        6     1.0    1.0 10000.0   25.24   31.34   14.26    NO
   1000.    152.5        6     1.0    1.0 10000.0   25.24   34.40   15.15    NO
   1100.    152.5        6     1.0    1.0 10000.0   25.24   37.43   15.95    NO
   1200.    150.8        6     1.0    1.0 10000.0   25.24   40.45   16.73    NO
   1300.    147.9        6     1.0    1.0 10000.0   25.24   43.45   17.50    NO
   1400.    144.3        6     1.0    1.0 10000.0   25.24   46.42   18.24    NO
   1500.    140.2        6     1.0    1.0 10000.0   25.24   49.38   18.97    NO
```

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```
MAXIMUM 1-HR CONCENTRATION AT OR BEYOND   213. M:
   213.   157.9        4     8.0     8.0  2560.0     9.26    16.49     8.98     SS

 DWASH=   MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

*********************************
*** SCREEN DISCRETE DISTANCES ***
*********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST     CONC              U10M   USTK   MIX HT   PLUME   SIGMA   SIGMA
   (M)   (UG/M**3)   STAB   (M/S)  (M/S)    (M)    HT (M)   Y (M)   Z (M)   DWASH
 -------  ----------  ----  -----  -----  ------   ------  ------  ------   -----
   457.   122.2        5     1.0    1.0 10000.0    27.26   25.71   13.60    NO
   762.   146.6        5     1.0    1.0 10000.0    27.26   40.26   18.76    NO

 DWASH=   MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

 ********************************************
 *  SUMMARY OF TERRAIN HEIGHTS ENTERED FOR   *
 *     SIMPLE ELEVATED TERRAIN PROCEDURE     *
 ********************************************

      TERRAIN        DISTANCE RANGE (M)
       HT (M)       MINIMUM     MAXIMUM
      -------      --------    --------
          0.         213.       1500.
          0.         457.         --
          0.         762.         --

****************************************
     *** REGULATORY (Default) ***
   PERFORMING CAVITY CALCULATIONS
  WITH ORIGINAL SCREEN CAVITY MODEL
          (BRODE, 1988)
****************************************


 *** CAVITY CALCULATION - 1 ***       *** CAVITY CALCULATION - 2 ***
  CONC (UG/M**3)     =    .0000         CONC (UG/M**3)     =    .0000
  CRIT WS @10M (M/S) =    99.99         CRIT WS @10M (M/S) =    99.99
  CRIT WS @ HS (M/S) =    99.99         CRIT WS @ HS (M/S) =    99.99
  DILUTION WS (M/S)  =    99.99         DILUTION WS (M/S)  =    99.99
  CAVITY HT (M)      =     3.96         CAVITY HT (M)      =     3.96
  CAVITY LENGTH (M)  =    22.01         CAVITY LENGTH (M)  =    15.90
  ALONGWIND DIM (M)  =    21.30         ALONGWIND DIM (M)  =    61.00

 CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S.  CONC SET = 0.0

****************************************
```

through the subsurface environment to the groundwater. Operations at the T&S 12 facility will be conducted in an enclosed environment which is protected from precipitation and run-on/run-off. 10/18

Groundwater at the ATPG facility is variable and ranges from about 60 feet below ground surface (BGS) in the northern sections of the ATPG property to about 14 feet BGS in the southern regions. Soils and related geology throughout the ATPG facility is varied, being comprised of unconsolidated sediments of glacial moraine consisting of sandy soil mantled on top of poorly to moderately well sorted outwash sands and gravels. These sand and gravels are stratigraphically followed by local clay, silt, and tills (i.e., poorly sorted sediments deposited directly by glacial ice). Regional trends of groundwater flow are toward the southwest, but local groundwater flow is highly influenced by surficial water bodies.

Existing groundwater monitoring wells are located within the ATPG facility approximately 8,000 feet north of the T&S 12 site (near T&S 5) which provide a baseline of local water quality conditions. ATPG currently makes no discharges of industrial wastewater to local soils or surface waters. Discharges are limited to sanitary purposes only.

The ATPG facility is located in a rural area approximately 30 miles northwest of the Minneapolis, St. Paul Metro. The area surrounding the ATPG facility can be characterized as lightly populated and is comprised of small farms or individual residences located on multi-acre properties. A groundwater receptor survey of the ATPG area was conducted in May of 1990. This survey reviewed well logs from the Minnesota Geologic Survey files for wells within a one (1) mile radius of the ATPG facility. No municipal or residential wells are located on the ATPG facility and the facility is sufficiently restricted such that no agricultural livestock or crops will be in the vicinity of permitted activities. No portion of the ATPG facility involves a shoreland zoning district, a delineated 100-year flood plain, or a state or federally designated wild or scenic river land use district.

The restricted location of the T&S 12 facility, along with the inherent characteristics of the waste materials and local geology, provide minimal potential for human health risks caused by exposure to waste constituents. These same factors also preclude significant potential for damage to domestic animals, wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents.

4.4.5.3 Air - In accordance with Minn. Rules pt. 7045.0539, Subp. 2.C., no releases that may have adverse effect on human health or the environment due to migration of waste constituents in the air are applicable. T&S 12 operations do not present a significant source of air emissions.

An assessment of the magnitude of air emissions was performed for this minor permit modification. No emission factors for the gun-firing of bullets were found in any of the databases researched for this application, nor has ATPG ever researched air emissions from gun-firing. However, an existing database containing emission factors for the open burning of specific explosives and propellants is available through the efforts of ATK's Subpt. X permitting of the OB/OD processes. The *Combustion Characterization Review-Final Report (RUST/ATK, 1995)* is the source of the majority of the emission factors used for this modification request. The use of this reference is justified since the process of gun-firing technically involves the combustion of propellants and explosives. 11/18

Table 4.3 presents a summary of the emissions for the treatment of the existing MCA inventory of 27,000 rounds. Lead and cadmium emissions are assumed to be the total available lead and cadmium from Table 2.1B, 57.8 and 6.1 pounds; respectively. The summary sheet attached to Table 4.3 presents a breakdown of the sources and derivations of the emission factors used for these calculations.

ATPG hired RUST Environmental to perform three air modeling analyses in relation to this application. The first model is for the existing MCA inventory of approximately 27,000 bullets. The emission rates are presented in Table 4.3. A background discussion on the details of the modeling can be found in Appendix A.

The second scenario modeled is a worst-case, on-going treatment process commencing after the current inventory is gun-fired. Table 4.3A presents the assumptions and emission rates for this evaluation. This is truly a worst-case analysis because it is very unlikely that the round chosen for modeling, the GAU8-HEIT, will be the only wastestream generated in the future. It is also a worst-case estimate because of the number of rounds assumed to be treated; 16,000. The current inventory of 27,000 rounds was accumulated over 15 years of contracts and programs. It is not probable that a treatment capacity of 16,000 rounds per year would ever be achieved.

The third scenario modeled was a more realistic representation of future operations for T&S 12. The bullet capacity assumptions are identical to the worst-case analysis, but the particular wastestream of bullets modeled was more representative of future work and on-going production contracts. Since the current inventory consists of over 90% 25 mm and 30 mm rounds, it was assumed that future wastestreams would be 100% 25 mm and 30 mm rounds. Also, the relative amounts of explosive, initiators, propellant, and pyrotechnic material in each round is more reflective of active programs within those two calibers. Table 4.3B presents the assumptions and emission rates for this scenario. It should be noted that the GAU8-HEIT round is no longer an active contract and would not be an appropriate representative of future wastestreams. Thus, it was not considered for this scenario.

The results of the air emission modeling assessment for each of the three scenarios are shown in Table 4.3C. Based on the results of the air modeling, no NAAQS levels are exceeded or even approached in any scenario. Based on this fact, no air monitoring should be necessary at the source or near the property boundary. However, as part of this facility's air permit (Registration Permit- Option D), a 12-month rolling sum of facility emissions must be maintained. Therefore, air emissions from this process are available on a monthly and 12-month rolling sum basis.

It should also be noted that the emission levels calculated for the existing MCA inventory, the worst-case emission scenario, and the realistic emission scenario did not exceed the registration permit emission limits. The only exception was the lead emissions for the worst-case scenario. Registration permits limit lead emissions to 0.5 tons (1,000 pounds). However, this scenario is not representative of the actual wastestream and was analyzed for the purposes of NAAQS comparisons. The realistic scenario has lead emissions easily within the registration permit limit. 12/18

4.4.5.3.1 Proposed Treatment Capacity for T&S 12

There are a variety of ways to limit or monitor the treatment process at T&S 12. It is ATPG's desire to monitor this process in the simplest and most direct manner while still collecting sufficient information to ensure that NAAQS levels are not exceeded. As such, the following limits are proposed:

N.E.W. limits: not to exceed 200,000 pounds annually and 1,000 pounds per day

Gun-firing limits-existing 27,000 round inventory:

The plan is to dispose of these bullets under the following schedule:

1) Maximum of 1,500 bullets per week
2) Maximum of 500 bullets per day
3) Maximum of 500 bullets per hour
4) Maximum of 9,000 bullets per quarter
5) All 27,000 rounds disposed of in 12 months

Gun-firing limits- future inventories:

The plan is to dispose of these bullets under the following schedule:

1) Maximum of 1,500 bullets per week
2) Maximum of 500 bullets per day
3) Maximum of 500 bullets per hour
4) Maximum of 4,000 bullets per quarter
5) Maximum 16,000 bullets per calendar year

ATPG would also like to request some flexibility in the limits proposed if we can demonstrate through air emissions calculations and/or modeling that no detrimental effects to human health or the environment will result if certain proposed limits are exceeded. Such demonstrations would occur prior to exceeding the defined limits. As stated earlier, our review of current contracts leads us to not anticipate such a large wastestream, and it is unlikely that the treatment limits proposed for future inventories would ever need to be exceeded.

4.4.5.4 Warning Signs - Warning signs legible from a minimum of 25 feet specifying - "NOTICE - AUTHORIZED PERSONNEL ONLY" will be posted at the perimeter of T&S 12.

4.4.6 Prevention of Run-off in Hazardous Waste Handling Areas

13/18

TABLE 2.1A
EXISTING MEDIUM CALIBER AMMUNITION INVENTORY BREAKDOWN

Caliber	No. of Rounds	Percent of Total	Number of Fuzed Rounds
20 mm	525	1.9	14
25 mm	14,376	53	4,333
30 mm	10,855	40.1	4,536
35 mm	597	2.2	308
40 mm	704	2.6	0
45 mm	10	0.03	0
TOTAL	27067	100.03	9191

TABLE 2.1B
TOTAL LEAD AND CADMIUM IN EXISTING MCA INVENTORY

Caliber	No. of Rounds	No. of Fuzed Rounds	Total Initiator Weight	Total Fuze Weight	Wt. of Lead from Initiator	Wt. of Lead from Fuze	Wt. of Cadmium from Fuze
20 mm	525	14	0.57	0.92511	0.26733	5.35E-05	0.009251
25 mm	14,376	4,333	23.96	286.3216	11.23724	0.002247	2.863216
30 mm	10,855	4,536	84.98	299.7357	39.85562	0.007971	2.997357
35 mm	597	308	3.51	20.35242	1.64619	0.000329	0.203524
40 mm	704	0	6.21	0	2.91249	0.000582	0
45 mm	10	0	3.86	0	1.81034	0.000362	0
TOTAL	**27067**	**9191**	**123.09**	**607.3348**	**57.72921**	**0.011546**	**6.073348**

Notes:

Underlined values reflect maximum lead and cadmium emission potential from the existing MCA inventory.

All weights in pounds

Initiator contains approximately **46.90%** lead by weight
Fuzes contain approximately **0.02%** lead by weight
Fuzes contain approximately **1%** cadmium by weight
MCA fuzes are approximately 30 gram (0.066 lb) in weight

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TABLE 4.3
EMISSION CALCULATIONS FOR EXISTING MCA INVENTORY

Breakdown of Source Material

Caliber	No. of Rounds	Total Explosive Weight (lb)	Total Propellant Weight (lb)	Total Initiator Weight (lb)	Total Pyrotechnic Weight (lb)
20 mm	525	5.51	62.46	0.55	0.04
25 mm	14,376	279.68	2887.71	23.96	37.03
30 mm	10,855	594.62	3681.49	84.98	1.56
35 mm	597	81.5	454.58	3.51	1.46
40 mm	704	155.23	620.93	6.21	1.55
45 mm	10	0	10.65	3.86	0.04
TOTAL	27067	1116.54	7717.82	123.07	41.68

Total Emission Summary for Selected Pollutants (all calibers combined)

Source Material	PM		PM(10)		Carbon Monoxide		Nitrogen Oxides		Sulfur Oxides		VOCs	
	EF	Act.	EF	Act.	EF	Act.	EF	Act.	EF	Act.	EF	Act.
Propellant	0.02	154.3564	0.02	154.3564	0.0009	6.946038	0.025	192.9	0.027	205	0.002	15.44
High Explosive	0.073	81.50742	0.073	81.50742	0.054	60.29316	0.0041	4.578	0.027	29.6	0.002	2.233
Initiator	0.073	8.98411	0.073	8.98411	0.054	6.64578	0.0041	0.505	0.027	3.26	0.002	0.246
Pyrotechnics	0.02	0.8336	0.02	0.8336	0.0009	0.037512	0.025	1.042	0.027	1.1	0.002	0.083
TOTAL	pounds	245.68153		245.68153		73.92249		199.1		238		18
	tons	0.12284077		0.1228408		0.036961		0.1		0.12		0.009

Notes:

EF = Emission factor in pounds of pollutant per pound of source material
Act = Actual pounds of pollutants emitted
See attached summary sheet for a discussion of Emission Factor references

15/18

TABLE 4.3 (cont'd)
EMISSION CALCULATIONS FOR EXISTING MCA INVENTORY

Assumptions for Air Emission Levels vs. Time

1) Limit of rounds per week	1500
2) Limit of rounds per day	500
3) Limit of rounds per hour	500
4) Limit of rounds per year	27067
5) Limit of rounds per quarter	9000

6) Based on the available amount of source material present in his inventory of MCA, including overall lead content, the following PER ROUND parameters were developed:

0.2851	pounds of propellant per round (avg.)
0.0413	pounds of high explosive per round (avg.)
0.0045	pounds of initiator per round (avg.)
0.0015	pounds of pyrotechnics per round (avg.)
0.0021	pounds of lead per round (avg.)

7) 100% of the emissions are collected and vented to the atmosphere

Summary of Maximum Total Emission Rates based on Assumptions 1-7

Time Frame	PM	PM(10)	CO	NOx	SOx	VOC	Pb	Cd*
Weekly	13.62	13.62	4.10	11.03	13.22	1.00	3.20	0.327
Daily	4.54	4.54	1.37	3.68	4.41	0.33	1.07	0.109
Hourly	4.54	4.54	1.37	3.68	4.41	0.33	1.07	0.109
Annually	245.68	245.68	73.92	199.07	238.48	18.00	57.80	6.07
Quarterly	81.69	81.69	24.58	66.19	79.30	5.98	19.22	1.96

All values in Pounds of Pollutant

* Based on maximum available Cd of 0.0006 pounds per round, 1/3 of the rounds are fuzed

17/18

TABLE 4.3A

WORST CASE EMISSIONS FOR ON-GOING OPERATIONS AT T&S 12

ASSUMPTIONS

1) Limit of rounds to be fired per week 1500
2) Limit of rounds per day 500
3) Limit of rounds per hour 500
4) Limit of rounds per year 16000
5) Limit of rounds per quarter 4000
6) Worst-case round to be used: GAU8- HEIT (high explosive incendiary tracer, 30 mm)
   Contains the highest NEW per round of the rounds MOST LIKELY to be fired in T&S 12

GAU8-HEIT:	**0.386**	pounds of propellant per round
specs	**0.125**	pounds of high explosive per round
	0.198	pounds of initiator per round
	0.004	pounds of pyrotechnics per round
	0.093	pounds of lead per round (initiators)

7) 100% of the generated emissions are collected and vented to the atmosphere

Summary of Emission Factors (pound of pollutant/pound of source material)

Source Mat'l	PM	PM(10)	CO	NOx	SOx	VOC	Pb
Propellant	0.02	0.02	0.0009	0.025	0.0265	0.002	*
High Explosive	0.073	0.073	0.054	0.004	0.0265	0.002	*
Initiators	0.073	0.073	0.054	0.004	0.0265	0.002	*
Pyrotechnics	0.02	0.02	0.0009	0.025	0.0265	0.002	*

* Lead to be determined on a pound per round calculation as presented above

Worst-Case Summary of Maximum Total Emissions based on Assumptions 1-7

Time Frame	PM	PM(10)	CO	NOx	SOx	VOC	Pb	Cd
Weekly	47.03	47.03	26.66	16.62	28.34	2.14	139.29	0.99
Daily	15.68	15.68	8.89	5.54	9.45	0.71	46.43	0.33
Hourly	15.68	15.68	8.89	5.54	9.45	0.71	46.43	0.33
Annually	501.69	501.69	284.35	177.28	302.27	22.81	1485.79	10.56
Quarterly	125.42	125.42	71.09	44.32	75.57	5.70	371.45	2.64

Values in Pounds of Pollutant

* Based on a maximum of 0.0006 pounds of Cd per round, 100% of the rounds are fuzed

18/18

TABLE 4.3B
REALISTIC EMISSIONS FOR EXPECTED OPERATIONS AT T&S 12

ASSUMPTIONS

1) Limit of rounds to be fired per week	1500
2) Limit of rounds per day	500
3) Limit of rounds per hour	500
4) Limit of rounds per year	16000
5) Limit of rounds per quarter	4000

6) Based on existing MCA inventory breakdown and knowledge of future deliveries, a ratio of 55% 25 mm rounds and 45% 30 mm rounds will make up the waste stream. Other size rounds referenced in Table 2A are defunct and will probably not be part of future gun-firing wastestreams. Based on ATK specs and data, a weighted average has been developed to generally reflect the composition of any single round to be treated at T&S 12 in the future.

Typical round 25/30 mm	**0.283**	pounds of propellant per round
	0.082	pounds of high explosive per round
	0.0099	pounds of initiator per round
	0.0038	pounds of pyrotechnics per round
	0.00464	pounds of lead per round (initiators)

7) 100% of the emissions are collected and vented to the atmosphere

Summary of Emission Factors (pound of pollutant/pound of source material)

Source Mat'l	PM	PM(10)	CO	NOx	SOx	VOC	Pb
Propellant	0.02	0.02	0.0009	0.025	0.0265	0.002	*
High Explosive	0.073	0.073	0.054	0.0041	0.0265	0.002	*
Initiators	0.073	0.073	0.054	0.0041	0.0265	0.002	*
Pyrotechnics	0.02	0.02	0.0009	0.025	0.0265	0.002	*

* Lead to be determined on a pound per round calculation as presented above

Worst-Case Summary of Maximum Total Emissions based on Assumptions 1-7

Time Frame	PM	PM(10)	CO	NOx	SOx	VOC	Pb	Cd*
Weekly	18.67	18.67	7.83	11.32	15.05	1.14	6.96	0.33
Daily	6.22	6.22	2.61	3.77	5.02	0.38	2.32	0.11
Hourly	6.22	6.22	2.61	3.77	5.02	0.38	2.32	0.11
Annually	199.12	199.12	83.53	120.75	160.57	12.12	74.29	3.49
Quarterly	49.78	49.78	20.88	30.19	40.14	3.03	18.57	0.87

Values in Pounds of Pollutant

* Based on a maximum of 0.0006 pounds of Cd per round, 1/3 of the rounds are fuzed

Appendix I

Ash Management Plan & Surface Soil Sampling and Analysis Plan

OB/OD Treatment Area (T&S 5) Site 675

OB/OD TREATMENT AREA (T&S 5) SITE 675

ASH MANAGEMENT PLAN & SURFACE SOIL SAMPLING AND ANALYSIS PLAN

Feb 2016

1.0 Introduction

This document discusses the procedures used for managing burn ground ash and residuals at the OB/OD Treatment Area (T&S 5) at TPG. It also provides the sampling plan for the surface soils in the immediate area of the treatment subunits which comprise T&S 5.

1.1 Background Information

T&S 5 consists of five active subunits:

- (3) Steel Evaporation Pans
- (4) Propellant Burn Pads
- (5) Steel Burn Boxes
- (1) Detonation Pit
- (1) Steel Burn Cage

T&S 5 is managed and operated by TPG personnel. A lead engineer, the group manager, and the facility environmental engineer provide oversight for its operation. The environmental engineer is consulted on issues related to environmental compliance, the facility-operating permit, and details on the design and operation of the treatment subunits. Trained and experienced technicians perform day-to-day treatment activities including burning, detonating, maintenance, and ash/residual management. All operations on TPG, which involve the handling of explosive materials, including T&S 5 operations, are shutdown if lightning has been detected within ten (10) miles of the facility. An initial warning of approaching thunderstorms is issued to personnel when lightning has been detected within 50 miles of the plant.

2.0 Residuals Management for OB/OD Treatment Subunits (T&S 5) Site 675

This section will discuss the management of burn ground ash and residuals from each treatment subunit located at T&S 5. Refer to the Part B application Sections 1.0 and 3.0 for additional details on T&S 5 and its treatment subunits.

2.1 Evaporation Pans

The evaporation pans are typically used to treat process water that contains residual levels (non-hazardous levels) of explosive compounds. A propane burner is the heat source for this process. Previously, a wood fire was used, and it caused significantly higher air emissions and treatment residue being generated than does the present gas burner. Generally, it takes about 7 hours to evaporate 200 gallons of water, which is the capacity of a pan.

After the water in a batch of wastewater has been evaporated, a rapid rise in temperature occurs in a pan. This causes auto-ignition of the small quantity of explosive, usually several grams that may be present in the residual material remaining in the pan. This residual consists primarily of hard water scale and other dissolved solids that are naturally occurring in the local ground water. The auto-ignition step of the treatment process occurs relatively quickly usually on the order of several minutes. After all the water has evaporated and the cook-off temperature has been achieved, the burner is shut down. The cook-off temperature is verified by the use of a thermocouple.

The risk of soil and/or groundwater contamination from this operation is considered minimal. The integrity of the evaporation pans is checked to ensure that there is no corrosion or damage that may cause leakage. Care is taken during the transfer of wastewater from the portable wastewater tank into the evaporation pans (via flexible hose) to avoid spillage. When an empty pan is uncovered there should be minimal explosive residue present to contact storm water because during every treatment cycle the temperature is allowed to reach the auto-ignition point. This process is not performed during storms because of the risk of overflowing the evaporation pans.

2.2 Propellant Burn Pads

Typically, bulk propellants (and some high explosives) are burned on the three (3) propellant burn pads located at T&S 5. Because propellant is quite reactive it does not require any supplemental fuel to perform a burn. However, whenever high explosive is burned fuel oil and straw are needed to support the treatment process. As a result the residuals that remain after a high explosive burn usually include straw residue. Some unburned propellant or explosive also may remain in the treatment residue. However, the levels remaining are normally very low because of the reactive nature of the waste.

When not in use, each of the three pads is covered with a metal cover designed to keep wind and water off the pad. A cover is removed for burning and it is replaced as soon as the heat dissipates enough to allow for the pad to be safely approached. A cover is not usually replaced on an individual pad if it is to be used more than once in a day. However, multiple burns in one day on the same pad are rare and is usually avoided due to safety concerns.

The ash is removed from the pad prior to the next burn and it is placed in a container on a site vehicle. The container is transferred to the Non-Explosive Waste Storage Building (T&S 3) where it is maintained as a satellite accumulation container until it is filled. If the waste that is treated contains lead or other regulated toxic metals, a hazardous waste label is placed on the container and it is entered into the storage inventory log.

2.3 Steel Burn Boxes

Burn boxes typically are used to burn cut projectiles, which have exposed high explosive, and for other miscellaneous reactive wastes that contain a relatively small quantity of explosive. The burn boxes treat wastes by both burning and low-scale detonation of individual components containing explosives. Examples of such components are fuzes, detonators, boosters, and primers. The burn boxes are located on a concrete pad, which is surrounded by an asphalt apron. Treatment residue is collected in a removable metal pan that is located beneath each burn box. This design limits the contact of treatment residue with the concrete pad or asphalt apron. The pans also provide an efficient means of transferring treatment residue to waste accumulation drums. If residue does spill onto the pad or asphalt apron it is promptly removed and placed into a waste accumulation drum.

During 1998, propane burners were installed in each burn box, thus replacing the use of straw, charcoal, and fuel oil as the heat source for this treatment process. This upgrade has reduced both air emissions and the volume of waste generated from this process. The waste reduction occurred because fuel residues have been eliminated from the waste stream. The waste now primarily consists of burned-out metal scrap from explosive devices and projectiles, metal slag, and a small quantity of non-reactive ash. Explosives, when properly burned, are not present at any significant concentration in the residue.

The charred metal scrap remaining after treatment is removed and visually inspected by the operators. Those few parts, which still may contain significant explosive waste content, are retreated in the burn boxes. However, most of the metal scrap is “clean” and is collected for shipment to a scrap metal vendor. It is placed into a storage bin, which is located adjacent to the burn box pad for the accumulation of recyclable metal. Any ash that is generated is removed from the steel screen inside the unit and from the metal collection pan located under each burn box. This ash is placed into a labeled hazardous waste accumulation drum. There is no established frequency for cleaning a burn box because the rate of ash/residue generation is dependent on its rate of use and on the type of waste treated.

Sheet metal lids, which have edges that overlap the sides of a burn box, are used to cover a box when it is not in use to prevent the entry of rainwater or the loss of ash due to strong winds. Following a burn, a cover is replaced onto a burn box after it has sufficiently cooled and is safe to approach. Boxes are not left uncovered overnight or during precipitation events.

2.4 Detonation Pit

Encased explosives or those devices that have sufficient confinement that a detonation might occur if open burned are detonated in the detonation pit subunit. Typically, the item to be disposed of is buried in a sidewall or at the bottom of the pit in order to eliminate the dispersion of shrapnel and other residue. The size and shape of the detonation pit does not significantly change as part of normal operations. Sand and dirt that is thrown out of the pit is recovered and backfilled into the pit. Pulverized soil that becomes airborne and is not recoverable is replaced with clean soil obtained on site.

Any treatment residues from this process typically consist of metal fragments from a detonated device. If the device is a billet of high explosive, which contains no metal parts, there will be no recoverable residue following detonation.

Currently, no measures are taken to control residues except for a thorough cleanup following a detonation in order to remove metal fragments and to ensure that the device was completely detonated.

2.5 Steel Burn Cage

This subunit is used to burn combustible debris, such as, paper, wooden boxes, and cardboard, that is suspected of containing low levels of explosive residue but not enough to be designated as a hazardous waste. The residuals from this process are primarily ash and metal parts (e.g., hasps, hinges, rings, and similar material) that accumulate at a rate proportional to the quantity of debris burned. Historically, this residue has tested as non-hazardous waste with respect to reactivity and RCRA metals. It is the only subunit at T&S 5 that has not had any detectable levels of explosives found in the surrounding soils.

The ash and debris from this process is generally allowed to accumulate to a depth of approximately 1-2 feet on top of the concrete base inside the burn cage. At that point, the material is shoveled out and transferred to open-top drums for transport to an industrial waste landfill. Typically, the cage is cleaned out several times per calendar year.

3.0 Soil Sampling and Analysis Plan - OB/OD Treatment Subunits (T&S 5)

This section discusses the soil-sampling program for the OB/OD Treatment Area (T&S 5) used to monitor potential contamination resulting from treatment activities on site.

3.1 Sampling Parameters and Analysis Methods

Based on past data, the analytes of concern are limited to the following regulated metals: arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and explosive residues detected using EPA Method 8330 (Refer to Appendix G). Total metal analyses will be performed using EPA Methods 6010A, 7760A, and 7471A.

3.2 Sampling Locations

Composite soil samples will be collected from the areas immediately surrounding the treatment subunits located at the OB/OD Treatment Area. Figure 1 shows the general location for each of these composite soil samples. For each sampling event, a report interpreting the sampling results along with the analytical reports will be submitted to the MPCA. Three (3) composite samples are collected from each subunit location as follows and as shown on Figure 1:

1) Concrete Culvert Pad (now inactive)
2) Evaporation Pans
3) Propellant Burn Pads
4) Steel Burn Boxes
5) Detonation Pit
6) Steel Burn Cage

Thus, a total of 18 composite soil samples will be collected and submitted for analysis.

Each composite sample will be derived from 3-4 individual samples collected at a depth of 0-6 inches from the areas shown in Figure 1 around each subunit. In the case of the detonation pit one composite sample will be collected from within the pit itself and two samples from around its circumference. The purpose of using composite samples rather than discrete samples is to allow for a greater area to be characterized and to provide a more representative sample of the soils surrounding the various subunits.

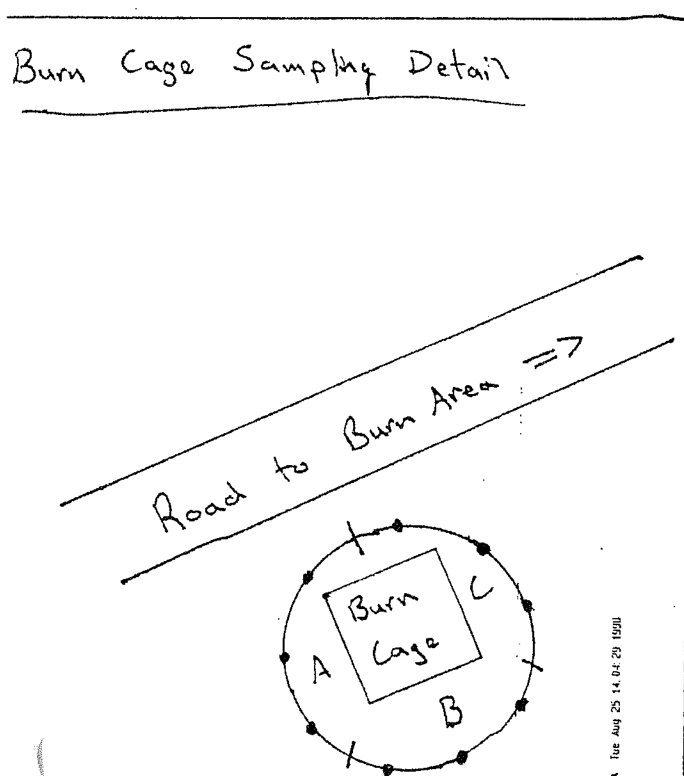
3.3 Sampling Frequency

Based on the considerable baseline generated from fifteen (15) years' of annual sampling from 1995 through 2009 without significant increase of heavy metals or explosive compounds in the soils, sampling now will be conducted once every three (3) calendar years with the next sampling event scheduled for 2012. If sampling is required during a period when the ground is frozen it will be rescheduled to occur within sixty (60) days after the soils have thawed even if that requires that sampling occur during the next calendar year.

Legend

Composite Sample Coverage (A, B, & C)

Individual Sample Location (approx.) for composite samples



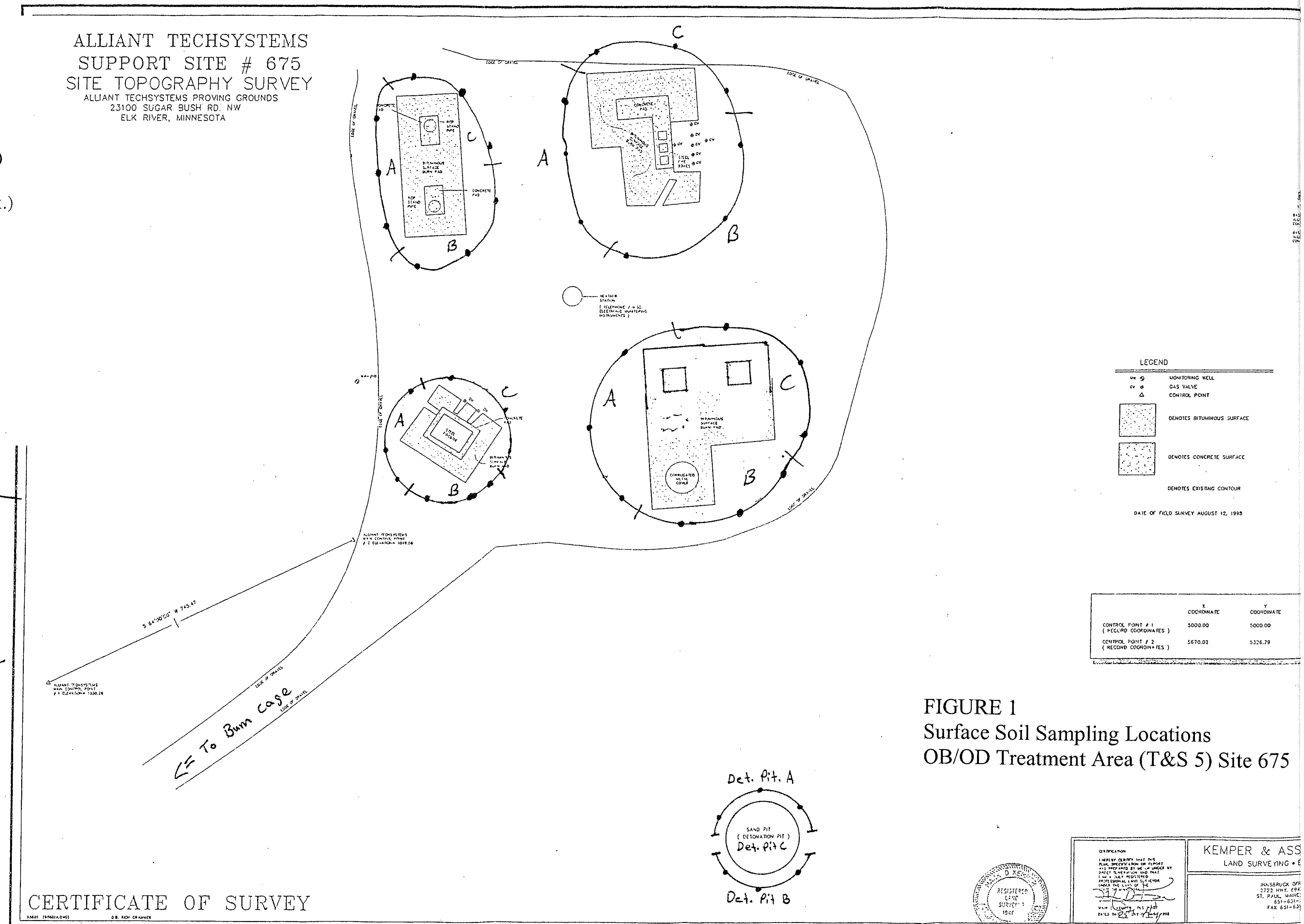


FIGURE 1
Surface Soil Sampling Locations
OB/OD Treatment Area (T&S 5) Site 675