

RCRA PART B PERMIT  
APPLICATION

NEVADA NATIONAL SECURITY  
SITE (NNSS)

FOR WASTE MANAGEMENT  
ACTIVITIES AT THE NNSS  
EXPLOSIVE ORDNANCE  
DISPOSAL UNIT (EODU)

OCTOBER 2015

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the U.S. Government or any agency thereof.

## Table of Contents

B.1	Explosive Ordnance Disposal Unit (EODU) Permit Application [40 CFR 270.14(b)(1)].....	1
B.1.a	EODU General Description [40 CFR 270.14(b)(1)] .....	1
B.1.b	NNSS General Facility Description.....	1
B.1.c	RCRA Permit Application History .....	13
B.1.d	Summary of RCRA Operational Units .....	13
B.1.e	General Dimensions and Structural Description.....	14
B.2	Chemical and Physical Analysis [40 CFR 270.14(b)(2)].....	15
B.3	Waste Analysis Plan [40 CFR 270.14(b)(3)].....	17
B.3.a	Physical and Chemical Characteristics .....	17
B.3.b	Acceptable Knowledge .....	17
B.3.c	Ignitable, Reactive, or Incompatible Wastes [40 CFR 264.17].....	18
B.4	Security [40 CFR 270.14(b)(4)].....	23
B.4.a	NNSS Access .....	23
B.4.b	EODU Access .....	23
B.5	General Inspection Schedule [40 CFR 270.14(b)(5)] .....	25
B.5.a	Remedial Action .....	25
B.6	Preparedness and Prevention [40 CFR 270.14(b)(6)].....	29
B.7	Contingency Plan [40 CFR 270.14(b)(7)] .....	31
B.8	EODU Procedures to Prevent Hazards [40 CFR 270.14(b)(8)].....	35
B.8.a	Operational Hazards .....	35
B.8.b	Waste Handling Areas Surface Water Run-On and Runoff.....	36
B.8.c	Contamination of Water Supplies.....	36
B.8.d	Equipment Failure and Effects of Power Outages.....	36
B.8.e	Undue Exposure of Personnel at the EODU .....	37
B.8.f	Releases to the Atmosphere .....	37
B.9	EODU Prevention of Reaction of Ignitable, Reactive, and Incompatible Hazardous Waste [40 CFR 270.14(b)(9)] .....	39
B.10	Traffic [40 CFR 270.14(b)(10)].....	41
B.11	Facility Location [40 CFR 270.14(b)(11)].....	43
B.11.a	Seismic Standard .....	43
B.11.b	Flood Hazard.....	43
B.12	Training Program [40 CFR 270.14(b)(12)].....	45
B.12.a	EODU Training Program .....	45
B.12.b	EODU Personnel.....	45
B.12.c	Visitors.....	45
B.12.d	Training Program Implementation .....	46
B.12.e	Course Descriptions .....	47

## Table of Contents (continued)

B.13	Closure and Post-Closure Care Plan [40 CFR 270.14(b)(13)] .....	49
B.13.a	Description of Closure [40 CFR 264.112(b)(4)] .....	49
B.13.a.1	EODU Firing Pad .....	49
B.13.a.2	EODU Storage Magazine .....	49
B.13.b	Closure Performance Standard [40 CFR 264.111].....	49
B.13.c	Closure Plan Implementation .....	50
B.13.c.1	Pre-Closure Activities .....	50
B.13.c.2	Removal of Debris .....	50
B.13.c.3	Site Investigation .....	50
B.13.c.4	Soil Removal and Decontamination.....	50
B.13.d	Closure Schedule .....	51
B.13.d.1	Notification of Closure.....	51
B.13.d.2	Time Allowed for Closure.....	51
B.13.d.3	Certification of Closure .....	51
B.13.e	Amendment to Closure Plan.....	51
B.14	Post-Closure Notices [40 CFR 270.14(b)(14)].....	53
B.15	Closure Cost Estimate [40 CFR 270.14(b)(15)].....	55
B.16	Post-Closure Cost Estimate [40 CFR 270.14(b)(16)] .....	57
B.17	Liability Requirements [40 CFR 270.14(b)(17)] .....	59
B.19	Topographic Map [40 CFR 270.14(b)(19)].....	61
B.19.a	Land Use .....	61
B.19.b	Well Locations .....	61
B.19.c	Wind Rose .....	69
B.19.d	Utility Characteristics .....	69
B.20	Additional Information [40 CFR 270.14(b)(20)].....	71
B.20.a	Operations.....	71
B.20.a.1	Operating Record [40 CFR 264.73] .....	71
B.20.a.2	Unit Description [40 CFR 270.23(a)(1) and (2)].....	71
B.20.b	Standard Detonation Procedures .....	72
B.20.b.1	Set Up Treatment Operations.....	72
B.20.b.2	Prepare Shock Tube and Shock Tube Detonators .....	73
B.20.b.3	Initiating the Shot Using the RFD .....	73
B.20.b.4	Performing Post-Shot Inspections .....	74
B.20.b.5	Performing Misfire Procedures .....	74
B.20.b.6	Replacing the Explosive Charge after an Explosive Charge Failure.....	74
B.20.b.7	Concluding EODU Disposal Operations – End of Day .....	75
B.20.b.8	Remote Firing Device .....	75
B.20.c	Live Explosives Training.....	75
B.20.d	Transportation .....	76
B.20.e	Waste Storage.....	76
B.20.f	Surface Water Run-On and Runoff Control.....	77
B.20.g	Environmental Performance Standards [40 CFR 270.23(b)(c)].....	77

## Table of Contents (continued)

B.20.g.1	Protection of Groundwater and Subsurface Environment – Hydrogeologic Assessment [40 CFR 270.23(b)(c)] .....	78
B.20.g.2	Protection of Surface Water, Wetlands, and Soil Surface .....	79
B.20.g.3	Air Quality .....	79
B.20.h	Environmental Risk Assessment .....	80
B.20.i	Site Characterization .....	80
B.20.i.1	Air Modeling Plan.....	81
B.20.i.2	Sampling Plan to Characterize Existing Soil Conditions.....	81
B.20.j	Other Federal Laws [40 CFR 270.3].....	83
B.20.k	Exposure Information Report [40 CFR 270.10(j)].....	84
B.20.l	Compliance Schedule [40 CFR 270.33].....	84
C.1	EODU Groundwater Protection [40 CFR 270.14(c)].....	87
D.1	Characterize Solid Waste Management Units (SWMUs) [40 CFR 270.14(d)].....	89

## List of Figures

Figure 1.	General Location Map .....	5
Figure 2.	Topographic Features and Infrastructure .....	7
Figure 3.	NNSS Land Use Map .....	9
Figure 4.	Explosive Ordnance Disposal Unit Aerial View .....	11
Figure 5.	View of the Storage Area from the Detonation Pit.....	62
Figure 6.	View of Storage Area .....	63
Figure 7.	EODU Firing Point.....	64
Figure 8.	Topographic Features .....	65
Figure 9.	Topographic Features .....	67
Figure 10.	Wind Rose Diagram for the RWMC Meteorology Station.....	69

## List of Tables

Table 1.	Metric Conversion Factors .....	3
Table 2.	List of Existing Permits .....	4
Table 3.	Operational Unit Locations and Regulatory Statuses.....	13
Table 4.	General Information – Area 11 EODU.....	15
Table 5.	Explosives That May be Treated as D003 Wastes at the EODU .....	18
Table 6.	Area 11 EODU Inspection Schedule .....	25
Table 7.	EODU Training Matrix .....	46
Table 8.	Area 11 EODU Closure Activity Schedule.....	51
Table 9.	Area 11 EODU Site Characterization Analytical Methods Rationale.....	82

## List of Exhibits

EXHIBIT 1.	EXAMPLE SAFETY DATA SHEETS.....	21
EXHIBIT 2.	EXAMPLE AREA 11 EODU WEEKLY/MONTHLY INSPECTION CHECKLIST AND SATELLITE ACCUMULATION STORAGE AREA CHECKLIST.....	27
EXHIBIT 3.	EMERGENCY RESPONSE PROCEDURE FOR AREA 11 EXPLOSIVE ORDNANCE DISPOSAL UNIT.....	33
EXHIBIT 4.	2015 SOIL CHARACTERIZATION REPORT FOR THE AREA 11 EXPLOSIVE ORDNANCE DISPOSAL UNIT, NEVADA NATIONAL SECURITY SITE, NEVADA.....	85

## Acronyms

ac	acre(s)
AQCR	Air Quality Control Region
BLM	Bureau of Land Management
BTN	1, 2, 4-butanetriol, trinitrate
CFR	Code of Federal Regulations
cm	centimeter(s)
DATB	1, 3-diamino-2, 4, 6-trinitrobenzene
DEGN	diethylene glycol, dinitrate
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EDDN	ethylenediamine dinitrate
EODU	Explosive Ordnance Disposal Unit
EPA	U.S. Environmental Protection Agency
ERP	Emergency Response Procedure
FFACO	<i>Federal Facility Agreement and Consent Order</i>
FM	Facility Manager
ft	foot (feet)
ft <sup>3</sup>	cubic foot (feet)
gal	gallon(s)
ha	hectare(s)
HHF	High Hazard Facility
HMX	cyclotetramethylene-tetranitramine
HNAB	hexanitroazobenzene
HNS	hexanitrostilbene
HWSU	Hazardous Waste Storage Unit
in.	inch(es)
kg	kilogram(s)
kg/hr	kilogram(s) per hour
km	kilometer(s)
km <sup>2</sup>	square kilometer(s)
L	liter(s)
lb	pound(s)
lb/hr	pound(s) per hour
LLMW	low-level mixed waste
m	meter(s)

## Acronyms (continued)

m <sup>3</sup>	cubic meter(s)
mi	mile(s)
mi <sup>2</sup>	square mile(s)
MWUD	Mixed Waste Disposal Unit
MWSU	Mixed Waste Storage Unit
NDEP	Nevada Division of Environmental Protection
NNSA/NFO	National Nuclear Security Administration Nevada Field Office
NNSS	Nevada National Security Site
NSTec	National Security Technologies, LLC
NTTR	Nevada Test and Training Range
OB	open burn
OBODM	Open Burn/Open Detonation Dispersion Model
OD	open detonation
OCC	Operations Command Center
PETN	pentaerythritol tetranitrate
PLO	Public Land Order
PM <sub>10</sub>	particulate matter (10 microns or less)
RCRA	<i>Resource Conservation and Recovery Act</i>
RDX	cyclotrimethylenetrinitramine
RFD	Remote Firing Device
RWMC	Radioactive Waste Management Complex
RWMS	Radioactive Waste Management Site
SAA	satellite accumulation area
SDS	Safety Data Sheet
SWMU	Solid Waste Management Unit
TATB	triaminotrinitrobenzene
TCLP	Toxicity Characterization Leaching Procedure
TEGN	triethylene glycol, dinitrate
TMETN	metriol tribitrate
TNT	trinitrotoluene
TPH	total petroleum hydrocarbons
TSP	total suspended particulate
UR	use restriction
UXO	unexploded ordnance
yd <sup>3</sup>	cubic yard(s)



## **B.1 Explosive Ordnance Disposal Unit (EODU) Permit Application [40 CFR 270.14(b)(1)]**

The Area 11 Explosive Ordnance Disposal Unit (EODU) is a miscellaneous unit regulated by **Title 40 Code of Federal Regulation (CFR) Part 264, Subpart X**.

### **B.1.a EODU General Description [40 CFR 270.14(b)(1)]**

The EODU, located on the Nevada National Security Site (NNSS), is an explosive detonation unit for the treatment of onsite-generated waste explosives and unexploded ordnance, which are hazardous wastes as defined under **40 CFR 261.23(a)(6)(7) and (8)**; and **265.382**. Additionally, live explosives training is conducted to ensure proficiency of the EODU operations personnel, explosives handlers, and the firing system components. Training detonations do not include waste explosives and are limited in respect to explosives volume and frequency (see Section B.20).

The controlled area containing the unit includes approximately 8.1 hectares (ha) (20 acres [ac]) of land located in the Massachusetts Mountains between Frenchman Flat and Yucca Flat, with three graded areas. Only one of these graded areas is used for the treatment of waste explosives and unexploded ordnance. The Area 11 EODU consists of a firing point (controlled access area where firing of explosives is conducted), firing pad (prepares site where explosives hazardous waste is fired), and ancillary equipment that includes an explosives magazine and firing point area. No buildings or structures are located at the EODU.

The magazine contains a satellite accumulation area (SAA) for the accumulation of waste explosives. When waste is present, this magazine is operated in compliance with the SAA requirements of **40 CFR 262.34**. The firing point is located approximately 1,423 meters (m) (4,670 feet [ft]) from the firing pad along the 6-03 Road.

The unit is owned by the U.S. Department of Energy, National Nuclear Security Administration Nevada Field Office (NNSA/NFO) and operated by National Security Technologies, LLC (NSTec).

### **B.1.b NNSS General Facility Description**

The NNSS is an NNSA/NFO installation comprising approximately 3,561 square kilometers (km<sup>2</sup>) (1,375 square miles [mi<sup>2</sup>]) of federally owned land located in southeastern Nye County, Nevada. Located approximately 105 kilometers (km) (65 miles [mi]) northwest of Las Vegas, Nevada, the NNSS is accessed from U.S. Highway 95, which roughly forms the southern boundary of the site. The site is bordered to the west, north, and east by the Nevada Test and Training Range (NTTR), another government-owned, restricted-access area. Public land to the south of the NNSS is managed by the Bureau of Land Management (BLM). Land in the surrounding area is predominantly rural, undeveloped public desert lands used for grazing and agriculture. The NNSS is well buffered from public access. The greater Las Vegas area is the closest major population center to the NNSS. Smaller, rural communities near the NNSS include Amargosa Valley and Pahrump.

The NNSS varies in distance from 46 to 57 km (28 to 35 mi) in the east/west direction and from 65 to 90 km (40 to 55 mi) in the north/south direction. Elevation varies from approximately 915 to 2,345 m (3,000 to 7,700 ft) above sea level. The terrain of the NNSS is characteristic of the Basin and Range Physiographic Province in Nevada, Arizona, and Utah, which is a province

of intervening valleys and ranges, all nearly parallel. There are numerous north to northeast trending mountain ranges separated by gently sloping linear valleys and broad flat basins. The principal valleys within the NNSS are Frenchman Flat, Yucca Flat, and Jackass Flats, with the principal highlands consisting of Pahute Mesa, Rainier Mesa, Timber Mountain, and Shoshone Mountain. Generally, large portions of the NNSS are within one or two elevation ranges from approximately 915 to 1,220 m (3,000 to 4,000 ft) in the valleys to the south and east to 1,675 to 2,225 m (5,500 to 7,300 ft) in the high country toward the northern and western boundaries.

Mercury, the base camp at the NNSS, is located in the southeast corner of the site, approximately 6.5 km (4.0 mi) north of U.S. Highway 95. Mercury has administrative and maintenance structures that currently support a working population of approximately 1,000 workers and a residential capacity of approximately 350. NNSS areas outside of Mercury were used for many activities. In Area 5, the Frenchman Flat vicinity was designated for atmospheric testing, hazardous materials spill testing, underground nuclear testing, and radioactive waste management. Yucca Flat and Rainier Mesa were both used for underground nuclear tests, and Yucca Flat was used for atmospheric nuclear tests. The Pahute Mesa vicinity was used for higher-yield underground nuclear tests.

Historically, the primary mission of the NNSS was to conduct nuclear weapons tests. Since the moratorium on nuclear weapons testing began in October 1992, this mission has changed to maintaining readiness to conduct these tests, if so directed. Because of its favorable environment and infrastructure, the NNSS supports national security-related research, development, and testing programs, as well as waste management activities.

Numerous government and/or research organizations use the NNSS for a variety of research activities and/or programs because of its specialized facilities, favorable climate, remote location, and controlled access. The research and testing activities comprising these programs are directly supported by NNSA/NFO.

NSTec, the Management and Operations Contractor, provides a number of services including designing and operating the functioning hazardous waste management units at the NNSS. The contractor also provides onsite medical services and operates the NNSS Fire and Rescue Department. Additionally, NNSA/NFO maintains separate contracts for 24-hour security services (armed patrol and access control), while the Nye County Sheriff's Office provides law enforcement support on the NNSS.

In addition to *Resource Conservation and Recovery Act* (RCRA) requirements, the EODU is subject to U.S. Department of Energy (DOE) Orders and other applicable federal and state regulations.

Table 1 provides the metric conversion factors used in this application. Table 2 provides a list of existing permits.

Figure 1 is a general location map of the NNSS showing permitted unit locations; Figure 2 is a topographic features and infrastructure map; Figure 3 is a land use map of the NNSS; and Figure 4 is an aerial view of the EODU.

**Table 1. Metric Conversion Factors**

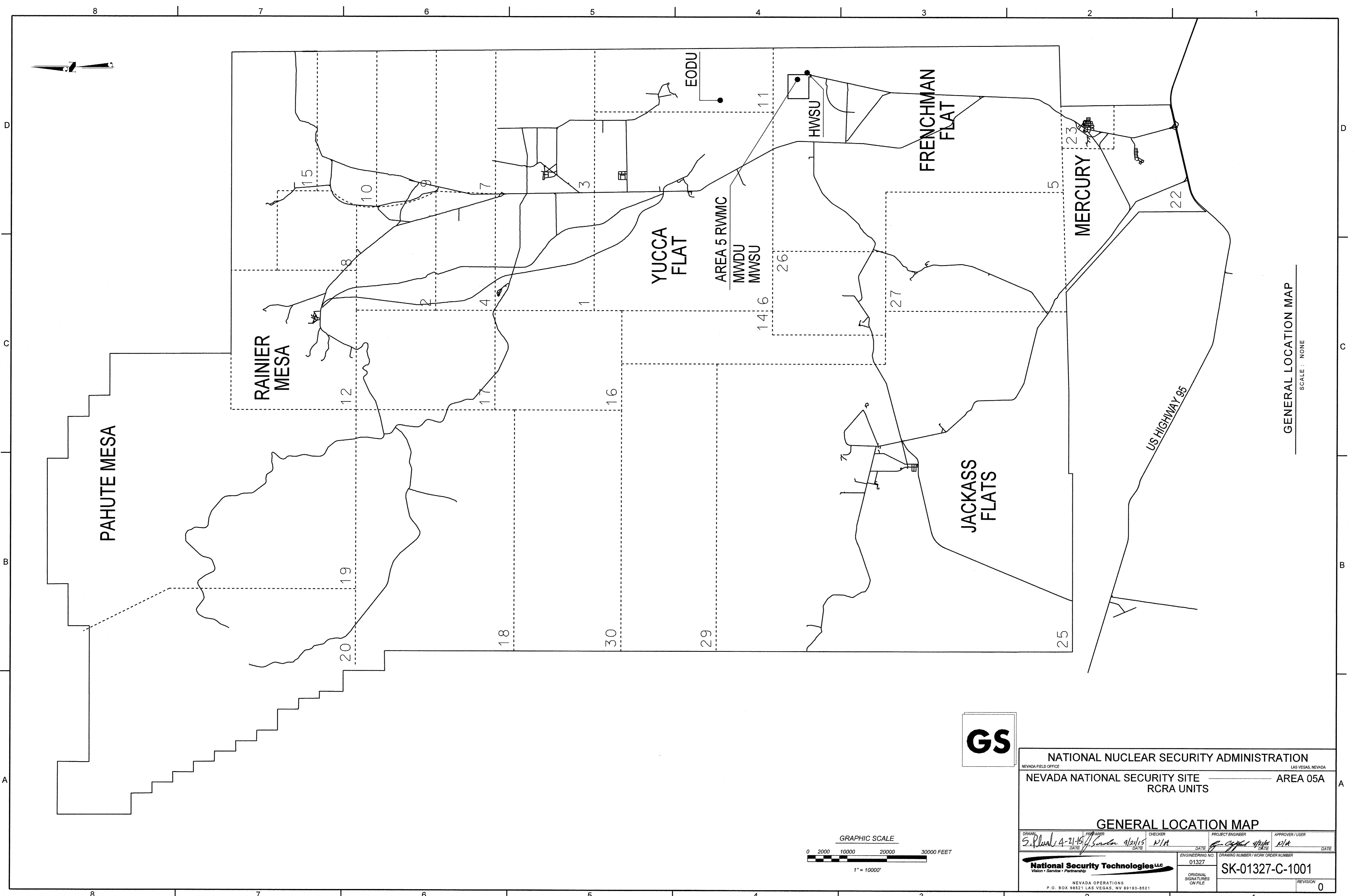
<b>Unit</b>	<b>Equals</b>
1 ha	2.471 ac
1 cm	0.394 in.
1 kg	2.205 lb
1 L	0.264 gal
1 m	3.281 ft
1 m <sup>3</sup>	35.32 ft <sup>3</sup>
1 m <sup>3</sup>	1.308 yd <sup>3</sup>
1 km	0.621 mi
1 km <sup>2</sup>	0.386 mi <sup>2</sup>
1 metric ton	1.102 short tons
The actual value (or real value), which is in metric units, is converted to the corresponding value in English units using the conversion factors listed above. The converted value is then rounded in the following manner.	
<b>Numerical Range</b>	<b>Rounded to the Nearest...</b>
0–10	0.10
10–100	1
100–5,000	5
5,000–10,000	10
10,000–500,000	100
500,000–1,000,000	1,000
>1,000,000	10,000

**Table 2. List of Existing Permits**

<b>Number</b>	<b>Type, Area, Location</b>
NY-1054	Septic System, Area 3, Waste Management Office
NY-1069	Septic System, Area 18, 820th Red Horse Squadron
NY-1077	Septic System, Area 27, Baker Compound
NY-1106	Septic System, Area 5, Building 5-8
NY-1079	Septic System, Area 12 (U12g Tunnel)
NY-1080	Septic System, Area 23, Building 1103
NY-1081	Septic System, Area 6, CP-170
NY-1082	Septic System, Area 22, Building 22-1
NY-1083	Septic System, Area 5, Radioactive Material Management Site (RWMS)
NY-1084	Septic System, Area 6, Device Assembly Facility
NY-1085	Septic System, Area 25, Central Support Area
NY-1086	Septic System, Area 25, Reactor Control Point
NY-1087	Septic System, Area 27, Able Compound
NY-1089	Septic System, Area 12 Camp
NY-1090	Septic System, Area 6, LANL Construction Campsite
NY-1091	Septic System, Area 23, Gate 100
NY-1103	Septic System, Area 22, Desert Rock Airport
NY-1110-HAA-A	Individual Sewage Disposal System, A-12, Bldg. 12-910
NY-1112	Commercial Sewage Disposal System, U1a, Area 1
NY-1113	Commercial Sewage Disposal System, Area 1, Building 121
NY-1124	Commercial Individual Sewage Disposal System, Area 6
NY-1128	Area 6 Yucca Lake Project
NY-1130	Commercial Individual Sewage Disposal System, Area 6, Fire Station #2
NY-17-06839	Septic Tank Pumping Contractor (5 units)
GNEV93001	Water Pollution Control General Permit
NEV96021	Water Pollution Control for E-Tunnel Waste Water Disposal System and Monitoring Well ER-12-1
31297	NNSS Hazardous Materials Permit
31304	Nonproliferation Test and Evaluation Complex Hazardous Materials Permit
NEV HW0101	NNSS Hazardous Waste Management Permit (RCRA)
AP9711-2557	NNSS Class II Air Quality Operating Permit
AP9711-2659	UGTA Surface Area Disturbance Permit ER-EC-13 and ER-EC-15
AP9711-2824	UGTA Surface Area Disturbance Permit ER-EC-14
NY-0360-12NTNC	Public Water System Area 23 and Area 6
NY-4098-12TNCWS	Public Water System Area 25
NY-4099-12TNCWS	Public Water System Area 12
NY-0835-12NP	NNSS (Water Hauler) #84846
NY-0836-12NP	NNSS (Water Hauler) #84847
SW 532	Area 5 Asbestiform Low-Level Solid Waste Disposal Site
SW 13 097 02	Area 6 Hydrocarbon Disposal Site
SW 13 097 03	Area 9 U10c Solid Waste Disposal Site
SW 13 097 04	Area 23 Solid Waste Disposal Site
UNEV2012203	NNSS Underground Injection Control Permit

**Figure 1. General Location Map**

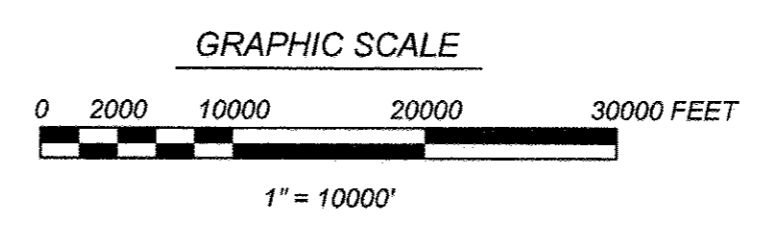
Page Intentionally Left Blank



GENERAL LOCATION MAP  
SCALE: NONE



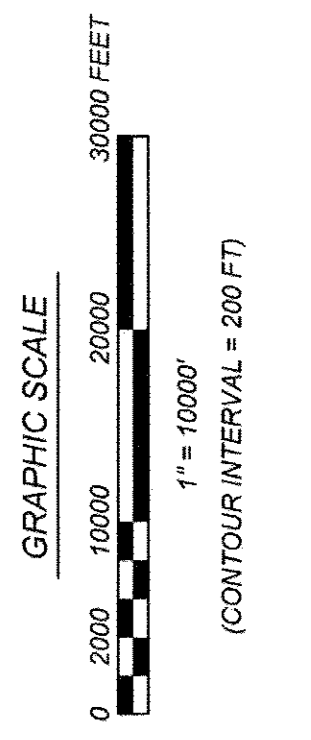
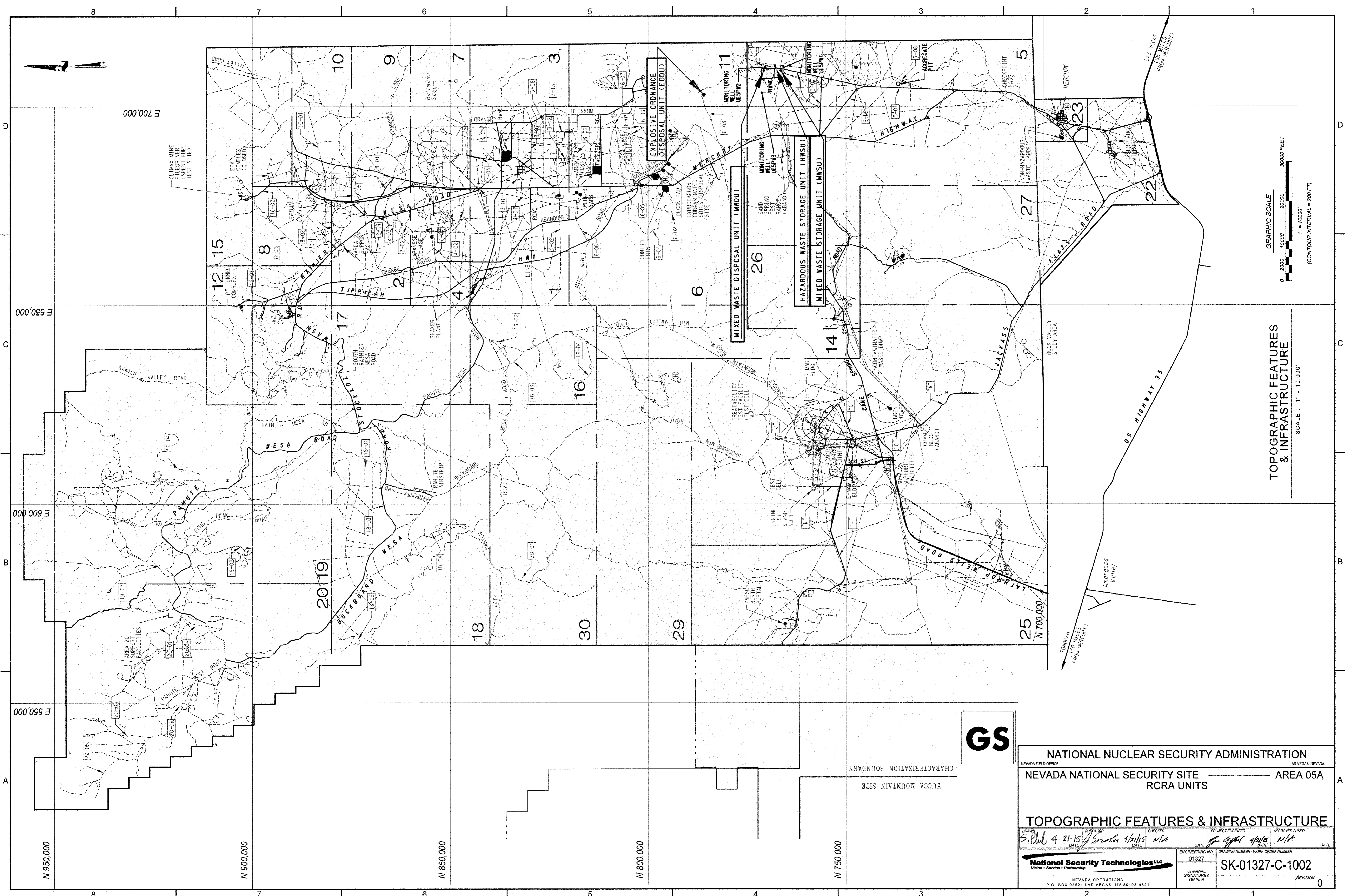
<b>NATIONAL NUCLEAR SECURITY ADMINISTRATION</b> <small>NEVADA FIELD OFFICE LAS VEGAS, NEVADA</small>			
<b>NEVADA NATIONAL SECURITY SITE</b>		<b>AREA 05A</b>	
<b>RCRA UNITS</b>			
<b>GENERAL LOCATION MAP</b>			
<small>DRAWN</small> <i>S. Plumb</i> 4-21-15 <small>DATE</small>	<small>PREPARED BY</small> <i>Carla</i> 9/21/15 <small>DATE</small>	<small>CHECKER</small> <i>N/A</i> <small>DATE</small>	<small>PROJECT ENGINEER</small> <i>[Signature]</i> 4/21/15 <small>DATE</small>
<small>APPROVER / USER</small> <i>N/A</i> <small>DATE</small>		<small>ENGINEERING NO.</small> 01327	
<small>ORIGINAL SIGNATURES ON FILE</small>		<small>DRAWING NUMBER / WORK ORDER NUMBER</small> <b>SK-01327-C-1001</b>	
<small>REVISION</small> 0		<small>NEVADA OPERATIONS</small> <small>P.O. BOX 98521 LAS VEGAS, NV 89193-8521</small>	



**Figure 2. Topographic Features and Infrastructure**



Page Intentionally Left Blank



**TOPOGRAPHIC FEATURES & INFRASTRUCTURE**  
SCALE: 1" = 10,000'



<b>NATIONAL NUCLEAR SECURITY ADMINISTRATION</b>			
NEVADA FIELD OFFICE		LAS VEGAS, NEVADA	
<b>NEVADA NATIONAL SECURITY SITE</b>		<b>AREA 05A</b>	
<b>RCRA UNITS</b>			
<b>TOPOGRAPHIC FEATURES &amp; INFRASTRUCTURE</b>			
DRAWN <i>S. Phib</i> DATE 4-21-15	PREPARED BY <i>Sandra Hallis</i> DATE N/A	CHECKER <i>N/A</i> DATE N/A	PROJECT ENGINEER <i>Scott Hallis</i> DATE N/A
APPROVER / USER <i>N/A</i> DATE N/A		DRAWING NUMBER / WORK ORDER NUMBER <b>SK-01327-C-1002</b>	
ENGINEERING NO. <b>01327</b>		ORIGINAL SIGNATURES ON FILE	
REVISION <b>0</b>		REVISION	

**National Security Technologies**  
Victory • Service • Partnership

NEVADA OPERATIONS  
P. O. BOX 98521 LAS VEGAS, NV 89193-8521

**Figure 3. NNSS Land Use Map**

**NOT AVAILABLE FOR PUBLIC VIEWING**

Page Intentionally Left Blank

**Figure 4. Explosive Ordnance Disposal Unit Aerial View**

**NOT AVAILABLE FOR PUBLIC VIEWING**

Page Intentionally Left Blank

### B.1.c RCRA Permit Application History

The Nevada Division of Environmental Protection (NDEP) issued a RCRA Part B Permit (Permit NEV HW0104) for this facility with an effective date of October 17, 2010. In April 2011, the EODU was incorporated into Revision 2 of Permit NEV HW0101, which kept its original effective date of December 2010. Permit NEV HW0101 was subsequently modified in 2013 as Revision 3. In addition to the requirements of RCRA, the EODU is also subject to DOE Orders and other applicable federal and state regulations. A description of the regulated waste codes accepted for treatment (controlled detonations) at the EODU is provided in Table 4.

### B.1.d Summary of RCRA Operational Units

Figure 1 and Table 3 provide the location of each RCRA operational unit on the NNSS and its regulatory status. Specific information for the Cell 18 Mixed Waste Disposal Unit (MWDU), the Area 11 EODU, the Area 5 Hazardous Waste Storage Unit (HWSU), and the Area 5 Mixed Waste Storage Unit (MWSU) can be found in the RCRA Part B Permit Application for each unit and the NDEP Permit for a Hazardous Waste Management Facility (NEV HW0101).

#### Cell 18 MWDU

Cell 18 MWDU is a fully compliant, RCRA-permitted landfill that disposes of onsite and offsite containerized low-level mixed waste (LLMW) from an approved DOE nexus. The permitted capacity of the unit is 25,485 cubic meters (m<sup>3</sup>) (33,300 cubic yards [yd<sup>3</sup>]).

#### EODU

The Area 11 EODU is a permitted thermal treatment unit for explosive waste treatment operations. The unit encompasses approximately 8.1 ha (20 ac) of land. A storage magazine is used to store explosive materials and serves as an SAA for waste explosives. The unit has an annual estimated capacity of 1,875 kilograms (kg) (4,130 pounds [lb]) of waste. The process design capacity of the EODU is 45 kilograms per hour (kg/hr) (100 pounds per hour [lb/hr]).

#### HWSU

The Area 5 HWSU is a permitted storage unit for hazardous non-radioactive waste generated on the NNSS. It is located immediately to the east of the Area 5 Radioactive Waste Management Complex (RWMC). The storage design capacity of the HWSU is approximately 61,600 liters (L) (16,300 gallons [gal]).

#### MWSU

The Area 5 MWSU is a permitted storage unit for onsite and offsite containerized LLMW from an approved DOE nexus. It is located within the Area 5 RWMC and uses existing facilities at the RWMC to store LLMW.

**Table 3. Operational Unit Locations and Regulatory Statuses**

Unit Name	Location	Regulatory Status	Permit	Effective Date
MWSU	Area 5 RWMC	Permitted	NEV HW0101	December 2010
Cell 18 MWDU	Area 5 RWMC	Permitted	NEV HW0101	December 2010
EODU	Area 11	Permitted	NEV HW0101	December 2010
HWSU	Area 5	Permitted	NEV HW0101	December 2010

### B.1.e General Dimensions and Structural Description

The EODU firing pad is located on a ridge top in the Massachusetts Mountains at an elevation of 1,335 m (4,380 ft). The 7.3-km (4.5-mi) access road from the Mercury Highway rises 250 m (820 ft), traversing an alluvial fan and its source drainage to the ridge top. The following elements described in **40 CFR 270.14(b)(19)** do not exist on or within 305 m (1,000 ft) of the EODU and require no further detail in Figure 8.

- Runoff system
- Storm, sanitary, or process sewer systems
- Buildings
- Injection or withdrawal wells
- Surface waters or intermittent streams
- Potable supply wells

The cleared firing pad is elevated from the surrounding terrain and bermed, thus preventing run-on during precipitation events. Runoff is also limited because the firing pad sits in an area surrounded by a berm. The firing pad is a rectangular area of land approximately 24 m (80 ft) by 11 m (35 ft).



## B.2 Chemical and Physical Analysis [40 CFR 270.14(b)(2)]

Past inventory of waste explosives detonated at the EODU consisted primarily of water-gel (pentaerythritol tetranitrate [PETN]) and slurry explosives. Other explosives included trinitrotoluene (TNT), cyclotrimethylenetrinitramine (RDX), small arms ammunition, solid rocket propellant, and black powder. Waste explosives are generated from construction operations, research projects for national laboratories, non-proliferation testing and evaluation projects supporting counter terrorism and homeland security, and other activities related to NNSS operations. Continuous mining machines used in tunneling have significantly reduced the use of water-gel and slurry explosives. Small arms ammunition, legacy explosives, and waste explosives from research and testing are more likely to be detonated at the EODU (Table 4).

**Table 4. General Information – Area 11 EODU**

Process Code	X01
Waste Codes	D001, D003, D034
Estimated Quantity	1,875 kg per year (4,130 lb per year)
Process Design	N/A
Capacity	45 kg/hr (100 lb/hr)

Page Intentionally Left Blank

## B.3 Waste Analysis Plan [40 CFR 270.14(b)(3)]

Explosives, explosive materials, and unexploded ordnance are declared waste explosives if they are damaged, are defective, have exceeded their shelf life, are the result of environmental restoration (legacy), or are discarded explosive material from research or testing projects.

### B.3.a Physical and Chemical Characteristics

Materials accumulated and detonated at the Area 11 EODU are hazardous by their explosive nature, as defined by **40 CFR 261.23(a)(6–8)** and **265.382**. This includes the explosive chemical groups consisting of primary explosives; aliphatic nitrate esters; nitroamines; nitro-aromatics; ammonium nitrate; and binary, tertiary, and quaternary explosives produced by commercial manufacturers. The chemical constituents of detonation materials that can be treated at the EODU are provided in Exhibit 1, Safety Data Sheets (SDSs).

### B.3.b Acceptable Knowledge

The hazards associated with explosives and the unique applications of different types of explosive materials at the NNSS require that the EODU Supervisor make waste determinations. The term “waste explosive” is defined in **40 CFR 265.382** or is a waste that exhibits the characteristics of reactivity as defined in **40 CFR 261.23(a)(6–8)**.

Generators of potential waste explosives are required to supply the EODU Supervisor with a description of the composition and hazardous characteristics of the waste material and a description of the products of detonation for this material. In most cases, this acceptable knowledge may be provided in the form of an SDS. In some cases, the EODU Supervisor will segregate explosives designated as “waste explosive” and reassign usable explosive material as “product” for other uses. The type and the quantity of waste explosive is recorded in the unit’s operating record, along with the SDS or written characterization. In addition to the SDS examples found in Exhibit 1, examples of reactive wastes that may be treated at the EODU include, but are not limited to, those explosives presented in Table 5.

The primary explosives contain materials that are easily detonated by simple ignition by means such as spark, flame, impact, and other primary heat sources of appropriate magnitude. Other ingredients are added to the primary explosive materials to enhance the desired property of ignition (such as percussion or spark). The resulting product, commonly called a primer, is usually attached to an initiating mechanism such as a pair of electrical leads or a fuse. In typical blasting devices, a booster (a small amount of secondary explosive material) is encased adjacent to the primer to produce a detonator or blasting cap. This secondary explosive material is less sensitive than the primary explosive material but is more energetic (the majority of the secondary explosive material is comprised of various combinations of carbon, hydrogen, nitrogen, and oxygen and chemically forms aliphatic nitrate esters, nitramines, nitroaromatics, and ammonium nitrates, or binary, ternary, or quaternary combinations of the above chemical forms). The booster (also adjacent to the main charge) produces sufficient energy to ensure detonation of the main charge. The main charge, also a secondary explosive, is usually less sensitive than the booster and produces the bulk of the desired explosive energy. Propellants also consist of many of the same secondary explosive ingredients that are specially formulated and mixed with other ingredients to produce the desired qualities. Other materials such as ammonium perchlorate, gunpowder, and various other oxidizers, fuels, stabilizers, and inhibitors are used in many of the propellants. A primer is usually present to initiate the igniters to ignite the propellant.

**Table 5. Explosives That May be Treated as D003 Wastes at the EODU**

<p><b>1. Primary Explosives</b>                  Lead azides                  Mercury fulminate                  Diazodinitrophenol                  Lead styphnate (normal)                  Tetracene                  Potassium dinitrobenzofuroxane                  Lead mononitroresorcinate</p>	<p><b>2. Aliphatic Nitrate Esters</b>                  BTN (1, 2, 4-butanetriol, trinitrate)                  DEGN (diethylene glycol, dinitrate)                  Nitrocellulose                  Nitroglycerin                  Nitrostarch                  PETN (pentaerythritol tetranitrate)                  TEGN (triethylene glycol, dinitrate)                  TMETN (metriol tribitrate)</p>
<p><b>3. Nitramines</b>                  HMX (octogen)                  RDX (cyclonite)                  EDDN (ethylenediamine dinitrate)                  Haleite                  Nitroguanidine                  Tetryl (tetraaitromethylamulene)</p>	<p><b>4. Nitroaromatics</b>                  Ammonium picrate                  DATB (1, 3-diamino-2, 4, 6-trinitrobenzene)                  HNAB (hexanitroazobenzene)                  HNS (hexanitrostilbene)                  TATB (triaminotrinitrobenzene)                  TNT (trinitrotoluene)</p>
<p><b>5. Ammonium Nitrate</b></p>	<p><b>6. Propellants</b></p>
<p><b>7.</b> Binary, ternary, and quaternary combinations of the above materials including but not limited to such items as Composition A, B, C, and D formulations and various formulations of Ednatols, Octols, Pentolites, Picratols, Tetrytols, Tritonals, Amatexes, HBXs, HTAs, Minols, Amatols, Torpexes, Ammonals, and LXs.</p>	<p><b>8.</b> Any other commercially manufactured explosive, as defined in 40 CFR 265.382 that is declared a waste.</p>

Waste pyrotechnic devices such as ammunition tracers, fumers, delays, fuses, igniters, initiators, flares, smoke generators, and smoke pots are also energetic reactive wastes that may be treated at the Area 11 EODU. Many of these wastes have a primary explosive material associated with the ignition of the pyrotechnic material.

The most common explosives and explosive-related materials used at the NNSS that may become D003 wastes include cutting tape, shaped charges, composition C4, detonating cord, squibs, blasting caps (electric and nonelectric), igniters, and small arms ammunition. D001 wastes could include gun powder (smokeless and black), water-gel blasting products, boosters, ammonium nitrate, ammonium perchlorate, and fuse materials. D034 wastes are typically related to smoke generators and smoke pots.

Any of these explosives and/or materials may contain plasticizers, fuels, oxidizers, retardants, burn inhibitors, binding agents, waterproofing agents, dyes, or color intensifiers.

### **B.3.c Ignitable, Reactive, or Incompatible Wastes [40 CFR 264.17]**

Precautions to prevent accidental ignition, reaction, and incompatibility include the following:

- Ignition sources are not permitted beyond the lower gate.
- Vehicle/handheld radios and cell phones are turned OFF at the lower gate. The EODU Supervisor is exempt from this requirement in order to maintain emergency communications.

- Explosives/reactive wastes accumulated at the EODU remain in the original packaging when appropriate or in containers approved by the U.S. Department of Transportation (DOT) that are compatible with the waste.
- Accumulation containers remain closed except when adding more waste or transferring waste to the detonation area.
- Accumulated waste is locked in the explosives magazine.
- The DOE Standard Explosives Safety (DOE-STD-1212) or successor document is used to determine compatibility requirements for waste explosives.
- Reactive wastes are segregated and containerized during accumulation.
- The common waste explosives detonated at the EODU are not of the type that produce flammable fumes or gases, or uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health or the environment.
- Waste explosives that are heat sensitive may be accumulated in a more controlled environment and only brought to the EODU for detonation.

Page Intentionally Left Blank

## **EXHIBIT 1. EXAMPLE SAFETY DATA SHEETS**

Page Intentionally Left Blank





# MATERIAL SAFETY DATA SHEET

Olin MSDS No.: 00050.001  
Revision No.: 11

Revision Date: 1/1/06  
Supercedes: 8/10/05

## 1. PRODUCT AND COMPANY IDENTIFICATION

**Product Name:** CENTERFIRE LOADED ROUNDS

**Chemical Name:** Mixture – Metal Alloy

**Synonyms:**

Super-X Centerfire Rifle: 218 Bee, 22 Hornet, 22-250 Remington, 222 Remington, 223 Remington, 225 Winchester, 243 Winchester, 6mm Remington, 25-06 Remington 25-20 Winchester, 25-35 Winchester, 250 Savage, 257 Roberts + P, 264 Winchester Mag., 270 Winchester, 284 Winchester, 7mm Mauser (7 x 57), 7mm Remington Mag., 30 Carbine, 30-30 Winchester, 30-06 Springfield, 30-40 Krag, 300 Winchester Mag., 300 H & H Magnum, 300 Savage, 303 Savage, 303 British, 307 Winchester, 308 Winchester, 32 Win. Special, 32-20 Winchester, 8mm Mauser (8 x 57), 338 Winchester Mag., 35 Remington, 356 Winchester, 357 Magnum, 358 Winchester, 375 Winchester, 375 H & H Magnum, 38-40 Winchester, 38-55 Winchester, 44 Remington Magnum, 44-40 Winchester, 45-70 Government, 458 Winchester Mag, 280 Remington, Supreme 243 Winchester, Supreme 22-250 Remington, Supreme 270 Winchester, Supreme 280 Remington, Supreme 7mm Remington Magnum, Supreme 30-30 Winchester, Supreme 308 Winchester, Supreme 30-06 Springfield, Supreme 300 Winchester Magnum, 223 Remington 55 gr. Pointed Soft Point Varminator, 22-250 Remington, 55 gr. Pointed Soft Point Varminator, 22 Hornet, 46 gr. Hollowpoint, Varminator, 243 Winchester, 100 gr. Power Point, Varminator, 222 Remington, 50 gr. Pointed Soft Point, Varminator, 220 Swift, 55 gr. Pointed Soft Point Varminator, 25-06 Remington, 90 gr. Positive Expanding Point, Varminator, 454 Casull, 260 gr. Jacketed Flat Point, 454 Casull, 300 gr. Jacketed Flat Point, 30-06 Springfield, 150 gr. Fail Safe, 280 Remington, 140 gr. Fail Safe, 7MM Remington Magnum, 140 gr. Fail Safe, 220 Swift, 40 gr. Ballistic Silvertip, 22-250 Remington, 50 gr. Ballistic silver-tip, 222 Remington, 40 gr. Ballistic Silvertip, 223 Remington, 50 gr. Ballistic Silvertip, 243 Winchester, 55 gr. Ballistic Silvertip, 25-06 Remington, 115 gr. Ballistic Silvertip, 270 Winchester, 130 gr. Ballistic Silvertip, 280 Remington, 140 gr. Ballistic Silvertip, 7mm Remington Magnum, 150 gr. Ballistic Silvertip, 30-06 Springfield, 150 gr. Ballistic Silvertip, 30-06 Springfield, 168 gr. Ballistic Silvertip, 300 Winchester Magnum, 180 gr. Ballistic Silvertip, 308 Winchester, 150 gr. Ballistic Silvertip, 308 Winchester, 168 gr. Ballistic Silvertip, 338 Winchester Magnum, Cal .50 - Long Range Sniper.

Military Centerfire Rifle: 5.56mm Ball M193 55 gr. full metal jacket, 5.56mm Penetrator M855 62 gr. full metal jacket, 7.62mm NATO Ball M80 147 gr. full metal jacket, Caliber 50 Ball M33 650 gr. full metal jacket.

Super-X Centerfire Pistol/Revolver: 25 Automatic (6.35mm) Expanding Point and Full Metal Case; 30 Luger (7.65mm) Full Metal Case; 30 Carbine Hollow Soft Point and Full Metal Case; 32 Smith & Wesson Lead Round Nose and Long Lead Round Nose; 32 Short and Long Colt Lead Round Nose; 32 Automatic Silvertip Hollow Point and Full Metal Case; 38 Smith & Wesson Lead Round Nose, 380 Automatic Silvertip Hollow Point and Full Metal Case; 38 Special Silvertip Hollow Point, Lead Round Nose, Lead Semi-Wad Cutter, Metal Point, Silvertip Hollow Point + P, Jacketed Hollow Point + P, Lead Hollow Point + P, Lead Semi-Wad Cutter + P, Match Lead Mid-Range Match; 9mm Luger(Parabellum): Full Metal Jacket Encapsulated, Full Metal Case, Silvertip Hollow Point; 38 Super Automatic Silvertip Hollow point + P, Full Metal Case + P; 357 Magnum Jacketed Hollow Point, Silvertip Hollow Point, Lead Semi-Wad Cutter, Jacketed Soft Point; 10mm Automatic Silvertip Hollow Point; 41 Remington Magnum Silvertip Hollow Point, Lead Semi-Wad Cutter, Jacketed Soft Point, Jacketed Hollow Point; 44 Smith & Wesson Special Silvertip Hollow Point, Hollow Soft Point; 44 Remington Magnum Silvertip Hollow Point, Hollow Soft Point, Lead Semi-Wad Cutter(Med. Vel. & Gas Check); 45 Automatic Silvertip Hollow Point + P, Full Metal Case, Super-Match Full Metal Case Semi-Wad Cutter; 45 Colt Silvertip Hollow Point, Lead Round Nose; 45 Winchester Magnum: Jacketed Soft Point, Full Metal Case; Black Talon; 40 Smith and Wesson: Silvertip Hollow Point, Full Metal Jacket Truncated Cone, Full Metal Jacket Encapsulated, Jacket Hollow Point, Full Metal Jacket, Supreme 357 Magnum 180 gr. Partition Bullet, Supreme 44 Magnum 250 gr. Partition Bullet, 180 gr. SXT, 165 gr. SXT; Ranger Talon, 40 Cal. 180 gr. JHP; Ranger Talon, 40 Cal. 165 gr. JHP; Ranger Talon, 45 Auto, 230 gr. JHP; Ranger Talon, 9mm, 147 gr. JHP, Winclean (BEB), Ranger Bonded Handgun Ammunition

**Chemical Family:**

Metal mixture

**Formula:**

Not applicable - mixture

**Product Use:**

Centerfire Rifle and Pistol Loaded Ammunition

<b>COMPANY ADDRESS</b>	MSDS Control Group	<b>TECHNICAL INFORMATION:</b>	<b>EMERGENCY TELEPHONE NUMBER:</b>
	Olin Brass and Winchester, Inc.		
	427 North Shamrock St.		
	East Alton, IL 62024-1197		
	<a href="http://www.winchester.com">www.winchester.com</a>	618-258-3507	1-888-2891-911

## 2. COMPOSITION / INFORMATION ON INGREDIENTS

CAS Number	Components	% By Weight	EINECS/ ELINCS #	EU Classification	
				Symbol	R-Phrase
7439-92-1	Lead	5 - 10	231-100-4	T, N*	R1-33-50/53-62
7440-50-8	Copper	30 - 55	231-159-6	None	None
7440-66-6	Zinc	5 - 15	231-175-3	F (as dust or powder)	R 15-17
9004-70-0	Nitrocellulose	10 - 20	Not listed	E*	R 2
55-63-0	Nitroglycerin	1 - 2	200-240-8	E, T+, N	R 3-26/27/28-33-51-53

\*This material is not listed in Annex 1 of Directive 88/379/EEC. Olin has classified the material according to the conventional method based upon information from similar materials.

OSHA REGULATORY STATUS: Explosive

## 3. HAZARDS IDENTIFICATION

### CAUTION!

EXPLOSIVE. KEEP AWAY FROM HEAT. DO NOT SUBJECT TO MECHANICAL SHOCK. PARTICLES FROM FIRING MAY BE HARMFUL IF INHALED. DO NOT TAKE INTERNALLY.

#### HAZARD RATINGS (for dust or fume)

Hazardous Materials Identification System (HMIS)

Degree of hazard (0 = low, 4 = extreme)

Health: 0

Flammability: 0

Physical Hazard:

Explosive: 2

National Fire Protection Association (NFPA)

Mixture. Not rated.

#### HUMAN THRESHOLD RESPONSE DATA

Odor Threshold:

Unknown

Irritation Threshold:

Unknown

Immediately Dangerous to Life or Health (IDLH) Value(s):

The IDLH for this product is not known. The IDLH for copper and lead is 100 mg/m<sup>3</sup>. The IDLH for nitroglycerin is 75 mg/m<sup>3</sup>.

#### POTENTIAL HEALTH EFFECTS

This product is composed of a finished metal alloy cartridge which contains the various components completely sealed within. Therefore, under normal handling of this product, no exposure to any harmful materials will occur.

When the ammunition is fired, a small amount of particles may be generated which may be slightly irritating to the eyes and the respiratory tract. The particles may contain trace amounts of these harmful substances:

**Lead:** Ingestion of large amounts of lead can cause abdominal pain, constipation, cramps, nausea and/or vomiting. Chronic exposure to lead can cause kidney damage, anemia, reproductive effects, developmental effects and permanent nervous system damage in humans including changes in cognitive function.

**Nitroglycerin:** Will produce dilation of blood vessels and drop in blood pressure which may affect the heart. It has also been shown to cause methemoglobinemia (cyanosis).

**Copper:** Inhalation of high concentrations of metallic copper dusts or fumes may cause nasal irritation and/or nausea, vomiting and stomach pain.

It is unlikely that the amount of particles that someone would be exposed to from firing a loaded round would be sufficient to cause any of these effects.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** There are no medical conditions known to be aggravated by exposure to this product in its solid form. Exposure to lead can aggravate anemia, cardiovascular and respiratory disease.

#### POTENTIAL ENVIRONMENTAL EFFECTS:

Product has not been tested for environmental properties. Lead shot has been shown to be toxic to aquatic species.

## 4. FIRST AID MEASURES

**EYE CONTACT:** Immediately flush out fume or particles with large amounts of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If eye irritation develops, call a physician at once.

**SKIN CONTACT:** Wash skin with plenty of soap and water.

**INHALATION:** If symptoms of lung irritation occur (coughing, wheezing or breathing difficulty), remove from exposure area to fresh air immediately. If breathing has stopped, perform artificial respiration. Keep affected person warm and at rest. Get medical attention.

**INGESTION:** If ingested, immediately call a physician.

## 5. FIRE FIGHTING MEASURES

PROPERTY	VALUE	PROPERTY	VALUE
Explosive	Yes	Flammable	Not applicable
Combustible	Not applicable	Pyrophoric	No
Flash Point (°C):	Not applicable	Burning Rate of Material:	Not applicable
Lower Explosive Limit:	Not applicable	Autoignition Temp.:	No data
Upper Explosive Limit:	Not applicable	Flammability Classification: (defined by 29 CFR 1910.1200)	Explosive

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** If fire reaches cargo, do not fight. Evacuate all person, including emergency responders from the area for 1500 feet (1/3 mile) in all directions.

**EXTINGUISHING MEDIA:** Flood area with water. If no water is available, carbon dioxide, dry chemical or earth may be used. If the fire reaches the cargo, withdraw and let fire burn.

**SPECIAL FIREFIGHTING PROCEDURES:** In case of fire, use normal fire fighting equipment. Protection concerns must also address the potential of the physical characteristic of this product as explosive.

## 6. ACCIDENTAL RELEASE MEASURES

**FOR ALL TRANSPORTATION ACCIDENTS, CALL CHEMTREC AT 800-424-9300.**

Spills of this material should be handled carefully. Do not subject materials to mechanical shock. A spill of this material will normally not require emergency response team capabilities. If, however, a large spill occurs, call 1-888-289-1911 for technical assistance.

## 7. HANDLING AND STORAGE

**HANDLING:** No special requirements

**STORAGE:** No special requirements

**Shelf Life Limitations:** Not known

**Incompatible Materials for Packaging:** None known

**Incompatible Materials for Storage or Transport:** Acids, Class A & B explosives, strong oxidizers, and caustics

**CONDITIONS TO AVOID:** Mechanical impact or shock and electrical discharge.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

CAS #	CHEMICAL NAME	ACGIH TLV	OSHA PEL	INTERNATIONAL OELS
7440-50-8	Copper	0.2 mg/m <sup>3</sup> (fume), 1 mg/m <sup>3</sup> (dusts and mists)	0.1 mg/m <sup>3</sup> (fume) 1 mg/m <sup>3</sup> (dusts and mists)	Austria, Belgium, Canada: 0.2 mg/m <sup>3</sup> (fumes), 1 mg/m <sup>3</sup> (dusts) Denmark: 1.0 mg/m <sup>3</sup> (dust and powder) Germany (MAK): 0.1 mg/m <sup>3</sup> (fume), 1 mg/m <sup>3</sup> (dusts and mists)
7439-92-1	Lead	0.05 mg/m <sup>3</sup>	0.05 mg/m <sup>3</sup>	Austria, Denmark, Germany, Sweden, Switzerland: 0.1 mg/m <sup>3</sup> Norway, Poland: 0.05 mg/m <sup>3</sup>
7440-66-6	Zinc	None established	None established	None established
9004-70-0	Nitrocellulose	None established	None established	None established
55-63-0	Nitroglycerin	0.05 ppm (0.46 mg/m <sup>3</sup> ) Skin	Ceiling – 0.2 ppm (2 mg/m <sup>3</sup> ) Skin	Denmark: 0.02 ppm (0.2 mg/m <sup>3</sup> ) Norway, Sweden: 0.03 ppm (0.3 mg/m <sup>3</sup> ) Austria, Belgium, Germany, The Netherlands, Poland, Switzerland: 0.05 ppm (0.47 mg/m <sup>3</sup> ), skin Finland, France: 0.1 ppm (0.9 mg/m <sup>3</sup> ), skin U.K.: 0.2 ppm (2 mg/m <sup>3</sup> ), skin

**ENGINEERING CONTROLS:** Local exhaust ventilation is recommended if significant dusting occurs or fumes are generated. Otherwise, use general exhaust ventilation. Use hearing protection.

**EYE / FACE PROTECTION:** Use safety glasses.

**SKIN PROTECTION:** Not normally needed

**RESPIRATORY PROTECTION:** Respiratory protection not normally needed.

**GENERAL HYGIENE:** Do not eat, drink, or smoke while using this product. Wash hands thoroughly after use.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

PROPERTY	VALUE	PROPERTY	VALUE
Appearance:	Cylindrical brass cartridge	Vapor Density (air = 1):	Not applicable
Odor:	None	Boiling Point (°F):	Not applicable
Molecular Weight:	Not applicable - Mixture	Melting point:	Not applicable
Physical State:	Solid	Specific gravity (g/cc):	Not applicable
pH:	Not applicable	Bulk Density:	Not applicable
Vapor Pressure (mm Hg):	Not applicable	Viscosity (cps):	Not applicable
Vapor Density:	Not applicable	Decomposition Temperature:	Not applicable
Solubility in Water (20 °C):	Insoluble	Evaporation Rate:	Not applicable
Volatiles, Percent by volume:	Not applicable	Octanol/water partition coefficient:	Not applicable

## 10. STABILITY AND REACTIVITY

### STABILITY:

Stable under normal temperatures and pressure.

### MATERIALS TO AVOID:

Acids, Class A & B explosives, strong oxidizers, and caustics

### HAZARDOUS DECOMPOSITION PRODUCTS:

Nitrogen oxides, carbon monoxide, lead oxides, carbon dioxide, lead dust/fume

### HAZARDOUS POLYMERIZATION:

Will not occur.

### OTHER:

**Cartridge may detonate if case is punctured or severely damaged.**

## 11. TOXICOLOGICAL INFORMATION

**POTENTIAL EXPOSURE ROUTES:** The physical nature of this product makes absorption from any route unlikely. A small amount of inhalable particles may be created when projectile is fired.

### ACUTE ANIMAL TOXICITY DATA:

For Product:		For Components				
		Copper	Lead	Nitrocellulose	Zinc	Nitroglycerin
Oral LD <sub>50</sub>	Not applicable for product	3.5 mg/kg (mouse, intraperitoneal)	No data	> 5 g/kg (rat)	No data	105 mg/kg (rat)
Dermal LD <sub>50</sub>	Not applicable for product	375 mg/kg (rabbit, subcutaneous)	No data	No data	No data	> 280 mg/kg (rabbit)
Inhalation LC <sub>50</sub>	Not applicable for product. Particles generated from firing may be slightly toxic.	No data	No data	No data	No data	No data
Irritation	Not a skin or eye irritant as a loaded round.	Respiratory irritant	Not irritating	No data	Eye irritant	Mild eye and skin irritant

### SUBCHRONIC/ CHRONIC TOXICITY:

Lead has caused blood, kidney and nervous system damage in laboratory animals. The International Agency for Research on Cancer (IARC) lists lead as possibly carcinogenic to humans, group 2B.

### CARCINOGENICITY:

### MUTAGENICITY:

This product is not known or reported to be mutagenic. Lead has been shown to be mutagenic in several *in vitro* assays.

### REPRODUCTIVE, TERATOGENICITY, OR DEVELOPMENTAL EFFECTS:

This product is not known or reported to cause reproductive or developmental effects. Lead has been shown to affect fetal development including birth defects and reduce male reproductive function in laboratory animals.

### NEUROLOGICAL EFFECTS:

This product is not known or reported to cause neurological effects. Lead has caused peripheral and central nervous system damage and behavioral effects in laboratory animals.

### INTERACTIONS WITH OTHER CHEMICALS WHICH ENHANCE TOXICITY:

None known or reported.

## 12. ECOLOGICAL INFORMATION

**ECOTOXICITY:** No data is available on this product. Individual constituents are as follows:

**Copper:** The toxicity of copper to aquatic organisms varies significantly not only with the species, but also with the physical and chemical characteristics of the water, such as its temperature, hardness, turbidity and carbon dioxide content. Copper concentration varying from 0.1 to 1.0 mg/l have been found by various investigators to be not toxic for most fish. However, concentrations of 0.015 to 3.0 mg/l have been reported as toxic, particularly in soft water to many kinds of fish, crustacea, mollusks, insects, and plankton.

**Lead:** LC 50 (48 hrs.) to bluegill (*Lepomis macrochirus*) is reported to be 2-5 mg/l. Lead is toxic to waterfowl.

Nitrocellulose: LC<sub>50</sub> > 1000 mg/l (fish, invertebrates, algae)

Nitroglycerin: Bluegill, 96 hour LC<sub>50</sub> = 1.228 mg/l (static)

Zinc: The following concentrations of zinc have been reported as lethal to fish:

Rainbow trout fingerlings: 0.13 mg/l, 12 – 24 hours

Bluegill sunfish: 6 hr TLM = 1.9 – 3.6 mg/l (soft water, 30°C)

Rainbow trout: 4 mg/l (hard water) 3 days

Sticklebacks: 1 mg/l (soft water) 24 hrs

The presence of copper appears to have a synergistic effect on the toxicity of zinc towards fish.

**MOBILITY:** Dissolved lead from degraded bullets may migrate through soil.

**PERSISTANCE/DEGRADABILITY:** Not biodegradable. Bullets may fragment and decompose in soil leading to accumulation of lead.

**BIOACCUMULATION:** No data

### 13. DISPOSAL CONSIDERATIONS

Care must be taken to prevent environmental contamination from the use of this material. The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes.

### 14. TRANSPORT INFORMATION

	U.S. DOT	RID/ADR	IMDG	IATA	IMO	Canada TDG
<b>PROPER SHIPPING NAME:</b>	Cartridges, small arms (other than blanks)					
<b>HAZARD CLASS:</b>	Explosive, 1.4S					
<b>UN NO.:</b>	UN 0012					
<b>PACKING GROUP:</b>	1.4 S					
<b>HAZARD LABEL/PLACARD:</b>	None required					
<b>REPORTABLE QUANTITY:</b>	Not applicable					
<b>SPECIAL COMMENTS:</b>	May be reclassified domestically as an ORM-D if packaged as a consumer commodity per 49 CFR 173.					

### 15. REGULATORY INFORMATION

#### US FEDERAL

<b>TSCA</b>	The components of this product are listed on the Toxic Substance Control Act inventory.					
<b>CERCLA:</b>	Copper, R.Q.= 5000 lbs.; Lead, R.Q. = 10 lbs.; Zinc, R.Q. = 1000 lbs.; Nitroglycerin, R.Q. = 10 lbs (No reporting is required if diameter of the pieces of metal is equal to or exceeds 100 micrometers (0.004 inches).					
<b>SARA 313:</b>	Copper, Lead and Lead compounds, Zinc (fume or dust), Nitroglycerin					
<b>SARA 313 Hazard Class:</b>	<u>Health:</u>	Acute - No Chronic - No	<u>Fire:</u> No	<u>Reactivity:</u> None	<u>Release of Pressure:</u> Yes	
<b>SARA 302 EHS List:</b>	None of the components of this product are listed.					

RQ = Reportable Quantity

#### STATE RIGHT-TO-KNOW STATUS

Component	*CA Prop. 65	New Jersey	Pennsylvania	Massachusetts	Michigan
Copper	Not listed	X	X	X	X
Lead	X	X	X	X	X
Zinc	Not listed	X	Not listed	X	X
Nitrocellulose	Not listed	X	X	X	Not listed
Nitroglycerin	Not listed	X	X	X	Not listed

\* "WARNING: This product contains detectable amounts of a chemical(s) known to the State of California to cause cancer and/or birth defects or other reproductive harm."

**EUROPEAN REGULATIONS****Hazard Classification**

Danger Symbol: E Explosive

Risk Phrases: R2 Risk of explosion by shock, friction, fire or other sources of ignition

Safety Phrases: S2 Keep out of reach of children.

German WGK Classification: Not known.

**CANADIAN REGULATIONS**

DSL LIST: The components of this product are on the DSL or are exempt from reporting under the New Substances Notification Regulations.

IDL: Lead, Copper

WHMIS: This product is not subject to WHMIS. It is regulated as a Class 6 Explosive in Canada.

**16. OTHER INFORMATION**

REVISIONS: Change to international format, revision of synonyms & composition, 1/1/03

PREPARED BY: Olin Corporation

OTHER: Additional information available from: [www.winchester.com](http://www.winchester.com)

**NOTICE:** THE INFORMATION IN THIS MSDS SHOULD BE PROVIDED TO ALL WHO WILL USE, HANDLE, STORE, TRANSPORT, OR OTHERWISE BE EXPOSED TO THIS PRODUCT. THIS INFORMATION HAS BEEN PREPARED FOR THE GUIDANCE OF PLANT ENGINEERING, OPERATIONS AND MANAGEMENT AND FOR PERSONS WORKING WITH OR HANDLING THIS PRODUCT. OLIN BELIEVES THIS INFORMATION TO BE RELIABLE AND CURRENT AS OF THE DATE OF PUBLICATION, BUT MAKES NO WARRANTY THAT IT IS.

SECURITY SIGNALS,INC -- M 60,IGNITER,FUSE -- 1375-00-691-1671

===== Product Identification =====

Product ID:M 60,IGNITER,FUSE

MSDS Date:09/01/1991

FSC:1375

NIIN:00-691-1671

MSDS Number: BPRJP

=== Responsible Party ===

Company Name:SECURITY SIGNALS,INC

Address:9509 MACON RD

City:CORDOVA

State:TN

ZIP:38018

Country:US

Info Phone Num:901-754-7228

Emergency Phone Num:901-754-7228

CAGE:13759

=== Contractor Identification ===

Company Name:SECURITY SIGNALS INC

Address:9509 MACON RD

Box:City:CORDOVA

State:TN

ZIP:38018-9746

Country:US

Phone:901-754-7228

CAGE:13759

===== Composition/Information on Ingredients =====

Ingred Name:PRIMER PERCUSSION M39.HAZ ING IN OLIN CENTER FIRE

PRIMER-SEE OLIN MSDS UNDER NSN 1375-00-691-1671,CAGE 99530,PART NUM

A.

Other REC Limits:NOT KNOWN

OSHA PEL:NOT KNOWN

ACGIH TLV:NOT KNOWN

===== Hazards Identification =====

LD50 LC50 Mixture:NOT KNOWN

Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO

Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO

Health Hazards Acute and Chronic:SEE SIGNS AND SYMPTOMS OF  
OVEREXPOSURE.

Explanation of Carcinogenicity:NONE

Effects of Overexposure:EFFECTS OF OVEREXPOSURE TO SMOKE FROM BURNING

IGNITERS:EYES:SEVERE IRRITATION,BLURRED VISION. SKIN:MODERATE  
IRRITATION. INHALATION:IRRITATION,HEADACHE,NAUSEA,DIZZINESS.

Medical Cond Aggravated by Exposure:NOT KNOWN

===== First Aid Measures =====

First Aid:EYES:FLUSH WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES .CONSULT PHYSICIAN IMMEDIATELY. SKIN:WASH WITH SOAP & WATER.GET MEDICAL ATTENTION. INGESTION:GET MEDICAL ATTENTION. INHALATION:REMO VE TO FRESH AIR,BEGIN RESUSCITATION.GETMEDICAL ATTENTION.

===== Fire Fighting Measures =====

Flash Point:NOT KNOWN  
Lower Limits:NOT KNOWN  
Upper Limits:NOT KNOWN  
Extinguishing Media:WATER SPRAY,DRY SAND,TALC,DRY GRAPHITE.  
Fire Fighting Procedures:WEAR SELF-CONTAINED BREATHING APPARATUS,PROTECTIVE BODY AND HEAD GEAR.MAINTAIN SAFE DISTANCE FROM BURNING MATERIALS.  
Unusual Fire/Explosion Hazard:FLAMMABLE WHEN EXPOSED TO OPEN FLAME,EXCESSIVE HEAT OR IMPACT.

===== Accidental Release Measures =====

Spill Release Procedures:ELIMINATE ALL SOURCES OF IGNITION.RECOVER ALL SPILLED UNITS AND EXAMINE FOR PHYSICAL CHANGE.  
Neutralizing Agent:NOT KNOWN

===== Handling and Storage =====

Handling and Storage Precautions:DESIGNED FOR MILITARY USE OR COMMERCIAL BLASTING OPERATIONS ONLY BY PERSONNEL THOROUGHLY TRAINED  
IN HANDLING/USE.NOT DESIGNED FOR RECREATIONAL USE.  
Other Precautions:LABEL AS EXPLOSIVE.

===== Exposure Controls/Personal Protection =====

Respiratory Protection:CONTACT LOCAL SAFETY/INDUSTRIAL HYGIENE OFFICE TO DETERMINE IF RESPIRATORY PROTECTION IS REQUIRED .  
Ventilation:CONTACT LOCAL SAFETY/INDUSTRIAL HYGIENE OFFICE TO DETERMINE IF LOCAL EXHAUST VENTILATION IS NEEDED .  
Protective Gloves:NOT KNOWN  
Eye Protection:CHEMICAL SAFETY GOGGLES .  
Other Protective Equipment:NOT KNOWN  
Work Hygienic Practices:LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.  
Supplemental Safety and Health  
CONTRACT #:DAAA09-91-R-0873.HAZARDOUS INGREDIENTS ARE IN OLIN CENTER FIRE PRIMER-SEE OLIN MSDS UNDER NSN 1375-00-691-1671,CAGE 99530,PART NUM A.

===== Physical/Chemical Properties =====

Melt/Freeze Pt:M.P/F.P Text:NOT KNOWN



Decomp Temp:Decomp Text:NOT KNOWN

Solubility in Water:INSOLUBLE

Appearance and Odor:ODORLESS, GREEN PLASTIC, POLYAMIDE, NYLON TUBE  
(ASSEMBLY).

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES

Stability Condition to Avoid:HEAT AND FLAME.

Hazardous Decomposition Products:SMOKE FROM BURNING IGNITERS.

Conditions to Avoid Polymerization:WILL NOT OCCUR.

===== Disposal Considerations =====

Waste Disposal Methods:DISP MUST BE IAW FED, STATE, & LOC REGS. COORDINATE  
W/ SUPPORTING INSTALLATION/MACOM ENVIRON OFFICE PRIOR TO DISP  
. DETERMINE IF WASTE MEETS FED/STATE HAZ WASTE CRITERIA BECAUSE  
USE, MIXTURES, PROCESSES, ETC MAY RENDER MATERIAL HAZARDOUS.

Disclaimer (provided with this information by the compiling agencies):

This information is formulated for use by elements of the Department  
of Defense. The United States of America in no manner whatsoever,  
expressly or implied, warrants this information to be accurate and  
disclaims all liability for its use. Any person utilizing this  
document should seek competent professional advice to verify and  
assume responsibility for the suitability of this information to their  
particular situation.



# Material Safety Data Sheet (MSDS-BP)

PRODUCT IDENTIFICATION	
Product Name	BLACK POWDER
Trade Names and Synonyms	N/A
Manufacturer/Distributor	GOEX, Inc. (Doyline, LA) & various international sources
Transportation Emergency	<b>800-255-3924 (24 hrs — CHEM • TEL)</b>

## PREVENTION OF ACCIDENTS IN THE USE OF EXPLOSIVES

The prevention of accidents in the use of explosives is a result of careful planning and observance of the best known practices. The explosives user must remember that he is dealing with a powerful force and that various devices and methods have been developed to assist him in directing this force. He should realize that this force, if misdirected, may either kill or injure both him and his fellow workers.

### **WARNING**

**All explosives are dangerous** and must be carefully handled and used following approved safety procedures either by or under the direction of competent, experienced persons in accordance with all applicable federal, state, and local laws, regulations, or ordinances. If you have any questions or doubts as to how to use any explosive product, **DO NOT USE IT** before consulting with your supervisor, or the manufacturer, if you do not have a supervisor. If your supervisor has any questions or doubts, he should consult the manufacturer before use.

HAZARDOUS COMPONENTS				
Material or Component	%	CAS No.	TLV	PEL
Potassium nitrate <sup>1</sup>	70-76	007757-79-1	NE	NE
Sodium nitrate <sup>1</sup>	70-74	007631-99-4	NE	NE
Charcoal	8-18	N/A	NE	NE
Sulfur	9-20	007704-34-9	NE	NE
Graphite <sup>2</sup>	Trace	007782-42-5	15 mppct (TWA)	2.5 mg/m <sup>3</sup>
N/A = Not assigned NE = Not established				

<sup>1</sup> Black Powder contains either potassium nitrate **or** sodium nitrate in the percentages indicated. Black powder **does not contain both**.

<sup>2</sup> Not contained in all grades of black powder.

PHYSICAL DATA	
Boiling Point	N/A
Vapor Pressure	N/A
Vapor Density	N/A
Solubility in Water	Good
Specific Gravity	1.70 - 1.82 (mercury method) • 1.92 - 2.08 (pycnometer)
PH	6.0 - 8.0
Evaporation Rate	N/A
Appearance and Odor	Black granular powder. No odor detectable.

HAZARDOUS REACTIVITY	
Instability	Keep away from heat, sparks, and open flame. Avoid impact, friction, and static electricity.
Incompatibility	When dry, black powder is compatible with most metals; however, it is hygroscopic, and when wet, attracts all common metals except stainless steel.  Black powder must be tested for compatibility with any material not specified in the production/procurement package with which they may come in contact. Materials include other explosives, solvents, adhesives, metals, plastics, paints, cleaning compounds, floor and table coverings, packing materials, and other similar materials, situations, and equipment.
Hazardous decomposition	Detonation produces hazardous overpressures and fragments (if confined). Gases produced may be toxic if exposed in areas with inadequate ventilation.
Polymerization	Polymerization will not occur.

FIRE AND EXPLOSION DATA	
Flashpoint	Not applicable
Auto ignition temperature	Approx. 464°C (867°F)
Explosive temperature (5 sec)	Ignites @ approx. 427°C (801°F)
Extinguishing media	Water
Special fire fighting procedures	<b>ALL EXPLOSIVES: DO NOT FIGHT EXPLOSIVES FIRES.</b> Try to keep fire from reaching explosives. Isolate area. Guard against intruders.  Division 1.1 Explosives (heavily encased): Evacuate the area for 5000 feet (1 mile) if explosives are heavily encased.  Division 1.1 Explosives (not heavily encased): Evacuate the area for 2500 feet (½ mile) if explosives are not heavily encased.  Division 1.1 Explosives (all): Consult the <i>2000 Emergency Response Guidebook, Guide 112</i> for further details.
Unusual fire and explosion hazards	Black powder is a deflagrating explosive. It is very sensitive to flame and spark and can also be ignited by friction and impact. When ignited unconfined, it burns with explosive violence and will explode if ignited under even slight confinement.

<b>HEALTH HAZARDS</b>	
<b>General</b>	Black powder is a Division 1.1 Explosive, and detonation may cause severe physical injury, including death. All explosives are dangerous and must be handled carefully and used following approved safety procedures under the direction of competent, experienced persons in accordance with all applicable federal, state, and local laws, regulations, and ordinances.
<b>Carcinogenicity</b>	None of the components of Black powder are listed as a carcinogen by NTP, IARC, or OSHA.

<b>FIRST AID</b>	
<b>Inhalation</b>	<i>Not a likely route of exposure.</i> If inhaled, remove to fresh air. If not breathing, give artificial respiration, preferably by mouth-to-mouth. If breathing is difficult, give oxygen. Seek prompt medical attention.
<b>Eye and skin contact</b>	<i>Not a likely route of exposure.</i> Flush eyes with water. Wash skin with soap and water.
<b>Ingestion</b>	<i>Not a likely route of exposure.</i> If ingested, induce vomiting immediately by giving two glasses of water and sticking finger down throat.
<b>Injury from detonation</b>	Seek prompt medical attention.

<b>SPILL OR LEAK PROCEDURES</b>	
<b>Spill/leak response</b>	Use appropriate personal protective equipment. Isolate area and remove sources of friction, impact, heat, low level electrical current, electrostatic or RF energy. Only competent, experienced persons should be involved in cleanup procedures.  Carefully pick up spills with non-sparking and non-static producing tools.
<b>Waste disposal</b>	Desensitize by diluting in water. Open train burning, by qualified personnel, may be used for disposal of small unconfined quantities. Dispose of in compliance with federal regulations under the authority of the <i>Resource Conservation and Recovery Act</i> (40 CFR Parts 260-271).

<b>SPECIAL PROTECTION INFORMATION</b>	
<b>Ventilation</b>	Use only with adequate ventilation.
<b>Respiratory</b>	None
<b>Eye</b>	None
<b>Gloves</b>	Impervious rubber gloves.
<b>Other</b>	Metal-free <i>and</i> non-static producing clothes

<b>SPECIAL PRECAUTIONS</b>	
<ul style="list-style-type: none"> <li>♦ Keep away from friction, impact, and heat. Do not consume food, drink, or tobacco in areas where they may become contaminated with these materials.</li> <li>♦ Contaminated equipment must be thoroughly water cleaned before attempting repairs.</li> <li>♦ Use only non-spark producing tools.</li> <li>♦ No smoking.</li> </ul>	

### STORAGE CONDITIONS

Store in a cool, dry place in accordance with the requirements of *Subpart K, ATF: Explosives Law and Regulations* (27 CFR 55.201-55.219).

### SHIPPING INFORMATION

<b>Proper shipping name</b>	Black powder	
<b>Hazard class</b>	1.1D	
<b>UN Number</b>	UN0027	
<b>DOT Label &amp; Placard</b>	DOT Label	EXPLOSIVE 1.1D
	DOT Placard	EXPLOSIVES 1.1
<b>Alternate shipping information</b>	Limited quantities of black powder may be transported as "Black powder for small arms", NA0027, class 4.1 pursuant to U.S. Department of Transportation authorization EX-8712212.	

The information contained in this Material Safety Data Sheet is based upon available data and believed to be correct; however, as such has been obtained from various sources, including the manufacturer and independent laboratories, it is given without warranty or representation that it is complete, accurate, and can be relied upon. OWEN COMPLIANCE SERVICES, INC. has not attempted to conceal in any manner the deleterious aspects of the product listed herein, but makes no warranty as to such. Further, OWEN COMPLIANCE SERVICES, INC. cannot anticipate nor control the many situations in which the product or this information may be used; there is no guarantee that the health and safety precautions suggested will be proper under all conditions. It is the sole responsibility of each user of the product to determine and comply with the requirements of all applicable laws and regulations regarding its use. This information is given solely for the purposes of safety to persons and property. Any other use of this information is expressly prohibited.

**For further information contact:**

David W. Boston, President  
OWEN COMPLIANCE SERVICES, INC.  
12001 County Road 1000  
P.O. Box 765  
Godley, TX 76044  
Telephone number: 817-551-0660  
FAX number: 817-396-4584

**MSDS prepared by:**

David W. Boston  
Original publication date: 12/08/93  
Revision date: 12/12/05  
12/03/03

ATLAS POWDER CO -- BOOSTERS -- 1376-00N015161

===== Product Identification =====

Product ID:BOOSTERS

MSDS Date:06/27/1988

FSC:1376

NIIN:00N015161

MSDS Number: BKNNX

=== Responsible Party ===

Company Name:ATLAS POWDER CO

Address:15301 DALLAS PARKWAY SUITE 1200

City:DALLAS

State:TX

ZIP:75248

Country:US

Info Phone Num:717-386-4121; 417-624-0212

Emergency Phone Num:717-386-4121; 417-624-0212

Preparer's Name:P.E. THERRIAULT

CAGE:5P744

=== Contractor Identification ===

Company Name:ATLAS POWDER CO

Address:15301 DALLAS PARKWAY SUITE 1200

Box:City:DALLAS

State:TX

ZIP:75248

Country:US

Phone:717-386-4121; 417-624-0212

CAGE:5P744

===== Composition/Information on Ingredients =====

Ingred Name:2,4,6-TRINITROTOLUENE (TNT)

CAS:118-96-7

RTECS #:XU0175000

Other REC Limits:TRANS PEL:1.5MG/M3,S

OSHA PEL:S, 1.5 MG/M3

ACGIH TLV:S, 0.5 MG/M3; 9293

Ingred Name:2,4,6-TRINITROTOLUENE (TNT)

CAS:118-96-7

RTECS #:XU0175000

OSHA PEL:S, 1.5 MG/M3

ACGIH TLV:S, 0.5 MG/M3; 9293

Ingred Name:PENTAERYTHRITOL, TETRANITRATE (PETN). VP:0.001 @ 97C.

MP:141.3C. BP:>202C. SPEC GRAV:1.76. APPEAR:COLORLESS CRYSTAL.

CAS:78-11-5

RTECS #:RZ2620000

Ingred Name:CYCLONITE

CAS:121-82-4

RTECS #:XY9450000  
OSHA PEL:S, 1.5 MG/M3  
ACGIH TLV:S, 1.5MG/M3; 9192

Ingred Name:CYCLONITE  
CAS:121-82-4  
RTECS #:XY9450000  
OSHA PEL:S, 1.5 MG/M3  
ACGIH TLV:S, 1.5MG/M3; 9192

=====  
===== Hazards Identification =====

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.  
Routes of Entry: Inhalation:NO Skin:YES Ingestion:NO  
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO  
Health Hazards Acute and Chronic:TRINITROTOLUNE:IRRITANT.  
CYCLOTRIMETHYLENE TRINITRAMINE:TOXIC.  
Explanation of Carcinogenicity:NOT RELEVANT  
Effects of Overexposure:NONE SPECIFIED BY MANUFACTURER.  
Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

=====  
===== First Aid Measures =====

First Aid:INHAL:REMOVE TO FRESH AIR. SUPPORT BREATHING (GIVE  
OXYGEN/ARTIFICIAL RESPIRATION), CALL MD . INGEST:CALL MD  
IMMEDIATELY .

=====  
===== Fire Fighting Measures =====

Extinguishing Media:USE MEDIA SUITABLE FOR SURROUNDING FIRE .  
Fire Fighting Procedures:DO NOT ATTEMPT TO FIGHT FIRES INVOLVING  
EXPLOSIVES. IMMEDIATELY EVACUATE AREA.  
Unusual Fire/Explosion Hazard:AVOID TOXIC FUMES FROM FIRE.

=====  
===== Accidental Release Measures =====

Spill Release Procedures:NONE SPECIFIED BY MANUFACTURER.  
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

=====  
===== Handling and Storage =====

Handling and Storage Precautions:FOLLOW OSHA STANDARDS FOR STORE/USE  
(29 CFR 1910.109). SEE "DO'S/DON'TS-INSTRUCTIONS & WARNINGS" FOUND  
IN EVERY SHIPPING CASE.  
Other Precautions:AVOID TOXIC FUMES FROM BLASTING. WEAR NORMAL  
PROTECTIVE EQUIPMENT. SEE INSTITUTE OF MAKERS OF EXPLOSIVES  
PUBLICATIONS.

=====  
===== Exposure Controls/Personal Protection =====

Respiratory Protection:USE NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE

FOR EXPOSURE OF CONCERN .

Ventilation:NONE SPECIFIED BY MANUFACTURER.

Protective Gloves:NONE SPECIFIED BY MANUFACTURER.

Eye Protection:CHEMICAL WORKERS GOGGLES .

Other Protective Equipment:NONE SPECIFIED BY MANUFACTURER.

Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.

Supplemental Safety and Health

NONE SPECIFIED BY MANUFACTURER.

===== Physical/Chemical Properties =====

HCC:E2

Boiling Pt:B.P. Text:SEE INGREDIENTS

Melt/Freeze Pt:M.P/F.P Text:SEE INGREDIENTS

Vapor Pres:SEE INGREDIENTS

Spec Gravity:SEE INGREDIENTS

Appearance and Odor:SEE INGREDIENTS.

===== Stability and Reactivity Data =====

NONE SPECIFIED BY MANUFACTURER.

Stability Condition to Avoid:NONE SPECIFIED BY MANUFACTURER.

Hazardous Decomposition Products:NONE SPECIFIED BY MANUFACTURER.

===== Disposal Considerations =====

Waste Disposal Methods:DISPOSAL OF DAMAGED OR DETERIORATED EXPLOSIVES  
MUST BE CARRIED OUT I/A/W ALL FEDERAL, AND STATE REGULATIONS.

Disclaimer (provided with this information by the compiling agencies):  
This information is formulated for use by elements of the Department  
of Defense. The United States of America in no manner whatsoever,  
expressly or implied, warrants this information to be accurate and  
disclaims all liability for its use. Any person utilizing this  
document should seek competent professional advice to verify and  
assume responsibility for the suitability of this information to their  
particular situation.





# Material Safety Data Sheet (MSDS-PLT)

PRODUCT IDENTIFICATION	
Product Name	Explosive Cartridges or Explosive Pellets
Trade Names and Synonyms	
Manufacturer/Distributor	Various
Transportation Emergency	800-255-3924 (24 hrs -- <i>CHEM • TEL</i> )

## PREVENTION OF ACCIDENTS IN THE USE OF EXPLOSIVES

The prevention of accidents in the use of explosives is a result of careful planning and observance of the best known practices. The explosives user must remember that he is dealing with a powerful force and that various devices and methods have been developed to assist him in directing this force. He should realize that this force, if misdirected, may either kill or injure both him and his fellow workers.

### **WARNING**

**All explosives are dangerous** and must be carefully handled and used following approved safety procedures either by or under the direction of competent, experienced persons in accordance with all applicable federal, state, and local laws, regulations, or ordinances. If you have any questions or doubts as to how to use any explosive product, **DO NOT USE IT** before consulting with your supervisor, or the manufacturer, if you do not have a supervisor. If your supervisor has any questions or doubts, he should consult the manufacturer before use.

HAZARDOUS COMPONENTS			
Material or Component	CAS No.	TLV	PEL
<b>Black Powder</b>	N/A	NE	NE
<b>C-4</b>	See RDX	See RDX	See RDX
<b>HMX</b> (Cyclotetramethylenetetranitramine)	02691-41-0	NE	NE
<b>HNS</b> (Hexanitrostilbene)	20062-22-0	NE	NE
<b>PYX</b> (Picrylaminodinitropyridine)	38082-89-2	NE	NE
<b>RDX</b> (Cyclotrimethylenetrinitramine)	00121-82-4	1.5 mg/m <sup>3</sup>	1.5 mg/m <sup>3</sup>
<b>Smokeless</b>	000055-63-0	0.46 mg/m <sup>3</sup>	0.1 mg/m <sup>3</sup>
<i>Depending upon model, cartridges/pellets contain one of the items listed above</i> N/A = Not assigned NE = Not established			

PHYSICAL DATA
Cartridges or Pellets of compressed high explosive. May be contained in plastic case. May be any of a number of different shapes.

HAZARDOUS REACTIVITY	
<b>Instability</b>	Detonates with friction, impact, heat, low level electrical current, electrostatic or RF energy
<b>Incompatibility</b>	Acids and alkalis
<b>Hazardous decomposition</b>	Detonation produces hazardous fragments. Gases produced may contain lead, carbon, and nitrogen oxide.
<b>Polymerization</b>	Polymerization will not occur.

FIRE AND EXPLOSION DATA	
<b>Flashpoint</b>	Not applicable
<b>Extinguishing media</b>	None
<b>Special fire fighting procedures</b>	<b>ALL EXPLOSIVES: DO NOT FIGHT EXPLOSIVES FIRES.</b> Try to keep fire from reaching explosives. Isolate area. Guard against intruders.  Division 1.4 Explosives: Evacuate the area for 1500 feet (1/3 mile). Consult <i>the 2000 Emergency Response Guidebook, Guide 114</i> for further details.
<b>Unusual fire and explosion hazards</b>	May detonate with impact or on heating.

<b>HEALTH HAZARDS</b>	
<b>General</b>	<p>Pellets do not present health hazards in normal handling and use; however, the products are Division 1.4 explosives, and detonation may cause severe physical injury, including death. All explosives are dangerous and must be handled carefully and used following approved safety procedures under the direction of competent, experienced persons in accordance with all applicable federal, state, and local laws, regulations, and ordinances.</p> <p>Inhalation of explosive powders may cause nervous system irregularities including headaches and dizziness.</p> <p>Nitrogen oxides generated during use are skin, eye, and respiratory tract irritants.</p>
<b>Carcinogenicity</b>	None of the components of Pellets are listed as a carcinogen by NTP, IARC, or OSHA.

<b>FIRST AID</b>	
<b>Inhalation</b>	Not a likely route of exposure. If inhaled, remove to fresh air. If not breathing, give artificial respiration, preferably by mouth-to-mouth. If breathing is difficult, give oxygen. Seek prompt medical attention.
<b>Eye and skin contact</b>	Not a likely route of exposure.
<b>Ingestion</b>	Not a likely route of exposure.
<b>Injury from detonation</b>	Seek prompt medical attention.

<b>SPILL OR LEAK PROCEDURES</b>	
<b>Spill/leak response</b>	Use appropriate personal protective equipment. Isolate area and remove sources of friction, impact, heat, low level electrical current, electrostatic or RF energy. Only competent, experienced persons should be involved in cleanup procedures. Sweep up with non-sparking tools and remove.
<b>Waste disposal</b>	Dispose of in compliance with federal regulations under the authority of the <i>Resource Conservation and Recovery Act</i> (40 CFR Parts 260-271).

<b>SPECIAL PROTECTION INFORMATION</b>	
<b>Ventilation</b>	Use only with adequate ventilation.
<b>Respiratory</b>	NIOSH approved particle masks for dust and mist.
<b>Eye</b>	Safety glasses or goggles.
<b>Gloves</b>	Impervious rubber gloves.
<b>Other</b>	Cotton overalls, undergarments and socks. Conductive soled shoes

<b>SPECIAL PRECAUTIONS</b>
Keep away from friction, impact, and heat. Do not consume food, drink, or tobacco in areas where they may become contaminated with these materials.

<b>STORAGE CONDITIONS</b>
Store in accordance with the requirements of <i>Subpart K, ATF: Explosives Law and Regulations</i> (27 CFR 555.201-555.219).

SHIPPING INFORMATION (May be one of the following)		
Proper shipping name	Charges, shaped	
Hazard class	1.4S	
UN Number	UN0441	
DOT Label & Placard	DOT Label	EXPLOSIVE 1.4S
	DOT Placard	EXPLOSIVE 1.4
Proper shipping name	Articles, explosive, n.o.s. (** pellets or ** cartridges) (** = RDX, HMX, HNS, PYX, C-4, etc.)	
Hazard class	1.4D	
UN Number	UN0352	
DOT Label & Placard	DOT Label	EXPLOSIVE 1.4D
	DOT Placard	EXPLOSIVE 1.4
Proper shipping name	Articles, explosive, n.o.s. (** pellets or ** cartridges) (** = RDX, HMX, HNS, PYX, C-4, etc.)	
Hazard class	1.4S	
UN Number	UN0349	
DOT Label & Placard	DOT Label	EXPLOSIVE 1.4S
	DOT Placard	EXPLOSIVES 1.4

The information contained in this Material Safety Data Sheet is based upon available data and believed to be correct; however, as such has been obtained from various sources, including the manufacturer and independent laboratories, it is given without warranty or representation that it is complete, accurate, and can be relied upon. OWEN COMPLIANCE SERVICES, INC. has not attempted to conceal in any manner the deleterious aspects of the product listed herein, but makes no warranty as to such. Further, OWEN COMPLIANCE SERVICES, INC. cannot anticipate nor control the many situations in which the product or this information may be used; there is no guarantee that the health and safety precautions suggested will be proper under all conditions. It is the sole responsibility of each user of the product to determine and comply with the requirements of all applicable laws and regulations regarding its use. This information is given solely for the purposes of safety to persons and property. Any other use of this information is expressly prohibited.

**For further information contact:**

David W. Boston, President  
 OWEN COMPLIANCE SERVICES, INC.  
 12001 County Road 1000  
 P.O. Box 765  
 Godley, TX 76044  
 Telephone number: 817-551-0660  
 FAX number: 817-396-4584

**MSDS prepared by:**

David W. Boston  
 Original publication date: 03/15/93  
 Revision dates: 03/07/08  
 11/28/05  
 12/03/03

**1. PRODUCT AND COMPANY IDENTIFICATION**

Name: **Double-base smokeless powder, propellant.**

Trade Names and Synonyms: **Accurate::No. 2, No. 5, No. 7, No. 9, 4100, 1680, 2200, 2230, 2460, 2520, 2700, MAGPRO, 8700, Nitro 100, 5744**

Distributed By: **WESTERN POWDERS, INC.**  
P.O. Box 158  
Miles City, Montana 59301  
Telephone: (406)234-0422  
Toll Free: (800)497-1007

**Transportation Emergencies – Chemtrec – 1-800-424-9300**

**2. HAZARD IDENTIFICATION**

**Emergency Overview – Danger! Extremely Flammable – Explosive.**

**Accidental Fire or Explosion is Likely to Cause Severe Injury or Death.**

**Avoid Exposure to all Sources of Heat or Flame, Electrical Sparks, Static Electricity, and Impact Shock.**

**OSHA Regulatory Status - This product may be considered to be a hazardous chemical under OSHA Hazard Communication Standard 29 CFR 1910.1200.**

**Applicable OSHA Classifications: Explosive, Toxic, Blood Toxin, Skin and Eye Irritant**

**Potential Health Effects – Eye contact may cause irritation. Acute contact may cause skin irritation. Acute exposure may cause irritation to nose, mouth, throat and lungs. Ingestion may cause irritation to gastrointestinal tract. Nitroglycerin content may cause dilation of blood vessels with a drop in blood pressure and headache, cyanosis and mental confusion. Nausea, vomiting and abdominal pain may also occur. Some components of this granular mixture may be absorbed directly through the skin. Neither this product nor any of its ingredients (except Dinitrotoluene) are listed as carcinogens by OSHA, NIOSH-NTP and IARC. Per IARC 28 Dinitrotoluene is listed as possibly carcinogenic to humans.**

**Potential Environmental Effects: Ecological studies on this product unknown. Some components are known to be harmful to aquatic organisms**

**3. COMPOSITION / INFORMATION ON INGREDIENTS**

COMPONENT	CAS #	wt. %
Nitrocellulose	9004-70-0	<90
Nitroglycerin	55-63-0	7 - 23
Dinitrotoluene	121-14-2	0 - 2
Dibutyl phthalate	84-74-2	0 - 7
Diphenylamine	122-39-4	0.5 – 3.0
Potassium nitrate	7757-79-1	0 – 1.5
Sodium sulfate	7757-82-6	0 – 1
Graphite	7782-42-5	1 max.
Polyester adipate	Not disclosed	0 - 10
Ethyl Centralite	85-98-3	0 - 6
Potassium sulfate	7778-80-5	0 - 1
Calcium carbonate	471-34-1	0 - 1
Deterrent	Not given	0 - 7
Rosin	8050-09-7	0 - 5

**4. FIRST AID MEASURES**

**EYES:** Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If eye irritation develops, call a physician.

**SKIN :** Immediately wash with soap water for at least 15 minutes. Call a physician if needed. If clothing comes in contact with the product, the clothing should be removed immediately and should be laundered before re-use.

**INGESTION:** Immediately drink large quantities of water. Induce vomiting. Call a physician at once. When vomiting occurs, keep head lower than hips to help prevent aspiration. **DO NOT** give anything by mouth if the person is unconscious or if having convulsions.

**INHALATION:**

- If person experiences nausea, headache or dizziness, person should stop work immediately and move to fresh air until these symptoms disappear. If breathing is difficult, administer oxygen, keep person warm and at rest. Call physician.
- In event that an individual inhales enough vapor to lose consciousness, person should be moved to fresh air at once and a physician should be called immediately. If breathing has stopped, artificial respiration should be given immediately.
- In all cases, ensure adequate ventilation and provide respiratory protection before the person returns to work.

**5. FIRE FIGHTING MEASURES**

**DANGER!!** **Extremely Flammable – Explosives**  
**Accidental Explosion May Cause Severe Injury or Death**  
**Evacuate the area immediately in case of emergency.**

**FLASH POINT:** Not Determined

**FLAMMABLE LIMITS:** Not Determined

**AUTOIGNITION TEMPERATURE:** 160°C – 180°C (320° F - 360°F)  
No explosion – 5 hours at 120°C (248°F)

**EXTINGUISHING MEDIA:**

Apply large volumes of water as quickly as possible from automatic sprinklers or with fire hose from a distant, protected location. **FIGHT EXPLOSIVE FIRES ONLY FROM WELL PROTECTED, DISTANT (FROM POINT OF FIRE) LOCATION.** Since product is self-oxidizing, smothering agents such as dry chemical, carbon dioxide, or foam are ineffective.

**PERSONAL PROTECTION FOR FIREFIGHTING**

Self contained breathing apparatus (SCBA) and protective clothing, to include impervious boots, gloves, hard hat, and chemically impermeable suit. Eye and face protection. Wash all clothing prior to reuse.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:**

Product is self oxidizing. Products are propellant explosives and are extremely flammable and readily ignited. Protect from fire, sparks, impact and high temperatures. **DO NOT** move or approach containers which have been damaged due to exposure to heat. Keep unnecessary people away, isolate hazard area. Use only trained and qualified clean up personnel wearing appropriate protective clothing to clean up heat damaged product.

**HAZARDOUS DECOMPOSITION PRODUCTS:** None expected, if stored and handled as in Section 7.

**HAZARDOUS PRODUCTS OF COMBUSTION.** Combustion products vary depending on fire conditions and other combustibles present in the fire. The predominant products will be carbon dioxide, and nitrogen oxides. Under some conditions, methane, carbon monoxide, irritating aldehydes and carboxylic acids, and hydrogen cyanide may be formed.

## 6. ACCIDENTAL RELEASE MEASURES

### SPILL PROCEDURES:

Clean up spills immediately using soft bristle brush and conductive rubber or plastic shovel. Use caution, material is sensitive to initiation from sources such as heat, flame, impact, friction or sparks.

**AIR RELEASE:** Not applicable

### WATER RELEASE:

- This material is heavier than water. Create an overflow dam with filtration capabilities to retain material.
- Divert water flow or stop if possible. Gather wet material using non-sparking or plastic utensils.
- Keep material damp until ready for disposal.

### LAND SPILL:

- Clean up of spill materials may be accomplished using non-sparking or plastic utensils. Wear non-flammable or flame retardant clothing at all times. Wet all spill materials prior to initiating clean up procedure.
- Material may best be destroyed by controlled open burning in small quantities (maximum about 1 pound) in piles not over 1 inch deep. Use an ignition train of slow-burning, combustible materials to permit retreat to a safe distance before powder is ignited. Stay upwind, do not breathe products of combustion. Burn only with permission of all appropriate regulatory agencies.

### WASTE DISPOSAL:

- If this product becomes a waste, it meets the criteria of a hazardous waste as defined under 40 CFR 261 and would have the following EPA hazardous waste number: D003
- If this product becomes a waste, it will be a hazardous waste which is subject to the Land Disposal Restrictions under 40 CFR 268 and must be managed accordingly.
- If this material becomes a waste, it can be disposed by controlled open burning in small quantities, as described above, with proper local agency authorization.

**CARE MUST BE TAKEN TO PREVENT ENVIRONMENTAL CONTAMINATION FROM THE USE OF THIS MATERIAL. THE USER HAS THE RESPONSIBILITY TO DISPOSE OF UNUSED MATERIAL, RESIDUES AND CONTAINERS IN COMPLIANCE WITH ALL RELEVANT LOCAL, STATE AND FEDERAL LAWS AND REGULATIONS REGARDING TREATMENT, STORAGE AND DISPOSAL FOR HAZARDOUS AND NONHAZARDOUS WASTES.**

## 7. HANDLING AND STORAGE

### HANDLING AND STORAGE PRECAUTIONS:

- For handling and storage requirements see 29 CFR 1920.109. Also see <<Properties and Storage of Smokeless Powder>> published by the SPORTING ARMS AND AMMUNITION MANUFACTURES' INSTITUTE; INC. (SAAMI), PO Box 838, Brandford, CT 06405.
- This product may react with acids, oxidizing agents, alkalizes or amines (organic and inorganic) and should not be stored near such materials.
- Avoid exposure to sunlight or artificial ultraviolet light.
- Recommended storage conditions -: 21°C (70°F) 50% relative humidity.
- Keep away from heat, sparks and open flame.
- Store in a cool, dry place.
- Do not store smokeless powder in the same area with solvents, flammable gases or highly combustible materials.
- Must be stored in original DOT approved containers or shipping container.
- Do not smoke in areas where powder is stored or used. (50 ft. minimum distance required).

**Section 7 - Continued**

- Do not keep old or salvaged powders. Check old powders for deterioration regularly. Destroy deteriorated powders immediately.
- Empty containers may contain residues of powder, and should be treated as hazardous waste.

**ENGINEERING CONTROLS:**

Adequate ventilation should be provided to keep dust concentrations below acceptable exposure limits. Discharge from the ventilation system should comply with applicable air pollution control regulations.

**PROTECTIVE MEASURES DURING REPAIR AND MAINTENANCE:**

Eliminate ignition sources and prevent build-up of static electric charges. Thoroughly clean up all powder grains and dust residues in the maintenance and repair areas before starting work.

**8. EXPOSURE CONTROL / PERSONAL PROTECTION**

**ESTABLISHED EXPOSURE LIMITS**

COMPONENT	OSHA (PEL)	ACGIH (TLV)
Nitrocellulose	None established	None established
Nitroglycerin	2mg/m <sup>3</sup> ceiling (skin)	0.05ppm TWA (skin)
Dinitrotoluene	1.5 mg/m <sup>3</sup> , skin	1.5 mg/m <sup>3</sup> , skin
Dibutyl phthalate	5 mg/m <sup>3</sup> TWA	5 mg/m <sup>3</sup> TWA
Diphenylamine	Not established	10 mg/m <sup>3</sup> TWA
Potassium nitrate	None established	
Sodium sulfate	None established	
Graphite	15 mg/m <sup>3</sup> total dust 5 mg/m <sup>3</sup> respirable dust	2 mg/m <sup>3</sup> Respirable dust
Polyester adipate	None established	
Ethyl Centralite	None established	
Potassium sulfate	None established	None established
Calcium carbonate	15 mg/m <sup>3</sup> total dust 5 mg/m <sup>3</sup> respirable dust	10 mg/m <sup>3</sup>
Deterrent	Not disclosed	
Rosin	None established	

**PERSONAL PROTECTIVE EQUIPMENT**

- Safety glasses or goggles with side shields.
- Impervious gloves.
- Appropriate respiratory protection required when exposure to airborne containment is likely to exceed acceptable limits. Respirators should be selected and used in accordance with OSHA Subpart I (29 CFR 1910.134) and manufacturer's recommendations.
- Flame-retardant cotton coveralls and conductive safety shoes.

**ENGINEERING CONTROLS**

Adequate ventilation should be provided to keep dust concentrations below acceptable exposure limits. Discharge from the ventilation system should comply with applicable air pollution control regulations. Use a local mechanical ventilation system if needed, preferably with explosion proof construction, and with a suitable dust filter installed at inlet to suction piping to the system to prevent accumulation of explosive dust in ventilation piping and blower.



**9. PHYSICAL AND CHEMICAL PROPERTIES**

<b>Appearance</b>	Granular Solid Mixture, silvery gray to black
<b>Freezing Point</b>	Not Applicable
<b>Boiling Point</b>	Not Applicable
<b>Decomposition Temperature</b>	Decomposition becomes measurable above 50° C (122°F)
<b>Autoignition Temperature</b>	160°C – 180°C (320° F - 360°F)
<b>Specific Gravity</b>	1.2 – 1.6
<b>Bulk Density</b>	0.5 – 1.1 (g/cc)
<b>pH 25 Deg. C</b>	Not Applicable
<b>Solubility in Water</b>	Negligible
<b>Volatiles, Percent By Volume</b>	<2
<b>Vapor Pressure 25 Deg. C</b>	<1mm Hg
<b>Evaporation Rate</b>	Negligible
<b>Vapor Density</b>	Not Applicable
<b>Molecular Weight</b>	Not Applicable - mixture
<b>Odor</b>	None
<b>Coefficient of Oil/Water Distribution</b>	No Data

**10. STABILITY AND REACTIVITY**

**INSTABILITY:** Unstable with heat, unstable with static charges, and unstable with impact. Not usual hazards when stored and used properly.

**INCOMPATIBILITY:** Incompatible with acids, bases, oxidants, amines.

**DECOMPOSITION:** Hazardous gases produced are carbon monoxide, carbon dioxide, oxides of nitrogen.

**HAZARDOUS POLYMERIZATION:** Will not occur.

**FIRE AND EXPLOSION DATA:** Ignition temperature: 160° - 180° C (320° - 360° F)  
Decomposition begins at approximately 50°C (122°F)

**OTHER CONDITIONS TO AVOID** Direct sunlight.

**11. TOXICOLOGICAL INFORMATION**

**ROUTES OF ABSORPTION:** Inhalation Skin Ingestion Eye Contact

**TOXICITY DATA:**

**Nitrocellulose:** Rat, Oral LD<sub>50</sub> : >5000 mg/kg

**Dinitrotoluene** Rat, Inhalation, LC<sub>50</sub> : 2.87 mg/l, 1 hour  
Rat, Oral LD<sub>50</sub> : 177mg/kg

**Dibutyl Phthalate:** Human, Oral TD<sub>LO</sub> : 140 mg/kg  
Rat, Oral LD<sub>50</sub> : 7499 mg/kg

**Nitroglycerin:** Woman, Oral TD<sub>LO</sub> : 8 µg/kg  
Rat, Acute Oral LD<sub>50</sub> : 105 mg/kg

**12. ECOLOGICAL INFORMATION**

**AQUATIC TOXICITY** - Components of this product known to be toxic to aquatic organisms:  
diphenylamine, dibutyl phthalate, dinitrotoluene, nitroglycerine

**Nitrocellulose:** Acute aquatic 96- hour static LC50 value falls within the relatively harmless range of >1,000 mg/L, according to U.S. Wildlife criteria. Four species were tested. EC50 in four species of bacteria ranged from 731 mg/L to > 1,000 mg/L.

**13. DISPOSAL CONSIDERATIONS**

**WASTE DISPOSAL:**

- If this product becomes a waste, it meets the criteria of a hazardous waste as defined under 40 CFR 261 and would have the following EPA hazardous waste number: D003
- If this product becomes a waste, it will be a hazardous waste which is subject to the Land Disposal Restrictions under 40 CFR 268 and must be managed accordingly.
- Material may best be safely destroyed by controlled open burning in small quantities (maximum about 1 pound) in piles not over 1 inch deep. Use an ignition train of slow-burning, combustible materials to permit retreat to a safe distance before powder is ignited. Stay upwind, do not breathe products of combustion. Burn only with permission of all local regulatory authorities.

**14. TRANSPORT INFORMATION**

**This material is regulated as a DOT Hazardous Material**  
**US DOT Classification: Land – Powder, Smokeless, 1.3C, UN 0161, - for all non-bulk powders listed in this MSDS shipped in excess of 100 pounds**  
**Land - Smokeless Powder for Small Arms (100 pounds or less), NA 3178, 4.1**  
**– for all products listed in this MSDS, in DOT approved containers and packaging.**

**15. REGULATORY INFORMATION**

**Toxic Substance Control Act (TSCA) :** all components of this product are listed in the TSCA Inventory.

**SARA Title III, Sections 311/312 : Hazard Categories per 40 CFR 370.21 :**

**Acute (health) - Yes**  
**Chronic (health) – No**  
**Reactive (physical) - Yes**  
**Sudden Release (physical) – Yes**

**CERCLA Sections 102a/103 – Hazardous Substances – RQ: dinitrotoluene, (4.54 kg), Nitroglycerin (4.54 kg), Dibutyl phthalate ( 4.54 kg),**

**SARA Title III, Section 313 covered components: diphenylamine, dinitrotoluene, dibutyl phthalate, Nitroglycerin**

**16. OTHER INFORMATION**

Revised: 11/15/2007 by Western Powders, Inc.

**CAUTION: Propellants are extremely dangerous. Only highly trained and qualified personnel should utilize this material. Propellants should be tested for compatibility with any materials which they contact. Clean up any spills of material immediately. Proper housekeeping techniques must be maintained to minimize the accumulation of propellant dust. Follow all safety regulations and precautions when handling, storing, or processing propellant material.**

**The information contained herein is believed to be accurate and represents the best information currently available to Western Powders, Inc. . No warranty or guarantee, express or implied, with regard to the safety or suitability of these products, or the results obtained from their use, is offered by Western Powders, Inc.. Buyer and user assume any and all risk, responsibility and liability for any injury (including death), loss or damage arising from usage of these products.**

## MATERIAL SAFETY DATA SHEET

### PRODUCT IDENTIFICATION

NAME : DETAFLEX\* PRODUCTS

TRADE NAMES AND SYNONYMS :

DETAPRIME\* BOOSTERS: UF-4, UF, UAL, UA-4, UA-6, EB-6, EB-18  
WG, GA, S

DETAFLEX\*

DETSHEET\*

\*Du Pont Trademarks

MANUFACTURER/DISTRIBUTOR : E.I. du Pont de Nemours & Co., Inc.  
1007 Market Street  
Wilmington, DE 19898

PRODUCT INFORMATION PHONE : 1-800-441-7515

MEDICAL EMERGENCY PHONE : 1-800-441-3637

TRANSPORTATION EMERGENCY PHONE : CHEMTREC 1-800-424-9300

### PREVENTION OF ACCIDENTS IN THE USE OF EXPLOSIVES

THE PREVENTION OF ACCIDENTS IN THE USE OF EXPLOSIVES IS A RESULT OF CAREFULL PLANNING AND OBSERVANCE OF THE BEST KNOWN PRACTICES. THE EXPLOSIVES USER MUST REMEMBER THAT HE IS DEALING WITH A POWERFUL FORCE AND THAT VARIOUS DEVICES AND METHODS HAVE BEEN DEVELOPED TO ASSIST HIM IN DIRECTING THIS FORCE. HE SHOULD REALIZE THAT THIS FORCE, IF MISDIRECTED, MAY EITHER KILL OR INJURE BOTH HIM AND HIS FELLOW WORKERS.

### WARNING

ALL EXPLOSIVES ARE DANGEROUS AND MUST BE CAREFULLY HANDLED AND USED FOLLOWING APPROVED SAFETY PROCEDURES EITHER BY OR UNDER THE DIRECTION OF COMPETENT, EXPERIENCED PERSONS IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS, REGULATIONS AND ORDINANCES. IF, AFTER CAREFULLY READING THE ENTIRE LEAFLET(S) "DO'S AND DON'TS" INSTRUCTIONS AND WARNINGS INSERTED IN EACH CASE OF THESE PRODUCTS, YOU HAVE ANY QUESTIONS OR DOUBTS AS TO HOW TO USE ANY EXPLOSIVE PRODUCT, DO NOT USE IT BEFORE CONSULTING YOUR SUPERVISOR, OR THE MANUFACTURER IF YOU DO NOT HAVE A SUPERVISOR. IF YOUR SUPERVISOR HAS ANY QUESTIONS OR DOUBTS, HE SHOULD CONSULT THE MANUFACTURER BEFORE USE. SEE "ADDITIONAL INFORMATION AND REFERENCES" BELOW.

\*\*\*\*\*  
HAZARDOUS COMPONENTS

#### CHEMICAL

#### CAS NUMBER

Pentaerythritol Tetranitrate

78-11-5

Acetyl Tributyl Citrate

77-90-7

Nitrocellulose

9004-70-0

FIRE AND EXPLOSION DATA

Flammable Limits of Styrene Monomer: LEL 1.1%; UEL 6.1%

FIRE AND EXPLOSION HAZARDS

Hazardous gases produced in fire are carbon monoxide. Will burn like wood if contacted with open flame.

EXTINGUISHING MEDIA

Water. CO2.

SPECIAL FIRE FIGHTING INSTRUCTIONS

Flood with water. Keep personnel removed & upwind of fire.

\*\*\*\*\*

HEALTH HAZARD INFORMATION

PRINCIPAL HEALTH HAZARDS

The catalyst and resin mix components of these products are mixtures of varying ratios of components. In animal tests of representative compositions, both catalyst and resin mix compositions were skin and eye irritants. The resin caused corneal injury. The ALD for the catalyst mixture was >17,000 mg/kg in rats. There have been reports of eye irritation and dermatitis in humans from contact with the products during manufacture and use.

STYRENE which is present in the product has caused nonspecific effects such as irritation, weight loss and moderate blood changes in laboratory animals. In humans, overexposure may cause eye, nose and throat irritation. Repeated or prolonged contact may cause skin irritation with discomfort and dermatitis. It can be absorbed through the skin in harmful amounts. Overexposure may cause central nervous system effects such as dizziness, headache, nausea, and loss of consciousness. Reports have associated repeated and prolonged overexposure to solvents with permanent brain and nervous system damage.

CARCINOGENICITY

NONE OF THE COMPONENT(S) OF THIS MATERIAL IS LISTED AS A CARCINOGEN BY NTP, IARC, OR OSHA.

EXPOSURE LIMITS

TLV \* (ACGIH) : None established.

PEL (OSHA) : None established.

\* TLV is a registered trademark.

Styrene: TLV (ACGIH) 50ppm  
PEL (OSHA) 100ppm

## EXPOSURE LIMITS - CONTINUED

Vinyl Toluene: TLV (ACGIH) 50ppm  
 PEL (OSHA) 100ppm

Butyl Benzyl Phthalate: AEL (Du Pont) 5mg/M3, 8 hr TWA

## SAFETY PRECAUTIONS

Avoid contact with eyes. Avoid contact with skin. Avoid contact with clothing. Wash thoroughly after handling. Do not open or puncture cartridges. Avoid breathing vapors.

## FIRST AID

## INHALATION :

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

## SKIN CONTACT :

Flush skin with water.

## EYE CONTACT :

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

## INGESTION :

If swallowed, induce vomiting immediately by giving two glasses of water and sticking finger down throat. Never give anything by mouth to an unconscious person. Call a physician.

\*\*\*\*\*  
 PROTECTION INFORMATION

## GENERALLY APPLICABLE CONTROL MEASURES and PRECAUTIONS

Use only with adequate ventilation. Keep container in a cool place. Do not mix with acids, alkalies, oxidants. Do not consume food, drink or tobacco in areas where they may become contaminated with this material.

## PERSONAL PROTECTIVE EQUIPMENT

Face shield. Chemical Cartridge Respirator : for organic vapors if exposure to excessive styrene fumes is likely. Impervious gloves such as NEOPRENE if contact is likely.

\*\*\*\*\*  
 SPILL, LEAK, OR RELEASE

Review FIRE AND EXPLOSION HAZARDS and SAFETY PRECAUTIONS before proceeding with clean up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean up.

Remove source of heat, sparks, flame, impact, friction or electricity. Recover undamaged and minimally contaminated material for reuse or

DISPOSAL INFORMATION - CONTINUED

applicable Federal Regulations under the authority of the Resource Conservation and Recovery Act (40 CFR, parts 260-271).

\*\*\*\*\*

SHIPPING INFORMATION

DOMESTIC OTHER THAN AIR (DOT)

Shipping Name : High Explosive
Hazard Class : Class A Explosive
UN/NA no. : UN: 0084
DOT Label(s) : EXPLOSIVE A
DOT Placard : EXPLOSIVES A

INTERNATIONAL WATER OR AIR (IMO/ICAO)

Shipping Name : IMO: Explosives, Blasting Type D
Hazard Class : 1.10
UN no. : 0084
IMO/ICAO Label : EXPLOSIVE
Special Information : IATA/ICAO: EXPLOSIVES, BLASTING, TYPE D; FORBIDDEN

\*\*\*\*\*
STORAGE CONDITIONS

Store in well ventilated area. Store in cool place. Do not store with other explosives. Store in accordance with National Fire Protection Assn regulations. Store in accordance with Federal Regulations. Do not store or consume food, drink, or tobacco in areas where they may become contaminated with this material. Store in approved type magazine.

\*\*\*\*\*

IT IS OBVIOUSLY IMPOSSIBLE TO INCLUDE WARNINGS OR APPROVED METHODS FOR EVERY CONCEIVABLE SITUATION. A LIST OF SUGGESTIONS TO AID IN AVOIDING THE MORE COMMON CAUSES OF ACCIDENTS IS SET FORTH IN THE "DO'S AND DON'TS" INSTRUCTIONS AND WARNINGS INCLUDED AS CASE INSERTS WITH THE PRODUCT. ADDITIONAL INFORMATION IS AVAILABLE IN THE BLASTERS' HANDBOOK, PUBLISHED BY E. I. DU PONT DE NEMOURS AND COMPANY, ORDNANCE SAFETY MANUAL, PUBLISHED BY THE U. S. ARMY ORDNANCE DEPARTMENT, AND IN THE INSTITUTE OF MAKERS OF EXPLOSIVES SAFETY LIBRARY PUBLICATIONS LISTED BELOW. COPIES OF THESE IME PUBLICATIONS MAY BE OBTAINED BY WRITING THE INSTITUTE OF MAKERS OF EXPLOSIVES, 1575 EYE STREET, N. W., SUITE 550, WASHINGTON, D. C. 20005, OR FROM YOUR EXPLOSIVES SUPPLIER: CONSTRUCTION GUIDE FOR STORAGE MAGAZINES (NO. 1); AMERICAN TABLE OF DISTANCES (NO. 2); SUGGESTED CODE OF REGULATIONS FOR THE MANUFACTURE, TRANSPORTATION, STORAGE, SALE, POSSESSION, AND USE OF EXPLOSIVES AND BLASTING MATERIALS (NO. 3); SAFETY GUIDE FOR THE STORAGE, HANDLING AND USE OF EXPLOSIVES MATERIALS (NO. 17); SAFETY GUIDE FOR THE PREVENTION OF RADIO FREQUENCY RADIATION HAZARDS (NO. 20); IME DESTRUCTION OF COMMERCIAL EXPLOSIVES (NO. 21); IME STANDARD FOR THE SAFE TRANSPORTATION OF CLASS C COMMERCIAL DETONATORS (BLASTING CAPS) IN A VEHICLE WITH OTHER CERTAIN EXPLOSIVES (NO. 22).

Date of latest Revision : 02-Nov-85
Person Responsible for MSDS : Product Manager, EP. F & FP
Address : E. I. Du Pont de Nemours & Co., Inc.
Wilmington, DE 19898
Telephone : 302-774-3120



AUSTIN POWDER CO -- GELATIN & SEMI-GELATIN DYNAMITES, 60% SEISMOGRAPH --  
1377-00N054762

=====  
===== Product Identification =====

Product ID:GELATIN & SEMI-GELATIN DYNAMITES, 60% SEISMOGRAPH

MSDS Date:01/01/1991

FSC:1377

NIIN:00N054762

MSDS Number: BVXXW

=== Responsible Party ===

Company Name:AUSTIN POWDER CO

Address:25800 SCIENCE PARK DR

City:CLEVELAND

State:OH

ZIP:44122

Country:US

Info Phone Num:216-464-2400

Emergency Phone Num:216-464-2407

CAGE:79985

=== Contractor Identification ===

Company Name:AUSTIN POWDER CO

Address:25800 SCIENCE PARK DR

Box:City:CLEVELAND

State:OH

ZIP:44122

Country:US

Phone:216-464-2400

CAGE:79985

=====  
===== Composition/Information on Ingredients =====

Ingred Name:NITROGLYCERIN; (NG) (SARA III)

CAS:55-63-0

RTECS #:QX2100000

Fraction by Wt: 3-15%

OSHA PEL:0.1 MG/M3, S

ACGIH TLV:0.05 PPM, S

EPA Rpt Qty:10 LBS

DOT Rpt Qty:10 LBS

Ingred Name:ETHYLENE GLYCOL DINITRATE; (EGDN)

CAS:628-96-6

RTECS #:KW5600000

Fraction by Wt: 11-50%

OSHA PEL:0.2 MG/M3, S, C

ACGIH TLV:0.05 PPM, S

Ingred Name:AMMONIUM (I) NITRATE (1:1); (AMMONIUM NITRATE)

CAS:6484-52-2

RTECS #:BR9050000

Fraction by Wt: 0-40%



OSHA PEL:N/K  
ACGIH TLV:N/K

=====  
===== Hazards Identification =====

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.  
Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES  
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO  
Health Hazards Acute and Chronic:INGESTION, INHALATION OR ABSORPTION  
THROUGH SKIN CONTACT MAY CAUSE HEADACHE, NAUSEA, BLOOD VESSEL  
DILATION, VOMITING & CONVULSIONS. IN EXTREME CASES, DEATH MAY  
RESULT. EYES:SLIGHT IRRITANT. SKIN:SLIGHT IRRITANT - ABSORBS  
THROUGH SKIN. NITRIC ESTERS ARE CORONARY VASODILATORS.  
Explanation of Carcinogenicity:NOT RELEVANT  
Effects of Overexposure:SEE HEALTH HAZARDS.  
Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

=====  
===== First Aid Measures =====

First Aid:INHAL:REMOVE TO FRESH AIR. SUPPORT BREATHING (GIVE O<sub>2</sub>/ARTF  
RESP) . EYES:HOLD EYE LID OPEN & FLUSH W/LARGE AMOUNTS OF WATER FOR  
AT LEAST 15 MINUTES. SKIN:WASH W/MILD SOAP & WATER. INGEST:CONSULT  
MD IF PERSISTENT HEADACHES OR CHEST PAINS DEVELOP.

=====  
===== Fire Fighting Measures =====

Extinguishing Media:DO NOT FIGHT FIRE.  
Fire Fighting Procedures:WITHDRAW PERSONNEL IMMEDIATELY. ALLOW FIRE TO  
BURN ITSELF OUT. DO NOT FIGHT FIRES.  
Unusual Fire/Explosion Hazard:MAY EXPLODE WHEN SUBJECTED TO FIRE OR  
SHOCK. AVOID TOXIC FUMES FROM FIRE. EXPLOSION POINT:337F.

=====  
===== Accidental Release Measures =====

Spill Release Procedures:SWEEP UP & DISPOSE OF ALL SPILLED MATERIAL  
IMMEDIATELY USING NON-SPARKING TOOLS. DO NOT PERMIT SMOKING OR OPEN  
FLAMES NEAR SPILL SITE. TRANSPORTATION EMERGENCIES INVOLVING  
SPILLS, LEAKS, FIRES/EXPOSURES CALL CHEMTREC: 1-800-424-9300.  
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

=====  
===== Handling and Storage =====

Handling and Storage Precautions:MINIMIZE INHALATION & SKIN CONTACT.  
PREVENT CONTACT W/FOOD & CHEWING OR SMOKING MATERIALS.  
Other Precautions:COMPLY W/"ALWAYS & NEVER" AS ADOPTED BY THE INSTITUTE  
OF MAKERS OF EXPLOS. TRANSPORTATION, STOR & USE MUST COMPLY W/OSHA  
SFTY & HLTH STDS, 29CFR1910.109, APPLIC MSHA REGS, DOT & HAZ MATLS  
REGS, BATF R REQUIREMENTS & STATE & LOC (SUPP DATA)

=====  
===== Exposure Controls/Personal Protection =====

Respiratory Protection:NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN . NOT REQUIRED UNDER NORMAL CONDITIONS.

Ventilation:VENTILATE MAGAZINES BEFORE ENTERING.

Protective Gloves:ABSORBANT COTTON GLOVES.

Eye Protection:ANSI APPROVED CHEM WORKERS GOGGS .

Other Protective Equipment:NONE SPECIFIED BY MANUFACTURER.

Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.

Supplemental Safety and Health

VP:0.038-0.05. SOL IN H\*2O:SOL IN WATER, BUT NITRIC ESTERS (NG & EGDN) ARE ONLY SLIGHTLY SOL. APPEAR/ODOR:SLIGHTLY SWEET ODOR. OTHER PREC:TRANSPORTATION, STORAGE & USE REGULATIONS & ORDINANCES.

===== Physical/Chemical Properties =====

Boiling Pt:B.P. Text:NONE

Vapor Pres:SUPP DATA

Spec Gravity:1-1.7 (H\*2O=1)

Solubility in Water:SALTS ARE (SUPDAT)

Appearance and Odor:MIXT OF ABSORBANTS, WHITE OXIDIZING SALTS. TAN COLOR W/WHITE GRANULES; (SUPDAT)

===== Stability and Reactivity Data =====

Stability Indicator/Materials to Avoid:YES

AVOID ALL CONTAMINATION ESPECIALLY ACIDS, ALKALIES, PEROXIDES & CHLORATES.

Stability Condition to Avoid:MAY EXPLODE WHEN SUBJECTED TO FIRE OR SHOCK.

Hazardous Decomposition Products:GASEOUS NITROGEN OXIDES & CARBON OXIDES.

===== Disposal Considerations =====

Waste Disposal Methods:DISP OF UNDER DIRECT SUPERVISION OF QUALIFIED PERS ACCORDING TO LOC, STATE & FED REGS. CALL MFR FOR RECS & ASSISTANCE. THIS MATL MAY BECOME HAZ WASTE UNDER CERTAIN CNDTNS & MUST BE COLLECTED, LABELED & DISPOSED OF PER STATE & FED HAZ WASTERECS.

Disclaimer (provided with this information by the compiling agencies):

This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever, expressly or implied, warrants this information to be accurate and disclaims all liability for its use. Any person utilizing this document should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation.

ATLAS POWDER COMPANY -- ELECTRIC DETONATORS-ALL TYPES -- 1375-00N015162  
===== Product Identification =====

Product ID:ELECTRIC DETONATORS-ALL TYPES  
MSDS Date:02/08/1988  
FSC:1375  
NIIN:00N015162  
MSDS Number: BKNNY  
=== Responsible Party ===  
Company Name:ATLAS POWDER COMPANY  
Address:15301 DALLAS PARKWAY SUITE 1200  
City:DALLAS  
State:TX  
ZIP:75248  
Country:US  
Info Phone Num:717-386-4121;417-624-0212  
Emergency Phone Num:717-386-4121;417-624-0212  
Preparer's Name:T A HARTER  
CAGE:HO819

=== Contractor Identification ===  
Company Name:ATLAS POWDER CO  
Address:15301 DALLAS PARKWAY SUITE 1200  
Box:City:DALLAS  
State:TX  
ZIP:75248  
Country:US  
Phone:717-386-4121; 417-624-0212  
CAGE:5P744  
Company Name:ATLAS POWDER COMPANY  
Address:15301 DALLAS PARKWAY SUITE 1200  
Box:City:DALLAS  
State:TX  
ZIP:75248  
Country:US  
Phone:717-386-4121;417-624-0212  
CAGE:HO819

===== Composition/Information on Ingredients =====

Ingred Name:PENTAERYTHRITOL TETRANITRATE. VP: .001 @ 97C. MP: D @ 300C.  
SPEC GRAV: 1.47(SOLID).  
CAS:78-11-5  
RTECS #:PZ2620000

Ingred Name:MANNITOL, HEXANITRATE. MP: 112C. BP: D @ 155C. SPEC GRAV:  
1.604.  
CAS:15825-70-4  
RTECS #:OP3000000

Ingred Name:DIAZODINITROPHENOL. BP: D @ 180C. SPEC GRAV: 1.63.  
CAS:4682-03-5

Ingred Name:BLACK POWDER: MIXTURE OF THE 3 FOLLOWING INGREDIENTS.

Ingred Name:POTASSIUM NITRATE  
CAS:7757-79-1  
RTECS #:TT3700000

Ingred Name:SULFUR  
CAS:7704-34-9  
RTECS #:WS4250000

Ingred Name:CHARCOAL  
CAS:7704-34-9  
RTECS #:WS4250000

Ingred Name:ANTIMONY (SARA III)  
CAS:7440-36-0  
RTECS #:CC4025000  
OSHA PEL:0.5 MG/M3  
ACGIH TLV:0.5 MG SB/M3; 9192  
EPA Rpt Qty:5000 LBS  
DOT Rpt Qty:5000 LBS

Ingred Name:POTASSIUM PERMANGANATE (SARA III)  
CAS:7722-64-7  
RTECS #:SD6475000  
OSHA PEL:5 MG MN/M3;CEILING  
ACGIH TLV:5 MG MN/M3; 9192  
EPA Rpt Qty:100 LBS  
DOT Rpt Qty:100 LBS

==== Hazards Identification =====

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.  
Routes of Entry: Inhalation:YES Skin:YES Ingestion:NO  
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO  
Health Hazards Acute and Chronic:SULFUR: EYE IRRITANT. ANTIMONY: HIGHLY  
TOXIC & TOXIC.  
Explanation of Carcinogenicity:NOT RELEVANT  
Effects of Overexposure:NONE SPECIFIED BY MANUFACTURER.  
Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

==== First Aid Measures =====

First Aid:INGEST: CALL MD IMMEDIATELY . INHAL: REMOVE TO FRESH AIR.  
SUPPORT BREATHING (GIVE O\*2/ARTF RESP) .

==== Fire Fighting Measures =====

Extinguishing Media:NONE SPECIFIED BY MANUFACTURER.  
Fire Fighting Procedures:DO NOT ATTEMPT TO FIGHT FIRES INVOLVING

EXPLOSIVES. IMMEDIATELY EVACUATE THE AREA.  
Unusual Fire/Explosion Hazard:AVOID TOXIC FUMES FROM THE FIRE.

===== Accidental Release Measures =====

Spill Release Procedures:NONE SPECIFIED BY MANUFACTURER.  
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

===== Handling and Storage =====

Handling and Storage Precautions:NONE SPECIFIED BY MANUFACTURER.  
Other Precautions:AVOID TOXIC FUMES FROM BLASTING.

===== Exposure Controls/Personal Protection =====

Respiratory Protection:NONE SPECIFIED BY MANUFACTURER.  
Ventilation:NONE SPECIFIED BY MANUFACTURER.  
Protective Gloves:NONE SPECIFIED BY MANUFACTURER.  
Eye Protection:CHEMICAL WORKERS GOGGLES .  
Other Protective Equipment:HARD HATS.  
Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.  
Supplemental Safety and Health  
APPEAR/ODOR: (ING 1) COLORLESS CRYSTAL. (ING 2) COLORLESS NEEDLES. (ING  
3) RED/YELLOW POWDER. (ING 4) BLACK GRAINS. (ING 8) SILVER METAL.  
(ING 9) PURPLE CRYSTALS.

===== Physical/Chemical Properties =====

HCC:E2  
Boiling Pt:B.P. Text:SEE INGRED  
Melt/Freeze Pt:M.P/F.P Text:SEE INGRED  
Vapor Pres:SEE INGRED  
Spec Gravity:SEE INGRED  
Appearance and Odor:SEE SUPP DATA

===== Stability and Reactivity Data =====

NONE SPECIFIED BY MANUFACTURER.  
Stability Condition to Avoid:NONE SPECIFIED BY MANUFACTURER.  
Hazardous Decomposition Products:NONE SPECIFIED BY MANUFACTURER.

===== Disposal Considerations =====

Waste Disposal Methods:THE DISPOSAL OF DAMAGED OR DETERIORATED ELECTRIC  
DETONATORS MUST BE CARRIED OUT IN ACCORDANCE WITH ALL FEDERAL AND  
STATE REGULATIONS.

Disclaimer (provided with this information by the compiling agencies):  
This information is formulated for use by elements of the Department  
of Defense. The United States of America in no manner whatsoever,  
expressly or implied, warrants this information to be accurate and

disclaims all liability for its use. Any person utilizing this document should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation.

# Material Safety Data Sheet

## MODEL 6210HC Canister HC Smoke Grenade

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910. 1200. Standard must be consulted for specific requirements

### QUICK IDENTIFIER

Common Name: (used on label and list)

### SECTION 1

Manufacturer's Name	Combined Systems, Inc.		
Address	388 Kinsman Road	Emergency Telephone No.	800-424-9300
City, State and ZIP	Jamestown, PA 16134	Other Information Calls	724-932-2177
Signature of Person Responsible for Preparation (Optional)	Date Prepared		08/17/07

### SECTION 2 - HAZARDOUS INGREDIENTS / IDENTITY

Hazardous Component(s) (chemical & common name(s))	OSHA PEL	ACGIH TLV	Other Exposure Limits	% (Optional)	CAS No.
Zinc Oxide		5 mg/m <sup>3</sup>			1314-132
Hexachloroethane			MLD 325 mg/kg		67-72-1
Aluminum Powder		10 mg/m <sup>3</sup>			

### SECTION 3 - PHYSICAL & CHEMICAL CHARACTERISTICS

Boiling Point	N/A	Specific Gravity H <sub>2</sub> O=1	N/A	Vapor Pressure (mm Hg)	N/A
Vapor Density (Air=1)	N/A	Solubility in Water	Slight	Reactivity in Water	Yes (Aluminum Powder)
Appearance & Odor	Grey Smoke, Slight odor			Melting Point	N/A

### SECTION 4 - FIRE & EXPLOSION DATA

Flash Point	N/A	Method Used	N/A	Flammable Limits in Air % by Volume	LEL Lower	N/A	UEL Upper	N/A
Auto-Ignition Temperature	N/A	Extinguisher Media	CO <sup>2</sup> , Dry Chemical					
Special Fire Fighting Procedures	Do not fight fire. If ignition occurs evacuate downwind area until unit burns out.							
Unusual Fire & Explosion Hazards								

**SECTION 5 - PHYSICAL HAZARDS (REACTIVITY DATA)**

Stability	Unstable	<input type="checkbox"/>	Conditions to Avoid	High heat sources, open flames and fire
	Stable	<input checked="" type="checkbox"/>		
Incompatibility (Materials to Avoid)	Water			
Hazardous Decomposition Products	None known			
Hazardous Polymerization	May Occur	<input type="checkbox"/>	Conditions to Avoid	N/A
	Will Not Occur	<input checked="" type="checkbox"/>		

**SECTION 6 - HEALTH HAZARDS**

1. Acute	See Signs & Symptoms	2. Chronic	None under normal handling						
Signs and Symptoms of Exposure	May be irritating to skin & mucus membrane. In high concentrations, it has a narcotic effect								
Medical Conditions Generally Aggravated by Exposure	May damage kidney & liver								
Listed as Carcinogen or Potential Carcinogen	National Toxicology Program	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	I.A.R.C. Monographs	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	OSHA	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Emergency and First Aid Procedures	If any medical problem arises from the use of this product seek medical attention from qualified medical persons.								
<b>ROUTES OF ENTRY</b>	1. Inhalation	Remove to fresh air, & give oxygen as necessary.							
	2. Eyes	Wash with water.							
	3. Skin	Wash with soap & water.							
	4. Ingestion	Contact physician.							

**SECTION 7 - SPECIAL PRECAUTIONS & SPILL / LEAK PROCEDURES**

Precautions in Handling and Storage	Keep away from heat, flames and strong oxidizers
Other precautions	
Steps to be Taken in Case Material is released or Spilled	Wear suitable protective clothing, Undamaged units may be returned to shipping container
Waste Disposal Method (Consult Federal, State and local Regulations)	

**SECTION 8 - SPECIAL PROTECTION INFORMATION / CONTROL MEASURES**

Respiratory Protection (Specify Type)	N/A								
Ventilation	Yes	Local Exhaust	Yes	Mechanical (General)	Yes	Special	Explosion Proof	Other	N/A
Protective Gloves	Yes	Eye Protection	Yes	Other Protective Clothing or Equipment	Goggles				
Work / Hygienic Practices	Normal Hygiene Practices								

**IMPORTANT** - Do not leave any blank spaces. If required information is unavailable, unknown or does not apply, so indicate.



===== MSDS  
Safety Information  
=====

[TOP](#)

FSC: 1375 NIIN: 00-691-1671 MSDS Date: 09/01/1991 MSDS Num: BPRJP

Submitter: A AM Tech Review: 05/15/1992 Status CD: C

Product ID: M 60,IGNITER,FUSE MFN: 01

Article: N Kit Part: N

Cage: 13759  
Responsible Party

Name: SECURITY SIGNALS,INC

Address: 9509 MACON RD

City: CORDOVA State: TN Zip: 38018

Country: US

Info Phone Number: 901-754-7228

Emergency Phone Number: 901-754-7228

Preparer's Name: N/P

Proprietary Ind: N Review Ind: Y

Published: Y Special Project CD: N

===== Contractor  
Summary =====

[TOP](#)

Cage: 13759 Name: SECURITY SIGNALS INC  
Address: 9509 MACON RD  
City: CORDOVA State: TN Zip: 38018-9746  
Country: US Phone: 901-754-7228

===== Description Information  
=====

[TOP](#)

Item Manager:

Item Name: IGNITER, TIME BLASTING FUSE

Specification Number: NK

Type/Grade/Class: NK

Unit of Issue: EA

Quantitative Expression:

UI Container Qty: Z

Type of Container: WOOD BOX

Ingredients

TOP

Cas: X Code: RTECS #: Code: X

Name: PRIMER PERCUSSION M39.HAZ ING IN OLIN CENTER FIRE PRIMER-SEE OLIN MSDS UNDER NSN 1375-00-691-1671,CAGE 99530,PART NUM A.

% Text: N/K

Environmental Wt:

OSHA PEL:

Other REC Limits: NOT KNOWN

NOT KNOWN

Code: M OSHA STEL: Code:

ACGIH TLV: NOT KNOWN

Code: M ACGIH N/P STEL: Code:

EPA Rpt Qty:

DOT Rpt Qty:

Ozone Depleting Chemical:

Hazards Data

TOP

LD50 LC50 Mixture

NOT KNOWN

Route Of Entry Inds - Inhalation: YES

Skin: NO

Ingestion: NO

Carcinogenicity Inds - NTP: NO

IARC: NO

OSHA: NO

Health Hazards Acute And Chronic

SEE SIGNS AND SYMPTOMS OF OVEREXPOSURE.

Explanation Of Carcinogenicity

NONE

Signs And Symptoms Of Overexposure

EFFECTS OF OVEREXPOSURE TO SMOKE FROM BURNING IGNITERS:EYES:SEVERE IRRITATION,BLURRED VISION. SKIN:MODERATE IRRITATION. INHALATION:IRRITATION,HEADACHE,NAUSEA,DIZZINESS.

#### Medical Cond Aggravated By Exposure

NOT KNOWN

#### First Aid

EYES:FLUSH WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES (FP A).CONSULT PHYSICIAN IMMEDIATELY. SKIN:WASH WITH SOAP & WATER.GET MEDICAL ATTENTION. INGESTION:GET MEDICAL ATTENTION. INHALATION:REMO VE TO FRESH AIR,BEGIN RESUSCITATION.GETMEDICAL ATTENTION.

#### Spill Release Procedures

ELIMINATE ALL SOURCES OF IGNITION.RECOVER ALL SPILLED UNITS AND EXAMINE FOR PHYSICAL CHANGE.

#### Neutralizing Agent

NOT KNOWN

#### Waste Disposal Methods

DISP MUST BE IAW FED,STATE,& LOC REGS.COORDINATE W/ SUPPORTING INSTALLATION/MACOM ENVIRON OFFICE PRIOR TO DISP (FP A).DETERMINE IF WASTE MEETS FED/STATE HAZ WASTE CRITERIA BECAUSE USE,MIXTURES,PROCESS ES,ETC MAY RENDER MATERIAL HAZARDOUS.

#### Handling And Storage Precautions

DESIGNED FOR MILITARY USE OR COMMERCIAL BLASTING OPERATIONS ONLY BY PERSONNEL THOROUGHLY TRAINED IN HANDLING/USE.NOT DESIGNED FOR RECREATIONAL USE.

#### Other Precautions

LABEL AS EXPLOSIVE.

===== Fire and Explosion Hazard Information =====	TOP
---	-----

Flash Point Method:

N/P

Flash Point:

Flash Point Text: NOT KNOWN

Autoignition Temp:

Autoignition Temp Text: N/A

Lower Limits: NOT KNOWN

Upper Limits: NOT KNOWN

### Extinguishing Media

WATER SPRAY, DRY SAND, TALC, DRY GRAPHITE.

### Fire Fighting Procedures

WEAR SELF-CONTAINED BREATHING APPARATUS, PROTECTIVE BODY AND HEAD GEAR. MAINTAIN SAFE DISTANCE FROM BURNING MATERIALS.

### Unusual Fire/Explosion Hazard

FLAMMABLE WHEN EXPOSED TO OPEN FLAME, EXCESSIVE HEAT OR IMPACT.

=====  
Measures Control TOP

### Respiratory Protection

CONTACT LOCAL SAFETY/INDUSTRIAL HYGIENE OFFICE TO DETERMINE IF RESPIRATORY PROTECTION IS REQUIRED (FP A).

### Ventilation

CONTACT LOCAL SAFETY/INDUSTRIAL HYGIENE OFFICE TO DETERMINE IF LOCAL EXHAUST VENTILATION IS NEEDED (FP A).

### Protective Gloves

NOT KNOWN

### Eye Protection

CHEMICAL SAFETY GOGGLES (FP A).

### Other Protective Equipment

NOT KNOWN

### Work Hygienic Practices

LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.

### Supplemental Safety and Health

CONTRACT #: DAAA09-91-R-0873. HAZARDOUS INGREDIENTS ARE IN OLIN CENTER FIRE PRIMER-SEE OLIN MSDS UNDER NSN 1375-00-691-1671, CAGE 99530, PART NUM A.

=====  
Physical/Chemical Properties TOP

HCC:

NRC/State LIC No: N/R

Net Prop WT For Ammo:

Boiling Point:

B.P. Text: N/A

Melt/Freeze Pt:

M.P/F.P Text: NOT KNOWN

Decomp Temp:

Decomp Text: NOT KNOWN

Vapor Pres: N/A

Vapor Density: N/A

Volatile Org Content %:

Spec Gravity: N/A

VOC Pounds/Gallon:

PH: N/A

VOC Grams/Liter:

Viscosity: N/P

Evaporation Rate & Reference: N/A

Solubility in Water: INSOLUBLE

Appearance and Odor: ODORLESS, GREEN PLASTIC, POLYAMIDE, NYLON TUBE (ASSEMBLY).

Percent Volatiles by Volume: N/K

Corrosion Rate: N/K

Reactivity Data

[TOP](#)

Stability Indicator:

YES

Stability Condition To Avoid: HEAT AND FLAME.

Materials To Avoid: N/A

Hazardous Decomposition Products: SMOKE FROM BURNING IGNITERS.

Hazardous Polymerization Indicator: NO

Conditions To Avoid Polymerization WILL NOT OCCUR.

:

Toxicological Information

[TOP](#)

Toxicological Information:

N/P

=====  
===== Ecological Information  
=====

[TOP](#)

Ecological:

N/P

=====  
===== Information  
=====

=====  
===== MSDS Transport  
=====

[TOP](#)

Transport Information:

N/P

=====  
===== Regulatory Information  
=====

[TOP](#)

Sara Title III Information:

N/P

Federal Regulatory Information: N/P

State Regulatory Information: N/P

=====  
===== Other Information  
=====

[TOP](#)

Other Information:

N/P

=====  
=====

This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever expressly or implied warrants, states, or intends said information to have any application, use or viability by or to any person or persons outside the Department of Defense nor any person or persons contracting with any instrumentality of the United States of America and disclaims all liability for such use. Any person utilizing this instruction who is not a military or civilian employee of the United States of America should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation regardless of similarity to a corresponding Department of Defense or other government situation.



# Material Safety Data Sheet (MSDS-DET)

PRODUCT IDENTIFICATION	
Product Name	Detonators, Class 1.4 Explosive
Trade Names and Synonyms <sup>1</sup>	Non-electric detonators, electric detonators, detonating fuzes, EFI detonators, EBW detonators
Manufacturer/Distributor	Various
Transportation Emergency	800-255-3924 (24 hrs -- <i>CHEM • TEL</i> )

## PREVENTION OF ACCIDENTS IN THE USE OF EXPLOSIVES

The prevention of accidents in the use of explosives is a result of careful planning and observance of the best known practices. The explosives user must remember that he is dealing with a powerful force and that various devices and methods have been developed to assist him in directing this force. He should realize that this force, if misdirected, may either kill or injure both him and his fellow workers.

### **WARNING**

**All explosives are dangerous** and must be carefully handled and used following approved safety procedures either by or under the direction of competent, experienced persons in accordance with all applicable federal, state, and local laws, regulations, or ordinances. If you have any questions or doubts as to how to use any explosive product, **DO NOT USE IT** before consulting with your supervisor, or the manufacturer, if you do not have a supervisor. If your supervisor has any questions or doubts, he should consult the manufacturer before use.

<sup>1</sup> If needed, an MSDS Supplement Page is available to describe specific item references

HAZARDOUS COMPONENTS			
Material or Component	CAS No.	TLV	PEL
<b>Black Powder</b>	N/A	NE	NE
<b>PETN</b> (Pentaerythritol Tetranitrate)	00078-11-5	NE	NE
<b>RDX</b> (Cyclotrimethylenetrinitramine)	00121-82-4	1.5 mg/m <sup>3</sup>	1.5 mg/m <sup>3</sup>
<b>HMX</b> (Cyclotetramethylenetetranitramine)	026914-41-0	NE	NE
<b>HNS</b> (Hexanitrostilbene)	20062-22-0	NE	NE
<b>PYX</b> (Picrylamino-dinitropyridine)	38082-89-2	NE	NE
<b>TACOT</b> (Tetranitrodibento-tetra-azapentalene)	25243-36-1	NE	NE
<b>Lead azide</b> (TLV & PEL given for lead)	13424-46-9	0.15 mg/m <sup>3</sup>	50 µg/m <sup>3</sup>
<b>Lead Styphnate</b> (TLV & PEL given for lead)	15245-44-0	0.15 mg/m <sup>3</sup>	50 µg/m <sup>3</sup>
<b>Aluminum</b>	07429-90-5	5 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>
<b>Corrosion resistant steel</b>	N/A	NE	NE
<b>Iron</b>	07439-89-6	5 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>
<b>Copper</b>	07440-50-8	1 mg/m <sup>3</sup>	1 mg/m <sup>3</sup>
<i>Detonators may contain and/or be constructed of one or more of the items listed above</i>			
N/A = Not assigned    NE = Not established			

PHYSICAL DATA
Metal shells containing explosives, with or without insulated metal leg wires.

HAZARDOUS REACTIVITY	
<b>Instability</b>	Detonates with friction, impact, heat, low level electrical current, electrostatic or RF energy
<b>Incompatibility</b>	Acids and alkalis
<b>Hazardous decomposition</b>	Detonation produces hazardous fragments. Gases produced may contain iron, lead, carbon and nitrogen oxides
<b>Polymerization</b>	Polymerization will not occur

FIRE AND EXPLOSION DATA	
<b>Flashpoint</b>	Not applicable
<b>Extinguishing media</b>	None
<b>Special fire fighting procedures</b>	<b>ALL EXPLOSIVES: DO NOT FIGHT EXPLOSIVES FIRES.</b> Try to keep fire from reaching explosives. Isolate area. Guard against intruders.  Division 1.4 Explosives: Evacuate the area for 1500 feet (1/3 mile). Consult <i>the 2000 Emergency Response Guidebook, Guide 114</i> for further details.
<b>Unusual fire and explosion hazards</b>	May detonate with impact or on heating



<b>HEALTH HAZARDS</b>	
<b>General</b>	<p>Detonators do not present health hazards in normal handling and use; however, the products are Division 1.4 explosives, and detonation may cause severe physical injury, including death. All explosives are dangerous and must be handled carefully and used following approved safety procedures under the direction of competent, experienced persons in accordance with all applicable federal, state, and local laws, regulations, and ordinances.</p> <p>Inhalation of explosives powders may cause nervous system irregularities including headaches and dizziness.</p> <p>Overexposure to lead may cause adverse effects to the blood forming, nervous, urinary, reproductive systems, including weakness, weight loss, insomnia, constipation, anemia, motor weakness, and encephalopathy. Lead may penetrate the placental barrier and has caused congenital abnormalities in animals. Several animal studies have indicated that high doses of lead may be carcinogenic.</p> <p>Nitrogen oxides generated during use are skin, eye, and respiratory tract irritants.</p>
<b>Carcinogenicity</b>	None of the components of detonators are listed as a carcinogen by NTP, IARC, or OSHA.

<b>FIRST AID</b>	
<b>Inhalation</b>	Not a likely route of exposure. If inhaled, remove to fresh air. If not breathing, give artificial respiration, preferably by mouth-to-mouth. If breathing is difficult, give oxygen. Seek prompt medical attention.
<b>Eye and skin contact</b>	Not a likely route of exposure.
<b>Ingestion</b>	Not a likely route of exposure.
<b>Injury from detonation</b>	Seek prompt medical attention.



<b>SPILL OR LEAK PROCEDURES</b>	
<b>Spill/leak response</b>	Use appropriate personal protective equipment. Isolate area and remove sources of friction, impact, heat, low level electrical current, electrostatic or RF energy. Only competent, experienced persons should be involved in cleanup procedures. Sweep up with non-sparking tools and remove.
<b>Waste disposal</b>	Dispose of in compliance with federal regulations under the authority of the <i>Resource Conservation and Recovery Act</i> (40 CFR Parts 260-271).

<b>SPECIAL PROTECTION INFORMATION</b>	
<b>Ventilation</b>	Use only with adequate ventilation.
<b>Respiratory</b>	NIOSH approved particle masks for dust and mist.
<b>Eye</b>	Safety glasses or goggles.
<b>Gloves</b>	Impervious rubber gloves.
<b>Other</b>	Cotton overalls, undergarments, and socks. Conductive soled shoes.

<b>SPECIAL PRECAUTIONS</b>	
Keep away from friction, impact, and heat. Do not consume food, drink, or tobacco in areas where they may become contaminated with these materials.	

<b>STORAGE CONDITIONS</b>	
Store in accordance with the requirements of <i>Subpart K, ATF: Explosives Law and Regulations</i> (27 CFR 555.201-555.219).	

## SHIPPING INFORMATION

<b>Basic Description</b>	<p>This MSDS applies to any of the following DOT Basic descriptions. If supplying this MSDS in fulfillment of the requirements of 49 CFR 172.602, place a check mark in the box next to the basic description being transported.</p> <p> <input type="checkbox"/> UN0456, Detonators, electric, 1.4S  <input type="checkbox"/> UN0455, Detonators, non-electric, 1.4S  <input type="checkbox"/> UN0367, Fuzes, detonating, 1.4S  <input type="checkbox"/> UN0410, Fuzes, detonating, 1.4D         </p>	
<b>DOT Label &amp; Placard</b>	DOT Label	<p>Products described in this MSDS may bear one of the following labels on each outer packaging. The actual label present will depend upon the hazard classification approved by the U.S. Department of Transportation.</p> <div style="text-align: center;">  <p>UN0367, UN0455, UN0456 (1.4S products)      UN0410 (1.4D products)</p> </div>
	DOT Placard	<p>Transport vehicles transporting products described in this MSDS may be placarded in accordance with DOT requirements utilizing one or more of the following placards. The actual placard(s) present will depend upon the hazard classification approved by the U.S. Department of Transportation.</p> <div style="text-align: center;">  <p>UN0367, UN0455, UN0456 (1.4S products)      UN0410 (1.4D products)      &lt; OR &gt; (1.4D &amp; 1.4S products)</p> </div>

The information contained in this Material Safety Data Sheet is based upon available data and believed to be correct; however, as such has been obtained from various sources, including the manufacturer and independent laboratories, it is given without warranty or representation that it is complete, accurate, and can be relied upon. *OWEN COMPLIANCE SERVICES, INC.* has not attempted to conceal in any manner the deleterious aspects of the product listed herein, but makes no warranty as to such. Further, *OWEN COMPLIANCE SERVICES, INC.* cannot anticipate nor control the many situations in which the product or this information may be used; there is no guarantee that the health and safety precautions suggested will be proper under all conditions. It is the sole responsibility of each user of the product to determine and comply with the requirements of all applicable laws and regulations regarding its use. This information is given solely for the purposes of safety to persons and property. Any other use of this information is expressly prohibited.

**For further information contact:**

David W. Boston, President  
*OWEN COMPLIANCE SERVICES, INC.*  
12001 County Road 1000  
P.O. Box 765  
Godley, TX 76044  
Telephone number: 817-551-0660  
FAX number: 817-396-4584

**MSDS prepared by:**

David W. Boston  
Original publication date: 03/15/93  
Revision date: 1/22/10  
2/22/06  
12/03/03

# Material Safety Data Sheet

**Dyno Nobel Inc.**

2650 Decker Lake Boulevard, Suite 300  
Salt Lake City, Utah 84119  
Phone: 801-364-4800 Fax: 801-321-6703  
E-Mail: [dna.hse@am.dynonobel.com](mailto:dna.hse@am.dynonobel.com)

**FOR 24 HOUR EMERGENCY, CALL** CHEMTREC (USA) 800-424-9300  
CANUTEC (CANADA) 613-996-6666

**MSDS # 1126**  
**Date 08/13/08**

Supersedes  
MSDS # 1126 01/24/05

## SECTION I - PRODUCT IDENTIFICATION

**Trade Name(s):** PRIMALINE®  
PRIMACORD®  
PRIMASHEAR™  
OPTICORD®  
GEOSEIS®  
LOW FLEX™  
FIRELINE CORD

**Product Class:** Detonating Cord

**Product Appearance & Odor:** Flexible cord of woven textile with a protected explosive core of PETN (white crystalline powder) and covered by a white or colored plastic or textile jacket. May have a waxed finish. No odor.

**DOT Hazard Shipping Description:** UN0065 Cord, Detonating 1.1D II

**NFPA Hazard Classification:** Not Applicable (See Section IV - Special Fire Fighting Procedures)

## SECTION II - HAZARDOUS INGREDIENTS

Ingredients	CAS#	%	Occupational Exposure Limits	
			OSHA PEL-TWA	ACGIH TLV-TWA
Pentaerythritol tetranitrate (PETN)	78-11-5	-----*	None <sup>1</sup>	None <sup>2</sup>

<sup>1</sup> Use limit for particulates not otherwise regulated (PNOR): Total dust, 15 mg/m<sup>3</sup>; respirable fraction, 5 mg/m<sup>3</sup>.

<sup>2</sup> Use limit for particulates not otherwise classified (PNOC): Inhalable particulate, 10 mg/m<sup>3</sup>; respirable part., 3 mg/m<sup>3</sup>.

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in de minimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

\* Core powder is 100% PETN. The approximate amount of PETN in a given grade of cord is expressed as that number of grams of PETN per linear meter of cord. Range is from 1 to 280 gram/meter. Example: PRIMALINE® 5 contains approximately 5 grams PETN per meter of cord. (1 gram/meter = 4.7 grains/foot)

## SECTION III - PHYSICAL DATA

**Boiling Point:** Not Applicable (PETN decomposes at melting point, about 141°C)

**Vapor Pressure:** Not Applicable

**Percent Volatile by Volume:** Not Applicable

**Vapor Density:** (Air = 1) Not Applicable

**Solubility in Water:** Insoluble.

# Material Safety Data Sheet

## SECTION IV - FIRE AND EXPLOSION HAZARD DATA

**Extinguishing Media:** (See Special Fire Fighting Procedures section.)

**Special Fire Fighting Procedures:** Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe, distant location. Allow fire to burn unless it can be fought remotely or with fixed extinguishing systems (sprinklers). For transportation fires involving large quantities of detonating cord, such as a trailer load, evacuate no less than 2,500 feet in all directions.

**Unusual Fire and Explosion Hazards:** Can explode or detonate under fire conditions. Burning or detonating material may produce toxic vapors.

## SECTION V - HEALTH HAZARD DATA

### Effects of Overexposure

This is a packaged product that will not result in exposure to the explosive core material under normal conditions of use.

**Eyes:** May cause irritation, redness and tearing.

**Skin:** PETN is not known as a skin irritant or sensitizer.

**Ingestion:** PETN is moderately toxic if ingested. See systemic effects below.

**Inhalation:** See systemic effects below.

**Systemic or Other Effects:** PETN is a known coronary vasodilator, and ingestion or inhalation may result in a lowering of blood pressure, headache or faintness, and a decreased tolerance for grain alcohol. Repeated over-exposure may result in chest pains in the absence of exposure. Systemic effects by ingestion include dermatitis.

**Carcinogenicity:** No constituents are listed by NTP, IARC or OSHA.

### Emergency and First Aid Procedures

**Eye:** Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.

**Skin:** Wash with soap and water.

**Ingestion:** Seek medical attention.

**Inhalation:** Remove to fresh air. If symptoms persist, seek medical attention.

**Special Considerations:** None.

## SECTION VI - REACTIVITY DATA

**Stability:** Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact, especially when confined or in large quantities.

**Conditions to Avoid:** Keep away from heat, flame, ignition sources, impact, friction, electrostatic discharge and strong shock.

**Materials to Avoid (Incompatibility):** Corrosives (strong acids and strong bases or alkalis).

**Hazardous Decomposition Products:** Nitrogen Oxides (NO<sub>x</sub>), Carbon Monoxide (CO)

**Hazardous Polymerization:** Will not occur.

## SECTION VII - SPILL OR LEAK PROCEDURES

**Steps to be taken in Case Material is Released or Spilled:** Protect from all ignition sources. In case of fire evacuate all personnel to a safe distant area and allow to burn or fight fire remotely. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If explosive powder is spilled from damaged detonating cord, remove all other explosives from the spill area. Wet down and clean spilled powder using a damp sponge or rag, avoid applying friction or pressure to the explosive, and place in a (Velostat) electrically conductive bag. Contamination of this material with sand, grit or dirt will render the material more sensitive to detonation. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other

# Material Safety Data Sheet

clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State, and local spill reporting requirements.

**Waste Disposal Method:** Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

## SECTION VIII - SPECIAL PROTECTION INFORMATION

**Ventilation:** Not required for normal handling.

**Respiratory Protection:** None normally required.

**Protective Clothing:** Work gloves and work clothing that reduce the possibility of skin abrasion and that would prevent contact with spilled explosive powder is suggested.

**Eye Protection:** Safety glasses or goggles are recommended.

**Other Precautions Required:** None.

## SECTION IX - SPECIAL PRECAUTIONS

**Precautions to be taken in handling and storage:** Store in cool, dry, well-ventilated location. Store in compliance with Federal, State and local regulations. Only properly qualified and authorized personnel should handle and use explosives. Keep away from heat, flame, ignition sources, impact, friction, electrostatic discharge and strong shock.

**Precautions to be taken during use:** Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death. Avoid breathing the fumes or gases from detonation of explosives. Detonation in confined or unventilated areas may result in exposure to hazardous fumes or oxygen deficiency.

**Other Precautions:** It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

## SECTION X - SPECIAL INFORMATION

This product contains the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

<u>Chemical Name</u>	<u>CAS Number</u>	<u>% By Weight</u>
None		

### Disclaimer

Dyno Nobel Inc. and its subsidiaries disclaim any warranties with respect to this product, the safety or suitability thereof, the information contained herein, or the results to be obtained, whether express or implied, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND/OR OTHER WARRANTY. The information contained herein is provided for reference purposes only and is intended only for persons having relevant technical skills. Because conditions and manner of use are outside of our control, the user is responsible for determining the conditions of safe use of the product. Buyers and users assume all risk, responsibility and liability whatsoever from any and all injuries (including death), losses, or damages to persons or property arising from the use of this product or information. Under no circumstances shall either Dyno Nobel Inc. or any of its subsidiaries be liable for special, consequential or incidental damages or for anticipated loss of profits.



# Material Safety Data Sheet (MSDS-RDX)

PRODUCT IDENTIFICATION	
Product Name	RDX
Trade Names and Synonyms	Cyclotrimethylenetrinitramine, Cyclonite, Hexogen, Composition A-6
Manufacturer/Distributor	Various
Transportation Emergency	<b>800-255-3924 (24 hrs -- CHEM • TEL)</b>

## PREVENTION OF ACCIDENTS IN THE USE OF EXPLOSIVES

The prevention of accidents in the use of explosives is a result of careful planning and observance of the best known practices. The explosives user must remember that he is dealing with a powerful force and that various devices and methods have been developed to assist him in directing this force. He should realize that this force, if misdirected, may either kill or injure both him and his fellow workers.

## **WARNING**

**All explosives are dangerous** and must be carefully handled and used following approved safety procedures either by or under the direction of competent, experienced persons in accordance with all applicable federal, state, and local laws, regulations, or ordinances. If you have any questions or doubts as to how to use any explosive product, **DO NOT USE IT** before consulting with your supervisor, or the manufacturer, if you do not have a supervisor. If your supervisor has any questions or doubts, he should consult the manufacturer before use.

HAZARDOUS COMPONENTS			
Material or Component	CAS No.	TLV	PEL
RDX (Cyclotrimethylenetrinitramine)	00121-82-4	1.5 mg/m <sup>3</sup>	1.5 mg/m <sup>3</sup>
Desensitizing Wax	N/A	NE	NE
Graphite	07782-42-5	15 mppct (TWA)	2.5 mg/m <sup>3</sup>
Water	N/A	NE	NE
Methanol	00067-56-1	325 mg/m <sup>3</sup> (STEL)	260 mg/m <sup>3</sup>
N/A = Not assigned    NE = Not established			

PHYSICAL DATA	
Boiling Point	N/A
Vapor Pressure	4.08 x 10 <sup>-5</sup> @ 100°C
Vapor Density	N/A
Solubility in Water	0.15 % @ 100°C
Specific Gravity	1.820
Melting Point	>203°C + 1°C
Evaporation Rate	N/A
Appearance and Odor	White or gray (if graphite present) powder. Powder may be wet (desensitized) with water (odorless) or a water-alcohol mixture (methanol odor). Powder may be dry and desensitized with wax (paraffin odor)

HAZARDOUS REACTIVITY	
Instability	Detonates with friction, impact, heat, electrostatic energy.
Incompatibility	Acids and alkalis, some organics such as amines and chlorides.
Hazardous decomposition	Detonation produces hazardous overpressures and fragments (if confined). Gases produced may contain carbon monoxide and nitrogen oxide.
Polymerization	Polymerization will not occur.

FIRE AND EXPLOSION DATA	
Flashpoint	Not applicable
Extinguishing media	None
Special fire fighting procedures	<b>ALL EXPLOSIVES: DO NOT FIGHT EXPLOSIVES FIRES.</b> Try to keep fire from reaching explosives. Isolate area. Guard against intruders.  Division 1.1 Explosives: Evacuate the area for 5000 feet (1 mile). Consult <i>the 2000 Emergency Response Guidebook, Guide 112</i> for further details..
Unusual fire and explosion hazards	May detonate with impact or on heating.



<b>HEALTH HAZARDS</b>	
<b>General</b>	<p>RDX is a Division 1.1 explosive, and detonation may cause severe physical injury, including death. All explosives are dangerous and must be handled carefully and used following approved safety procedures under the direction of competent, experienced persons in accordance with all applicable federal, state, and local laws, regulations, and ordinances.</p> <p>RDX is toxic by ingestion. In chronic animal studies by ingestion, RDX caused lung and GI tract congestion, anxiety psychoses, central nervous system diseases, abnormal reflexes, and death. It was not mutagenic in bacterial cell cultures.</p> <p>Reported human health effects include convulsions, insomnia, restlessness, and irritability. Seizures were followed by temporary amnesia, nausea, and weakness. Immediately after convulsions, there was evidence of rapid pulse rate and hypertension. Recovery was eventually complete. RDX was not a human skin irritant and an epidemiology study did not identify any abnormalities attributed to RDX exposure.</p> <p>Inhalation of explosive powders may cause nervous system irregularities including headaches and dizziness.</p> <p>Nitrogen oxides generated during use are skin, eye, and respiratory tract irritants.</p>
<b>Toxicity</b>	Oral LD50: 100 g/kg in rats.
<b>Carcinogenicity</b>	None of the components of RDX are listed as a carcinogen by NTP, IARC, or OSHA.

<b>FIRST AID</b>	
<b>Inhalation</b>	Not a likely route of exposure. If inhaled, remove to fresh air. If not breathing, give artificial respiration, preferably by mouth-to-mouth. If breathing is difficult, give oxygen. Seek prompt medical attention.
<b>Eye and skin contact</b>	Not a likely route of exposure. Flush eyes with water. Wash skin with soap and water
<b>Ingestion</b>	Not a likely route of exposure. Induce vomiting immediately by giving two glasses of water and sticking finger down throat.
<b>Injury from detonation</b>	Seek prompt medical attention.

<b>SPILL OR LEAK PROCEDURES</b>	
<b>Spill/leak response</b>	Use appropriate personal protective equipment. Isolate area and remove sources of friction, impact, heat, low level electrical current, electrostatic or RF energy. Only competent, experienced persons should be involved in cleanup procedures. Sweep up with non-sparking tools and remove.
<b>Waste disposal</b>	Dispose of in compliance with federal regulations under the authority of the <i>Resource Conservation and Recovery Act</i> (40 CFR Parts 260-271).

<b>SPECIAL PROTECTION INFORMATION</b>	
<b>Ventilation</b>	Use only with adequate ventilation.
<b>Respiratory</b>	NIOSH approved particle masks for dust and mist.
<b>Eye</b>	Safety glasses or goggles.
<b>Gloves</b>	Impervious rubber gloves.
<b>Other</b>	Cotton overalls, undergarments and socks. Conductive soled shoes

<b>SPECIAL PRECAUTIONS</b>	
Keep away from friction, impact, and heat. Do not consume food, drink, or tobacco in areas where they may become contaminated with these materials.	

### STORAGE CONDITIONS

Store in accordance with the requirements of *Subpart K, ATF: Explosives Law and Regulations (27 CFR 55.201-55.219)*.

### SHIPPING INFORMATION

<b>Proper shipping name</b>	RDX, Wetted	
<b>Hazard class</b>	1.1D	
<b>UN Number</b>	UN0072	
<b>DOT Label &amp; Placard</b>	DOT Label	EXPLOSIVE 1.1D
	DOT Placard	EXPLOSIVES 1.1

The information contained in this Material Safety Data Sheet is based upon available data and believed to be correct; however, as such has been obtained from various sources, including the manufacturer and independent laboratories, it is given without warranty or representation that it is complete, accurate, and can be relied upon. *OWEN COMPLIANCE SERVICES, INC.* has not attempted to conceal in any manner the deleterious aspects of the product listed herein, but makes no warranty as to such. Further, *OWEN COMPLIANCE SERVICES, INC.* cannot anticipate nor control the many situations in which the product or this information may be used; there is no guarantee that the health and safety precautions suggested will be proper under all conditions. It is the sole responsibility of each user of the product to determine and comply with the requirements of all applicable laws and regulations regarding its use. This information is given solely for the purposes of safety to persons and property. Any other use of this information is expressly prohibited.

**For further information contact:**

David W. Boston, President  
*OWEN COMPLIANCE SERVICES, INC.*  
12001 County Road 1000  
P.O. Box 765  
Godley, TX 76044  
Telephone number: 817-551-0660  
FAX number: 817-396-4584

**MSDS prepared by:**

David W. Boston  
Original publication date: 03/15/93  
Review date: 2/22/06  
12/03/03

**1. PRODUCT AND COMPANY IDENTIFICATION**

Name: **Single-base smokeless powder, propellant.**

Trade Names and Synonyms: **Accurate:: Solo 1000, Solo 1250, 2015, 2495, 4064, 4350, 3100**

Distributed By: **WESTERN POWDERS, INC.**

P.O. Box 158  
Miles City, Montana 59301  
Telephone: (406)234-0422  
Toll Free: (800)497-1007

**Transportation Emergencies – Chemtrec – 1-800-424-9300**

**2. HAZARD IDENTIFICATION**

**Emergency Overview – Danger! Extremely Flammable – Explosive.**

**Accidental Fire or Explosion is Likely to Cause Severe Injury or Death.**

**Avoid Exposure to all Sources of Heat or Flame, Electrical Sparks, Static Electricity, and Shock.**

**OSHA Regulatory Status - This product may be considered to be a hazardous chemical under OSHA Hazard Communication Standard 29 CFR 1910.1200.**

**Applicable OSHA Classifications: Explosive, Toxic, ,Skin and Eye Irritant**

**Potential Health Effects – Eye contact may cause irritation. Acute contact may cause skin irritation. Acute exposure may cause irritation to nose, mouth, throat and lungs. Ingestion may cause irritation to gastrointestinal tract. Nausea, vomiting and abdominal pain may also occur. Some components of this granular mixture may be absorbed directly through the skin.**

**Neither this product nor any of its ingredients (except Dinitrotoluene) are listed as carcinogens by OSHA, NIOSH-NTP and IARC. Per IARC 28 Dinitrotoluene is listed as possibly carcinogenic to humans.**

**Potential Environmental Effects: Ecological studies on this product unknown. Some components are known to be harmful to aquatic organisms**

**3. COMPOSITION / INFORMATION ON INGREDIENTS**

COMPONENT	CAS #	wt. %
Nitrocellulose	9004-70-0	<98
Dinitrotoluene	121-14-2	0 - 16
Diphenylamine	122-39-4	0.5 – 3.0
Potassium nitrate	7757-79-1	0 – 1.5
Potassium sulfate	7778-80-5	0 – 1
Graphite	7782-42-5	1.5 max.
Ethyl Centralite	85-98-3	0 - 6
Methyl Centralite	611-92-7	0 – 2

**4. FIRST AID MEASURES**

**EYES:** Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If eye irritation develops, call a physician.

**Section 4 - Continued**

**SKIN :** Immediately wash with soap water for at least 15 minutes. Call a physician if needed. If clothing comes in contact with the product, the clothing should be removed immediately and should be laundered before re-use.

**INGESTION:** Immediately drink large quantities of water. Induce vomiting. Call a physician at once. When vomiting occurs, keep head lower than hips to help prevent aspiration. DO NOT give anything by mouth if the person is unconscious or if having convulsions.

**INHALATION:**

- If person experiences nausea, headache or dizziness, person should stop work immediately and move to fresh air until these symptoms disappear. If breathing is difficult, administer oxygen, keep person warm and at rest. Call physician.
- In event that an individual inhales enough vapor to lose consciousness, person should be moved to fresh air at once and a physician should be called immediately. If breathing has stopped, artificial respiration should be given immediately.
- In all cases, ensure adequate ventilation and provide respiratory protection before the person returns to work.

**5. FIRE FIGHTING MEASURES**

**DANGER!!**      **Extremely Flammable – Explosives**  
**Accidental Explosion May Cause Severe Injury or Death**  
**Evacuate the area immediately in case of emergency.**

**FLASH POINT:**                      Not Determined  
**FLAMMABLE LIMITS:**            Not Determined  
**AUTOIGNITION TEMPERATURE:**    160°C – 180°C (320° F - 360°F)  
    No explosion – 5 hours at 120°C (248°F)

**EXTINGUISHING MEDIA:**

Apply large volumes of water as quickly as possible from automatic sprinklers or with fire hose from a distant, protected location. FIGHT EXPLOSIVE FIRES ONLY FROM WELL PROTECTED, DISTANT (FROM POINT OF FIRE) LOCATION. Since product is self-oxidizing, smothering agents such as dry chemical, carbon dioxide, or foam are ineffective.

**PERSONAL PROTECTION FOR FIREFIGHTING**

Self contained breathing apparatus (SCBA) and protective clothing, to include impervious boots, gloves, hard hat, and chemically impermeable suit. Eye and face protection. Wash all clothing prior to reuse.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:**

Product is self oxidizing. Products are propellant explosives and are extremely flammable and readily ignited. Protect from fire, sparks, impact and high temperatures. DO NOT move or approach containers which have been damaged due to exposure to heat. Keep unnecessary people away, isolate hazard area. Use only trained and qualified clean up personnel wearing appropriate protective clothing to clean up heat damaged product.

**HAZARDOUS DECOMPOSITION PRODUCTS:** None expected, if stored and handled as in Section 7.

**HAZARDOUS PRODUCTS OF COMBUSTION.** Combustion products vary depending on fire conditions and other combustibles present in the fire. The predominant products will be carbon dioxide, and nitrogen oxides. Under some conditions, methane, carbon monoxide, irritating aldehydes and carboxylic acids, and hydrogen cyanide may be formed.

**6. ACCIDENTAL RELEASE MEASURES**

**SPILL PROCEDURES:**

Clean up spills immediately using soft bristle brush and conductive rubber or plastic shovel. Use caution, material is sensitive to initiation from sources such as heat, flame, impact, friction or sparks.

**AIR RELEASE:**                      Not applicable

**Section 6 - Continued****WATER RELEASE:**

- This material is heavier than water. Create an overflow dam with filtration capabilities to retain material.
- Divert water flow or stop if possible. Gather wet material using non-sparking or plastic utensils.
- Keep material damp until ready for disposal.

**LAND SPILL:**

- Clean up of spill materials may be accomplished using non-sparking or plastic utensils. Wear non-flammable or flame retardant clothing at all times. Wet all spill materials prior to initiating clean up procedure.
- Material may best be destroyed by controlled open burning in small quantities (maximum about 1 pound) in piles not over 1 inch deep. Use an ignition train of slow-burning, combustible materials to permit retreat to a safe distance before powder is ignited. Stay upwind, do not breathe products of combustion. Burn only with permission of all appropriate regulatory agencies.

**WASTE DISPOSAL:**

- If this product becomes a waste, it meets the criteria of a hazardous waste as defined under 40 CFR 261 and would have the following EPA hazardous waste number: D003
- If this product becomes a waste, it will be a hazardous waste which is subject to the Land Disposal Restrictions under 40 CFR 268 and must be managed accordingly.
- If this material becomes a waste, it can be disposed by controlled open burning in small quantities, as described above, with proper local agency authorization.

**CARE MUST BE TAKEN TO PREVENT ENVIRONMENTAL CONTAMINATION FROM THE USE OF THIS MATERIAL. THE USER HAS THE RESPONSIBILITY TO DISPOSE OF UNUSED MATERIAL, RESIDUES AND CONTAINERS IN COMPLIANCE WITH ALL RELEVANT LOCAL, STATE AND FEDERAL LAWS AND REGULATIONS REGARDING TREATMENT, STORAGE AND DISPOSAL FOR HAZARDOUS AND NONHAZARDOUS WASTES.**

<b>7. HANDLING AND STORAGE</b>
--------------------------------

**HANDLING AND STORAGE PRECAUTIONS:**

- For handling and storage requirements see 29 CFR 1920.109. Also see <<Properties and Storage of Smokeless Powder>> published by the SPORTING ARMS AND AMMUNITION MANUFACTURES' INSTITUTE; INC. (SAAMI), PO Box 838, Brandford, CT 06405.
- This product may react with acids, oxidizing agents, alkalizes or amines (organic and inorganic) and should not be stored near such materials.
- Avoid exposure to sunlight or artificial ultraviolet light.
- Recommended storage conditions -: 21°C (70°F) 50% relative humidity.
- Keep away from heat, sparks and open flame.
- Store in a cool, dry place.
- Do not store smokeless powder in the same area with solvents, flammable gases or highly combustible materials.
- Must be stored in original DOT approved containers or shipping container.
- Do not smoke in areas where powder is stored or used. (50 ft. minimum distance required).
- Do not keep old or salvaged powders. Check old powders for deterioration regularly. Destroy deteriorated powders immediately.

**Section 7 – continued.**

- Empty containers may contain residues of powder, and should be treated as hazardous waste.

**ENGINEERING CONTROLS:**

Adequate ventilation should be provided to keep dust concentrations below acceptable exposure limits. Discharge from the ventilation system should comply with applicable air pollution control regulations.

**PROTECTIVE MEASURES DURING REPAIR AND MAINTENANCE:**

Eliminate ignition sources and prevent build-up of static electric charges. Thoroughly clean up all powder grains and dust residues in the maintenance and repair areas before starting work.

**8. EXPOSURE CONTROL / PERSONAL PROTECTION**

**ESTABLISHED EXPOSURE LIMITS**

COMPONENT	OSHA (PEL)	ACGIH (TLV)
Nitrocellulose	None established	None established
Diphenylamine	Not established	10 mg/m <sup>3</sup> TWA
Potassium nitrate	None established	
Ethyl Centralite	None established	
Methyl Centralite	None established	
Graphite	15 mg/m <sup>3</sup> total dust 5 mg/m <sup>3</sup> respirable dust	2 mg/m <sup>3</sup> Respirable dust
Potassium sulfate	None established	None established
Dinitrotoluene	1.5 mg/m <sup>3</sup> , skin	1.5 mg/m <sup>3</sup> , skin

**PERSONAL PROTECTIVE EQUIPMENT**

- Safety glasses or goggles with side shields.
- Impervious gloves.
- Appropriate respiratory protection required when exposure to airborne containment is likely to exceed acceptable limits. Respirators should be selected and used in accordance with OSHA Subpart I (29 CFR 1910.134) and manufacturer's recommendations.
- Flame-retardant cotton coveralls and conductive safety shoes.

**ENGINEERING CONTROLS**

Adequate ventilation should be provided to keep dust concentrations below acceptable exposure limits. Discharge from the ventilation system should comply with applicable air pollution control regulations. Use a local mechanical ventilation system if needed, preferably with explosion proof construction, and with a suitable dust filter installed at inlet to suction piping to the system to prevent accumulation of explosive dust in ventilation piping and blower.

**9. PHYSICAL AND CHEMICAL PROPERTIES**

<b>Appearance</b>	Granular Solid Mixture, silvery gray to black
<b>Freezing Point</b>	Not Applicable
<b>Boiling Point</b>	Not Applicable
<b>Decomposition Temperature</b>	Decomposition becomes measurable above 50° C (122°F)
<b>Autoignition Temperature</b>	160°C - 180°C (320° F - 360°F)
<b>Specific Gravity</b>	1.2 - 1.6
<b>Bulk Density</b>	0.5 - 1.1 (g/cc)
<b>pH 25 Deg. C</b>	Not Applicable
<b>Solubility in Water</b>	Negligible
<b>Volatiles, Percent By Volume</b>	<2
<b>Vapor Pressure 25 Deg. C</b>	<1mm Hg
<b>Evaporation Rate</b>	Negligible
<b>Vapor Density</b>	Not Applicable
<b>Molecular Weight</b>	Not Applicable - mixture
<b>Odor</b>	None
<b>Coefficient of Oil/Water Distribution</b>	No Data

**10. STABILITY AND REACTIVITY**

**INSTABILITY:** Unstable with heat, unstable with static charges, and unstable with impact. Not usual hazards when stored and used properly.

**INCOMPATIBILITY:** Incompatible with acids, bases, oxidants, amines.

**DECOMPOSITION:** Hazardous gases produced are carbon monoxide, carbon dioxide, oxides of nitrogen.

**HAZARDOUS POLYMERIZATION:** Will not occur.

**FIRE AND EXPLOSION DATA:** Ignition temperature: 160° - 180° C (320° - 360° F)  
Decomposition begins at approximately 50°C (122°F)

**OTHER CONDITIONS TO AVOID** Direct sunlight.

**11. TOXICOLOGICAL INFORMATION**

**ROUTES OF ABSORPTION:** Inhalation Skin Ingestion Eye Contact

**TOXICITY DATA:**

**Nitrocellulose:** Rat, Oral LD<sub>50</sub> : >5000 mg/kg

**Dinitrotoluene** Rat, Inhalation, LC<sub>50</sub> : 2.87 mg/l, 1 hour  
Rat, Oral LD<sub>50</sub> : 177mg/kg

**12. ECOLOGICAL INFORMATION**

**AQUATIC TOXICITY** - Components of this product known to be toxic to aquatic organisms:  
diphenylamine, dinitrotoluene

**Section 12 - Continued**

**Nitrocellulose:** Acute aquatic 96- hour static LC50 value falls within the relatively harmless range of >1,000 mg/L, according to U.S. Wildlife criteria. Four species were tested. EC50 in four species of bacteria ranged from 731 mg/L to > 1,000 mg/L.

**13. DISPOSAL CONSIDERATIONS**

**WASTE DISPOSAL:**

- If this product becomes a waste, it meets the criteria of a hazardous waste as defined under 40 CFR 261 and would have the following EPA hazardous waste number: D003
- If this product becomes a waste, it will be a hazardous waste which is subject to the Land Disposal Restrictions under 40 CFR 268 and must be managed accordingly.
- Material may best be safely destroyed by controlled open burning in small quantities (maximum about 1 pound) in piles not over 1 inch deep. Use an ignition train of slow-burning, combustible materials to permit retreat to a safe distance before powder is ignited. Stay upwind, do not breathe products of combustion. Burn only with permission of all local regulatory authorities.

**14. TRANSPORT INFORMATION**

**This material is regulated as a DOT Hazardous Material**

**US DOT Classification:** Land - Powder, Smokeless, 1.3C, UN 0161, - for all powders listed in this MSDS shipped in excess of 100 pounds.

**Land - Smokeless Powder for Small Arms (100 pounds or less), NA 3178, 4.1  
- for all products listed in this MSDS, in DOT approved containers and packaging.**

**15. REGULATORY INFORMATION**

**Toxic Substance Control Act (TSCA) :** all components of this product are listed in the TSCA Inventory.

**SARA Title III, Sections 311/312 :** Hazard Categories per 40 CFR 370.21 :

- Acute (health) - Yes**
- Chronic (health) - No**
- Reactive (physical) - Yes**
- Sudden Release (physical) - Yes**

**CERCLA Sections 102a/103 - Hazardous Substances - RQ:** dinitrotoluene, (4.54 kg)

**SARA Title III, Section 313 covered components:** diphenylamine, dinitrotoluene

**16. OTHER INFORMATION**

Revised: 11/15/2007 by Western Powders, Inc.

**CAUTION: Propellants are extremely dangerous. Only highly trained and qualified personnel should utilize this material. Propellants should be tested for compatibility with any materials which they contact. Clean up any spills of material immediately. Proper housekeeping techniques must be maintained to minimize the accumulation of propellant dust. Follow all safety regulations and precautions when handling, storing, or processing propellant material.**

**The information contained herein is believed to be accurate and represents the best information currently available to Western Powders, Inc. . No warranty or guarantee, express or implied, with regard to the safety or suitability of these products, or the results obtained from their use, is offered by Western Powders, Inc.. Buyer and user assume any and all risk, responsibility and liability for any injury (including death), loss or damage arising from usage of these products.**





The MSDS format adheres to the standards and regulatory requirements of the United States and may not meet regulatory requirements in other countries.

DuPont  
Material Safety Data Sheet

Page 1

-----  
DUPONT SPECIALTY ELECTRIC "SQUIBS" - "S" PRODUCTS  
6103CR Revised 6-OCT-2006  
-----

-----  
CHEMICAL PRODUCT/COMPANY IDENTIFICATION  
-----

Material Identification

"SQUIBS" is a registered trademark of DuPont.

Corporate MSDS Number : DU008073

Tradenames and Synonyms

SQUIBS  
S - \*\*\*

\*\*\* = Number and/or Letter Designation of Product

Tradenames and Synonyms (Remarks)

\*\*\*\*\*  
PREVENTION OF ACCIDENTS IN THE USE OF EXPLOSIVES

The prevention of accidents in the use of explosives is a result of careful planning and observance of the best known practices. The explosives user must remember they are dealing with a powerful force and various devices and methods have been developed to assist them in directing this force. The user should realize this force, if misdirected, may either kill or injure.

WARNING

All explosives are dangerous and must be carefully handled and used following approved safety procedures either by or under the direction of competent, experienced persons in accordance with all applicable Federal, State and local laws regulations and ordinances. If, after carefully reading the "Instructions and Warnings" leaflet inserted in each case of these products, you have any questions or doubts as to how to use any explosive product, do not use it before consulting your supervisor. If your supervisor has any questions or doubts, he should consult the manufacturer before use. See "Additional Information and References" below.

\*\*\*\*\*

Company Identification

MANUFACTURER/DISTRIBUTOR

DuPont  
1007 Market Street  
Wilmington, DE 19898

PHONE NUMBERS

Product Information : 1-800-962-9919  
Transport Emergency : CHEMTREC: 1-800-424-9300

## (CHEMICAL PRODUCT/COMPANY IDENTIFICATION - Continued)

Medical Emergency : 1-800-441-3637

-----  
COMPOSITION/INFORMATION ON INGREDIENTS  
-----

## Components

Material	CAS Number	%
Boron	7440-42-8	0-10
Ferric Oxide	1309-37-1	0-20
Magnesium	7439-95-4	0-35
Smokeless Powder		0-100
Barium Peroxide	1304-29-6	0-35
Black Powder		0-100
Polyvinyl Acetate	9003-20-7	0-10
*Selenium	7782-49-2	0-35
Potassium Chlorate	3811-04-9	0-35
*Lead Oxide Red	1314-41-6	0-35
*Lead Dinitroorthocresylate	79357-62-3	0-35

\* Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

-----  
HAZARDS IDENTIFICATION  
-----

## Potential Health Effects

As supplied, DuPont "S" Product "SQUIBS" do not present health hazards in normal handling and use. Under reasonably foreseeable conditions of use, there is no exposure to these materials. Attempting to dismantle the shell may cause physical injury due to detonation. Upon detonation, decomposition products produced and that may be released include nitrogen oxides, lead oxides, and oxides of various metals present in the product such as magnesium, selenium, boron, copper, barium or iron.

Overexposure to nitrogen oxides may cause coughing, shortness of breath or difficult breathing.

Effects of overexposure to nitrogen oxides and other metal oxides that may be present as decomposition products include skin irritation with discomfort or rash; or eye irritation with discomfort, tearing, blurring of vision. Inhalation overexposure to the products of decomposition may cause irritation of the respiratory passages with cough, difficult breathing or shortness of breath.

## Carcinogenicity Information

The following components are listed by IARC, NTP, OSHA or ACGIH as carcinogens.

## (HAZARDS IDENTIFICATION - Continued)

Material	IARC	NTP	OSHA	ACGIH
Lead Oxide Red	2A	X		A3

-----  
FIRST AID MEASURES  
-----

## First Aid

Contact with the product under reasonably foreseeable conditions of use do not pose a skin, eye or inhalation hazard. Get medical attention immediately if explosion causes physical injury.

## INHALATION

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

-----  
FIRE FIGHTING MEASURES  
-----

## Flammable Properties

Detonates when exposed to heat or flame.

## Fire and Explosion Hazards:

Hazardous gases/vapors produced in fire are nitrogen oxides and fumes of boron, selenium, lead, magnesium and iron. Product will detonate and produces shrapnel.

## Extinguishing Media

None.

## Fire Fighting Instructions

Evacuate personnel to a safe area. Do not fight fire. Isolate area. Guard against intruders.

-----  
ACCIDENTAL RELEASE MEASURES  
-----

## Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

## (ACCIDENTAL RELEASE MEASURES - Continued)

## Accidental Release Measures

Control access to area and remove sources of friction, impact, heat, low level electrical current, electrostatic or RF energy. Refer to manufacturer's "Instructions and Warnings" supplied with each product shipment.

-----  
HANDLING AND STORAGE  
-----

## Handling (Personnel)

Avoid breathing dust. Avoid contact with eyes, skin, or clothing. Wash thoroughly after handling. Wash clothing after use.

## Storage

Store in a well ventilated place. Store in a cool place.

Storage and distribution of explosives is regulated by the U.S. Department of the Treasury, Bureau of Alcohol, Tobacco, and Firearms (BAFT). Procedural requirements are described in 25 CFR 55, "Commerce in Explosives"

-----  
EXPOSURE CONTROLS/PERSONAL PROTECTION  
-----

## Engineering Controls

Use only with adequate ventilation. Keep away from friction impact, heat, low level electrical current, electrostatic or RF energy. Refer to the manufacturer's "Instructions and Warnings" leaflet supplied with each product shipment.

See also OSHA Lead Standard 29 CFR 1910.1025.

## Personal Protective Equipment

Eye/Face	: Safety Glasses.
Additional	: Cotton socks and conductive soled shoes, floors and surfaces.

## # Exposure Guidelines

## Exposure Limits

DUPONT SPECIALTY ELECTRIC "SQUIBS" - "S" PRODUCTS	
PEL (OSHA)	: Particulates (Not Otherwise Regulated)
	15 mg/m <sup>3</sup> , 8 Hr. TWA, total dust
	5 mg/m <sup>3</sup> , 8 Hr. TWA, respirable dust

## Other Applicable Exposure Limits

## Ferric Oxide

PEL (OSHA) : 10 mg/m<sup>3</sup>, as Total Particulate- 8 Hr TWA  
 TLV (ACGIH) : 5 mg/m<sup>3</sup>, respirable dust, 8 Hr. TWA, A4  
 AEL \* (DuPont) : None Established

## Selenium

PEL (OSHA) : 0.2 mg/m<sup>3</sup>, as Se, 8 Hr. TWA  
 TLV (ACGIH) : 0.2 mg/m<sup>3</sup>, as Se, 8 Hr. TWA  
 AEL \* (DuPont) : None Established

## Lead Oxide Red

PEL (OSHA) : 0.05 mg/m<sup>3</sup>, 8 Hr. TWA, as Pb  
 for > 8 Hrs. exposure, limit in mg/m<sup>3</sup> =  
 0.4 divided by hours worked.  
 TLV (ACGIH) : 0.05 mg/m<sup>3</sup> 8-hour TWA, lead, elemental  
 and inorganic compounds as Pb, A3  
 AEL \* (DuPont) : 0.05 mg/m<sup>3</sup>, 8 Hr. TWA, Skin  
 0.05 mg of lead/dL of blood  
 "See Human Health Effects Section"

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

-----  
PHYSICAL AND CHEMICAL PROPERTIES  
-----

## Physical Data

Form: Aluminum, bronze or cardboard shells with attached insulated copper leg wires.

-----  
STABILITY AND REACTIVITY  
-----

## Chemical Stability

Unstable with heat. Unstable with shock. Unstable with static charges.

Detonates with friction, low level electrical current, electrostatic or RF energy.

## Incompatibility with Other Materials

Incompatible with acids and alkalies.

## Decomposition

Decomposes with heat. Decomposes with shock.

Hazardous gases/vapors produced are carbon monoxide, nitrogen oxides and fumes of lead, boron, iron, magnesium and selenium. Detonation produces shrapnel.

## (STABILITY AND REACTIVITY - Continued)

## Polymerization

Polymerization will not occur.

-----  
DISPOSAL CONSIDERATIONS  
-----

## Waste Disposal

Consult explosive manufacturer for recommended methods of destroying explosive materials. Comply with applicable Federal, State/Provincial and Local Regulations.

-----  
TRANSPORTATION INFORMATION  
-----

## Shipping Information

DOT/IMO  
Proper Shipping Name : IGNITERS  
Hazard Class : 1.4S  
UN No. : 0454  
DOT/IMO Label : EXPLOSIVE 1.4S  
Packing Group : II

-----  
REGULATORY INFORMATION  
-----

## U.S. Federal Regulations

TSCA Inventory Status : Reported/Included.

## State Regulations (U.S.)

## Warning!

This product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

-----  
OTHER INFORMATION  
-----

## Additional Information

It is obviously impossible to include warnings or approved methods for every conceivable situation. A list of suggestions to aid in avoiding the more common causes of accidents is set forth in the "Instructions and Warnings" included as case inserts with the product. Additional

(Continued)

information is available in the Blasters' Handbook, published by Explosives Technology International, Inc., Ordnance Safety Manual, published by the U.S. Army Ordnance Department, and the Institute of Makers of Explosives Safety Library Publications. Copies of these IME publications may be obtained by writing the Institute of Makers of Explosives, 1120 19th Street, N.W., Suite 510, Washington, D.C. 20036-3605, or from your explosives supplier:

IME publication subjects:

- o Storage Magazines
- o Table of Distances
- o Use and Handling of Explosives
- o RF Hazards
- o Destruction of Commercial Explosives
- o Transportation

---

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

Responsible for MSDS : MSDS Coordinator  
> : DuPont Chemical Solutions Enterprise  
Address : Wilmington, DE 19898  
Telephone : (800) 441-7515

# Indicates updated section.

This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained.

End of MSDS



# Material Safety Data Sheet (MSDS-TNT)

PRODUCT IDENTIFICATION	
Product Name	TNT
Trade Names and Synonyms	2,4,6 Trinitrotoluene
Manufacturer/Distributor	Various
Transportation Emergency	800-255-3924 (24 hrs -- <i>CHEM • TEL</i> )

## PREVENTION OF ACCIDENTS IN THE USE OF EXPLOSIVES

The prevention of accidents in the use of explosives is a result of careful planning and observance of the best known practices. The explosives user must remember that he is dealing with a powerful force and that various devices and methods have been developed to assist him in directing this force. He should realize that this force, if misdirected, may either kill or injure both him and his fellow workers.

### **WARNING**

**All explosives are dangerous** and must be carefully handled and used following approved safety procedures either by or under the direction of competent, experienced persons in accordance with all applicable federal, state, and local laws, regulations, or ordinances. If you have any questions or doubts as to how to use any explosive product, **DO NOT USE IT** before consulting with your supervisor, or the manufacturer, if you do not have a supervisor. If your supervisor has any questions or doubts, he should consult the manufacturer before use.



HAZARDOUS COMPONENTS			
Material or Component	CAS No.	TLV	PEL
TNT (Trinitrotoluene)	38082-89-2	1.5 MG/M <sup>3</sup>	.5 MG/M <sup>3</sup>
N/A = Not assigned    NE = Not established			

PHYSICAL DATA	
Boiling Point	464° F
Vapor Pressure	.057 MPa @ 179° F
Vapor Density	N/A
Solubility in Water	Insoluble
Specific Gravity	1.5 - 1.6
Melting Point	176°F
Evaporation Rate	N/A
Appearance and Odor	Yellow Flakes, with bitter almond odor.

HAZARDOUS REACTIVITY	
Instability	Stable
Incompatibility	No data applicable
Hazardous decomposition	Nitrous Oxide
Polymerization	Polymerization will not occur

FIRE AND EXPLOSION DATA	
Flashpoint	Not applicable
Extinguishing media	None
Special fire fighting procedures	<b>ALL EXPLOSIVES: DO NOT FIGHT EXPLOSIVES FIRES.</b> Try to keep fire from reaching explosives. Isolate area. Guard against intruders.  Division 1.1 Explosives: Evacuate the area for 5000 feet (1 mile). Consult <i>the 2000 Emergency Response Guidebook, Guide 112</i> for further details.
Unusual fire and explosion hazards	Will detonate if suitably primed by heat or flame.

<b>HEALTH HAZARDS</b>	
<b>General</b>	<p>TNT is a Division 1.1 explosive, and detonation may cause severe physical injury, including death. All explosives are dangerous and must be handled carefully and used following approved safety procedures under the direction of competent, experienced persons in accordance with all applicable federal, state, and local laws, regulations, and ordinances.</p> <p>Inhalation of explosives powders may cause nervous system irregularities including headaches and dizziness.</p> <p>Nitrogen oxides generated during use are skin, eye, and respiratory tract irritants.</p>
<b>Carcinogenicity</b>	None of the components of TNT are listed as a carcinogen by NTP, IARC, or OSHA.

<b>FIRST AID</b>	
<b>Inhalation</b>	If detonation fumes are inhaled, remove to fresh air. If not breathing, give artificial respiration, preferably mouth to mouth. If breathing is difficult, give oxygen and call a physician.
<b>Eye and skin contact</b>	Flush eyes with water. Wash skin with soap and water.
<b>Ingestion</b>	Induce vomiting immediately by giving two glasses of water and sticking finger down throat.
<b>Injury from detonation</b>	Seek prompt medical attention.

<b>SPILL OR LEAK PROCEDURES</b>	
<b>Spill/leak response</b>	Review fire and explosion hazards before proceeding with clean up. Remove all ignition sources. Wear protective equipment during clean up. Mop up with water.
<b>Waste disposal</b>	Dispose of in compliance with federal regulations under the authority of the <i>Resource Conservation and Recovery Act</i> (40 CFR Parts 260-271).

<b>SPECIAL PROTECTION INFORMATION</b>	
<b>Ventilation</b>	General ventilation with local exhaust in operation area.
<b>Respiratory</b>	Wear fitted NIOSH approved respirator, avoid dusting by keeping wet when possible .
<b>Eye</b>	Chemical goggles.
<b>Gloves</b>	Cotton or leather gloves
<b>Other</b>	Flame proof coveralls and conductive boots.

<b>SPECIAL PRECAUTIONS</b>	
Refer to manufacturer's instructions and warnings supplied with product.	

<b>STORAGE CONDITIONS</b>	
Store in accordance with the requirements of <i>Subpart K, ATF: Explosives Law and Regulations</i> (27 CFR 55.201-55.219).	

SHIPPING INFORMATION		
Proper shipping name	TNT	
Hazard class	1.1D	
UN Number	UN0209 (1.1D)	
DOT Label & Placard	DOT Label	EXPLOSIVE 1.1D
	DOT Placard	EXPLOSIVES 1.1

The information contained in this Material Safety Data Sheet is based upon available data and believed to be correct; however, as such has been obtained from various sources, including the manufacturer and independent laboratories, it is given without warranty or representation that it is complete, accurate, and can be relied upon. *OWEN COMPLIANCE SERVICES, INC.* has not attempted to conceal in any manner the deleterious aspects of the product listed herein, but makes no warranty as to such. Further, *OWEN COMPLIANCE SERVICES, INC.* cannot anticipate nor control the many situations in which the product or this information may be used; there is no guarantee that the health and safety precautions suggested will be proper under all conditions. It is the sole responsibility of each user of the product to determine and comply with the requirements of all applicable laws and regulations regarding its use. This information is given solely for the purposes of safety to persons and property. Any other use of this information is expressly prohibited.

**For further information contact:**

David W. Boston, President  
**OWEN COMPLIANCE SERVICES, INC.**  
 12001 County Road 1000  
 P.O. Box 765  
 Godley, TX 76044  
 Telephone number: 817-551-0660  
 FAX number: 817-396-4584

**MSDS prepared by:**

Johnny R. Rodriguez, Compliance Specialist  
 Original publication date: 04/30/97  
 Review date: 2/22/06  
 12/03/03

# MATERIAL SAFETY DATA SHEET (MSDS)



643 Martin Ave. • Suite 3  
Rohnert Park CA 94928  
Phone: (707) 584-9384  
Fax: (707) 584-8712  
www.evhill.com  
info@evhill.com

Revision Date: 11/1/06  
For the following products:  
#10-030, #10-060, #10-180, and  
#10-182 White Smoke Candles  
#10-200 Standard Smoke Grenade  
#10-210 Professional Smoke Grenade

## SECTION I: MATERIAL IDENTIFICATION

**Material Name:** *Safe-Vue*<sup>TM</sup> Smoke Candles & Grenades      **UN Number:** none  
**Chemical Family:** Screening Smoke      **CAS Registry Number:** none  
**Trade Name:** *Safe-Vue*<sup>TM</sup> Smoke for air flow studies.

## SECTION II: INGREDIENTS AND HAZARDS (SMOKE)

Component	Amount	Hazard Data
Hydrated Zinc Chloride	TLV 1 mg/m <sup>3</sup>	8-hour, time weighted averages  Neither TLV nor PEL is applicable because product is intended for use in short term tests.
Water Condensate	PEL 1 mg m <sup>3</sup>	
Carbon Monoxide	-	
All other ingredients are present in negligible amounts and/or are non-hazardous.	55 mg/m <sup>3</sup> 55 mg/m <sup>3</sup>	

## SECTION III: PHYSICAL DATA (SMOKE)

**Boiling Point:** n/a      **pH:** No Data  
**Vapor Pressure:** n/a  
**Vapor Density:** n/a  
**Water Solubility at 20°C:** Soluble  
  
**Appearance and Odor:** Gray to white with an odor of burning paper.

## SECTION IV: FIRE AND EXPLOSION DATA

**Flash Point and Method (Smoke):** None  
**Autoignition Temp. (Smoke):** n/a  
**Flammability Limits in Air (Smoke):** n/a  
**Extinguishing Media (Solid Product):** Use media suitable for surrounding fire.  
**Special Fire Fighting Procedures (Smoke and Solid Product):** Self-contained breathing apparatus and full protective clothing.  
**Unusual Fire and Explosion Hazards:** None known.

## SECTION V: REACTIVITY DATA

**Stable:** Yes, under normal conditions.  
**Hazardous Decomposition Products:** See section II.  
**Polymerization:** None known.

## SECTION VI: HEALTH HAZARD INFORMATION

*Safe-Vue*<sup>TM</sup> white smoke can be used without hazard if applied as directed. The main effects of the smoke are some minimal irritation of the throat, an awareness of an odd odor, and the appearance of smoke. These effects act as a warning and are desirable to prevent voluntary overexposure. Individuals should be urged not to accept exposures that cause minor irritation, but to leave the area and ventilate well to dissipate the smoke. Persons with respiratory ailments must never be exposed to any smoke. **Warning:** the #10-200 and #10-210 Smoke Grenades generate huge volumes of white smoke that would quickly accumulate to concentrations hazardous in confined spaces. Never use these items in an interior or enclosed space.

**Ingestion:** Not a significant route of exposure.

**Eye Contact:** Acute exposure is not likely to induce eye irritation.

**Skin Absorption:** Not a significant route of exposure.

**Inhalation:** Acute exposure can cause irritation of the respiratory tract and mucous membranes. Irritation is a warning property of smoke materials. In itself irritation is not usually regarded as a toxic effect unless it is sufficient to cause inflammation and then inflammation, not irritation, is the toxic effect.

**Effects of Overexposure:** Irritation of the respiratory passages; cough; nausea. Gross overexposure to dense smoke concentrations could result in throat irritation and mucous membrane congestion requiring medical treatment. Coughs, chills, fever and pulmonary edema can result from overwhelming exposure. Increasingly severe overexposure is likely to result in increasingly severe irritation and inflammation to all mucous membranes contacted by the smoke with most severe effects usually appearing in the respiratory tract.

**FIRST AID:** Remove to fresh air. If breathing is difficult, get medical attention.

## SECTION VII: SPILL, LEAK AND DISPOSAL PROCEDURES

**(Smoke):** Ventilate area. Use local exhaust to keep exposure to a minimum. The duration of smoke would be short and the length of exposure could be reduced further by opening doors and windows for a few minutes, if and when smoke appears.

**(Solid Product):** Dispose in chemical disposal area in a manner that complies with local, state and federal regulations.

## SECTION VIII: SPECIAL PROTECTION INFORMATION

**Respiratory Protection:** See section IV.

**Ventilation:** Use product in a well-ventilated area.

**Protective Gloves:**

**Other Protective Equipment:** Use self-contained breathing apparatus and full protective clothing when treating spills or fighting fires.

## SECTION IX: SPECIAL PRECAUTIONS AND COMMENTS

Store in a cool, dry place. Keep product out of the reach of children.

Use only in a well-ventilated place.

Do not use or store around food or food products. Before eating, drinking or smoking, hands and face must be thoroughly washed.

Product should be used only by those familiar with all safety documentation.

This MSDS is provided as a guideline for the use of our products only. E. Vernon Hill, Inc. disclaims responsibility for damage or injury resulting from the improper use of these products. Contact E. Vernon Hill, Inc. for a "Product Information Sheet."

We believe all information given is accurate. It is offered in good faith, but without guarantee. Since conditions of product use are beyond our control, all risks of use are assumed by the user. Nothing herein shall be construed as a recommendation for uses which infringe valid patents or as extending a license under valid patents.

Ref. S.S. "SD/1A & SD/2A 2/1/93"

Page Intentionally Left Blank

## B.4 Security [40 CFR 270.14(b)(4)]

The NNSS is bordered on three sides by 6,629 km<sup>2</sup> (2,560 mi<sup>2</sup>) of federal land, providing restricted and secure access for the NNSS. This restricted zone provides an additional buffer between the EODU and other properties. Land administered by the BLM borders the fourth side of the NNSS.

In addition to its remote location, NNSA/NFO maintains a contractor security force of highly trained security personnel who are present at the NNSS 24 hours a day, 7 days a week, including holidays. These personnel monitor entry to and exit from the NNSS and provide security measures throughout the NNSS. The size and location of the NNSS with respect to public highways have made the construction of a facility boundary fence impractical. General security measures taken at the NNSS are maintained by a two-level system: (1) security stations at all authorized entrances to the NNSS, property line warning signs, and surveillance patrolling; and (2) specific security measures taken at individual locations such as fencing, warning signs, and building security.

### B.4.a NNSS Access

There are security stations at all authorized entrances to the NNSS. Only authorized and badged personnel are allowed access to the NNSS. Security personnel perform a visual and tactile inspection of each person's badge before entry to and exit from the NNSS.

Signs stating **No Trespassing by Order of the United States Department of Energy** are located along the public highways that border the NNSS. The signs are legible from a distance of 7.6 m (25 ft) and are spaced at regular intervals. In areas where the visibility of the sign may be obstructed, signs may appear at more frequent intervals.

Security personnel also perform non-repetitive and random patrols of the NNSS boundaries and roads. Security patrols also check buildings, facilities, and vehicles on the NNSS on a 24-hour basis, including holidays.

### B.4.b EODU Access

Access to the EODU requires the approval of the NSTec Facility Manager (FM). The EODU Supervisor escorts all visitors/workers and remains onsite with these persons, unless there are no explosives onsite. In cases where work is performed in the absence of explosives (e.g., road grading, soil sampling), the Supervisor accompanies personnel to their work location and provides instructions for locking the gates when exiting. All personnel entering the EODU also notify the NNSS Operations Command Center (OCC) upon entry and exit.

Page Intentionally Left Blank



## B.5 General Inspection Schedule [40 CFR 270.14(b)(5)]

This section describes the EODU inspection program. EODU personnel are responsible for tracking inspection due dates and ensuring that the inspections and remedial actions are completed. Table 6 provides the EODU inspection schedule, including the type of inspection, description, and frequency. The inspection schedule is maintained at the unit. An example checklist is provided in Exhibit 2.

**Table 6. Area 11 EODU Inspection Schedule**

<b>Inspection</b>	<b>Description</b>	<b>Frequency</b>
Signs, Gates, and Locks	Verify that items are intact. Also, verify that signs are legible.	Each site visit (minimum of monthly)
Fire Extinguishers <sup>a</sup>	Verify that hoses are in good condition and pressure gauges are in the appropriate range.	Monthly
Magazine Inventory <sup>b</sup>	Verify the availability and condition of materials stored in the magazines.	Monthly
Magazine Structural Integrity	Verify integrity of magazine structure.	Each site visit (minimum of monthly)
Magazine Cleanliness	Materials are organized and stored in an efficient manner.	Each site visit (minimum of monthly)
SAA	Verify that the amount of waste in the SAA magazine matches the SAA magazine log.	Monthly

<sup>a</sup> Fire extinguishers are inspected monthly by Area 11 EODU personnel and certified annually by trained personnel according to National Fire Protection Association requirements.

<sup>b</sup> Quantities of each stored material are logged.

### B.5.a Remedial Action

If an inspection reveals the deterioration of the explosives magazine, satellite accumulation container, or gates, the problem is documented on the inspection checklist. Corrective actions are scheduled to ensure compliant operation of the EODU before continuing operations. When corrective actions are completed or delayed, action or non-action is noted on the next scheduled inspection checklist.

Page Intentionally Left Blank

**EXHIBIT 2. EXAMPLE AREA 11 EODU WEEKLY/MONTHLY  
INSPECTION CHECKLIST AND SATELLITE  
ACCUMULATION STORAGE AREA CHECKLIST**

**THE EODU WEEKLY/MONTHLY INSPECTION CHECKLIST IS  
NOT AVAILABLE FOR PUBLIC VIEWING**

Page Intentionally Left Blank

# SATELLITE ACCUMULATION STORAGE AREA CHECKLIST

Inspector Name / Signature \_\_\_\_\_

Date \_\_\_\_\_

Time \_\_\_\_\_

- Is there a sign posted identifying area as 'Satellite Accumulation Area'?  Yes /  No
- Is container marked "Hazardous Waste"?  Yes /  No
- Is the container in good condition?  Yes /  No
- Is the container labeled with identification number, description of the contents, and organization name?  Yes /  No
- Is the labeling legible?  Yes /  No
- Are there any signs of spills or leaks?  Yes /  No
- Are the container lids closed?  Yes /  No
- Is the SAA secure?  Yes /  No
- Are all SAA contents appropriate?  Yes /  No
- Is there less than 55 gallons (or 1qt if acute waste)?  Yes /  No
- Is training current and is record available?  Yes /  No

Comments / Corrective Actions \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Page Intentionally Left Blank

## **B.6 Preparedness and Prevention [40 CFR 270.14(b)(6)]**

EODU emergency response activities are performed by the DOE contractor and/or subcontractor. Contractor emergency services located on the NNSS include the NNSS Fire and Rescue Department and NNSS Occupational Medicine, and the Nye County Sheriff's Office provides law enforcement services. Verbal and written notification requirements to the appropriate federal and state agencies are performed by an NNSA/NFO representative.

DOE maintains Memorandums of Understanding with Nye County, the BLM, Creech Air Force Base, and the DOE Office of Secure Transportation for emergency activities. Las Vegas area hospitals that are notified include University Medical Center, Mountain View Hospital, Sunrise Hospital, and Mercy Flight for Life air ambulance service. NNSA/NFO also maintains an Agreement-in-Principle with the state of Nevada.

Because of the complexity of operations at the NNSS, facilities are required to maintain individual emergency response procedures. Exhibit 3 provides a copy of the Emergency Response Procedure (ERP) for the EODU. As required in **40 CFR 264.51**, any imminent or actual emergency requiring implementation of the ERP is recorded in the operating record, and a written report is submitted to NDEP by NNSA/NFO within 15 days of the incident. The written report includes the following information:

- Name, address, and telephone number of the owner or operator
- Name, address, and telephone number of the facility
- Date, time, and type of incident
- Name and quantity of materials involved
- Extent of injuries (if any)
- An assessment of actual or potential hazards to human health or the environment (as applicable)
- Estimated quantity and disposition of recovered material that resulted from the incident

Page Intentionally Left Blank



## **B.7 Contingency Plan [40 CFR 270.14(b)(7)]**

Exhibit 3 is a copy of the Area 11 Explosive Ordnance Disposal Unit ERP.

Page Intentionally Left Blank

**EXHIBIT 3. EMERGENCY RESPONSE PROCEDURE FOR AREA 11  
EXPLOSIVE ORDNANCE DISPOSAL UNIT**

**NOT AVAILABLE FOR PUBLIC VIEWING**

Page Intentionally Left Blank

## **B.8 EODU Procedures to Prevent Hazards [40 CFR 270.14(b)(8)]**

This section describes the procedures that are used at the EODU to ensure safety and prevent hazards to human health and the environment. The procedures, structures, and equipment used at the EODU are summarized below. In addition, inspections of the EODU are conducted as described in Section B.5.

### **B.8.a Operational Hazards**

#### **Transportation**

- Transport vehicles that meet the DOT definition of a commercial motor vehicle are operated by trained and qualified drivers.
- Transport vehicles are inspected, maintained, and repaired to ensure parts and accessories necessary for safe operation are in proper operating condition.
- Vehicles loading or unloading explosives have the motor turned off, unless the motor is required to provide power to vehicle accessories used in loading and unloading and the motor is equipped with an exhaust spark arrestor.
- Vehicles transporting explosives are placarded according to DOT regulations.
- Matches, lighters, or other fire-, flame-, or spark-producing devices are not in the vehicle or carried by personnel in the vehicle.
- Except for emergency situations, fueling or maintenance of vehicles containing explosives is prohibited.
- Explosives cargo is blocked, braced, chocked, tied down, or otherwise secured to prevent shifting during transit.
- Transport of explosive material is suspended during adverse weather conditions (e.g., lightning, snow, icy or flooded roads, poor visibility).
- No smoking is allowed within 25 ft of any vehicle transporting explosive material.

#### **Storage**

- Only qualified explosives handlers, unexploded ordnance (UXO) technicians, or blasters load and unload explosives.
- Explosives shipments are inspected for damage before storage.
- Spilled materials are cleaned up before continuing with loading or unloading.
- Magazines used to store explosives meet the current DOE Explosive Safety Manual requirements. Magazine doors are kept locked except when inspecting, loading, or unloading the magazine.

#### **Access Control**

- Gates are locked unless personnel are at the EODU.
- Operating personnel are limited to the number required to work in a safe and efficient manner, but never less than two during explosive operations.

- Entry into the EODU is only accomplished with escort by an EODU Supervisor.
- Before entry, all personnel entering the EODU are given a documented safety briefing.
- All work at the EODU is coordinated with the NNSS OCC.
- For operations that do not require activity-level work, only the EODU Supervisor needs to be present.

### **Detonation**

- Warning flags are raised at the 6-03 Road Access Control Point and on the EODU whenever explosives operations are being conducted.
- No more than 100 lb of net waste explosive weight is detonated per shot.
- The firing system is tested and checked before each use.
- The EODU Supervisor physically ensures that all personnel present at the EODU are accounted for at the firing point before detonation.
- The NNSS OCC is notified before each detonation event.

### **B.8.b Waste Handling Areas Surface Water Run-On and Runoff**

#### **(1) Run-on**

The cleared pad is elevated from the surrounding terrain and bermed, preventing run-on during precipitation events.

#### **(2) Runoff**

Runoff is limited because the detonation pit sits in a depression on the pad.

### **B.8.c Contamination of Water Supplies**

Contamination of water supplies from EODU activities is unlikely since annual rainfall is low, evaporation rates are high, and depth from the land surface to the water table is 550 to 610 m (1,800 to 2,000 ft). There are no surface waters or intermittent streams in this area.

### **B.8.d Equipment Failure and Effects of Power Outages**

No power is needed or supplied to the unit. Potential for equipment failure is limited to the firing system, emergency communications, locks on gates, warning devices, and vehicles.

The following procedures are used to safeguard personnel and property:

- Firing system is tested and checked before each use.
- Vehicle and hand-held radios are checked each day.
- If communications with the NNSS OCC cannot be made, detonations are suspended until communications are re-established.
- Locks are checked during each entry and relocked when personnel exit the EODU.
- Pre-trip inspections are conducted on vehicles.

#### **B.8.e Undue Exposure of Personnel at the EODU**

EODU personnel involved in managing waste explosives are thoroughly trained in the proper procedures for handling explosive materials, performing site operations, and responding to emergency situations. Section B.12 describes training qualifications for EODU personnel. Emergency response is covered in Section B.7.

#### **B.8.f Releases to the Atmosphere**

Releases to the atmosphere from detonation events are documented in the treatment plans, and particulate matter (10 microns or less) (PM<sub>10</sub>) air monitors are used. Explosive wastes are identified, and emission factors are calculated using standard data from U.S. Environmental Protection Agency (EPA) publications. These factors are reported to NDEP to obtain prior approval for detonation events. Particulate release is monitored using approved methods, and the results are reported to the State.

Page Intentionally Left Blank



## **B.9 EODU Prevention of Reaction of Ignitable, Reactive, and Incompatible Hazardous Waste [40 CFR 270.14(b)(9)]**

Explosive materials handled at the EODU and stored in magazines meet the following criteria:

- Explosive materials are stored in approved containers.
- Explosive materials are placed in a magazine in a manner that allows adequate ventilation, ready inspection of containers, and the removal of oldest materials first.
- Only compatible materials are stored in an individual magazine.
- No liquid-type explosives or unstable explosives that may be adversely affected by an earthquake are stored in magazines.

These criteria along with procedures identified in Sections B.3.c and B.8 are designed to prevent the acceptance and/or storage of materials that may explode in an uncontrolled environment.

Page Intentionally Left Blank

## **B.10 Traffic [40 CFR 270.14(b)(10)]**

Mercury Highway is the main entrance to the NNSS from U.S. Highway 95 and serves as the major traffic route connecting the primary support area in Mercury with other areas of the NNSS. Vehicles transporting material to the EODU from onsite generators travel on Mercury Highway to the junction of the 6-03 Road. From there, vehicles obtain authorized access through a padlocked gate and proceed northeast approximately 1.6 km (1 mi) on the 6-03 Road. Access to the detonation area and storage magazine is gained through a chained, padlocked barrier. Dirt roads lead up to the graded pads for the storage magazine and the detonation area.

The estimated traffic volume for the portion of the Mercury Highway connecting Mercury to the 6-03 Road is approximately 500 vehicles daily. The traffic includes maintenance and construction personnel, security personnel, construction equipment, and supply vehicles. Mercury Highway is the only asphalt-paved road leading to the 6-03 Road, which is compacted dirt and has no published load-bearing capacity. Dust control vehicles (water spray) are used when necessary.

Vehicle traffic at the EODU is minimal, and the traffic volume on the 6-03 Road averages two to nine vehicle trips per month. Figure 8 depicts traffic access from Mercury Highway and the location of the locked gate/chain barrier.

Page Intentionally Left Blank

## B.11 Facility Location [40 CFR 270.14(b)(11)]

The EODU is centrally located at N 786,358.19 ft and E 703,311.93 ft based on Nevada State Plane Grid – Central Zone, North American Datum.

### B.11.a Seismic Standard

Seismic standards for RCRA are derived from location standards that are related to the natural stability of the site and to the occurrence of surface-cutting Holocene faults. The southwestern United States, including Nevada, is tectonically active compared with other parts of the country (**40 CFR 264, Appendix VI**). Natural seismic risk is moderate in the NNSS region. No known surface-cutting faults that have had displacement during Holocene time are present within 915 m (3,000 ft) of the EODU.

### B.11.b Flood Hazard

The EODU is located outside the 100-year flood hazard area and is in compliance with **40 CFR 264.18(b)** and **270.14(b)(11)(iii)**. This unit is located along a ridge top in the Massachusetts Mountains that separates Frenchman and Yucca Flats. Because it is located on a ridge top, this ideal condition does not subject the unit to concentrated flow that results in flooding.

A flood assessment of the EODU consisted of a field investigation and analysis of large-scale (1:6,000) aerial photographs. The assessment determined that the potential for run-on (flow originating from outside the unit) along the ridge top is nonexistent; therefore, the EODU is not located within a 100-year flood hazard area as defined by the Federal Emergency Management Agency (100-year flow flooding depths greater than 0.3 m [1 ft]). Runoff is prevented by the structure of the EODU area, which consists of a pit formed by previous detonations. Precipitation falling inside the pit is allowed to evaporate.

Page Intentionally Left Blank

## **B.12 Training Program [40 CFR 270.14(b)(12)]**

This section identifies the training requirements applicable to personnel assigned to perform duties at the EODU.

### **B.12.a EODU Training Program**

The training and qualification requirements are established using the contractor's Training Program Manual. The manual uses the systematic approach to training to ensure personnel assigned to waste handling operations are trained and qualified to safely and effectively perform their assigned work. Qualified training personnel work with the EODU Supervisor and subject matter experts knowledgeable in the areas of explosives handling, disposal, safety, and emergency procedures to develop training for support of EODU operations. Qualification programs are developed that identify critical task assignments, entry level qualifications, and training requirements. Qualification cards are prepared for EODU personnel that document completion of the assigned qualification program. Annual reviews of training programs and qualification status for EODU personnel are performed by Training and assigned managers to ensure personnel training qualification requirements are current. Personnel qualification records are maintained by the contractor's Training Division. Personnel training records are accessible at the Training Division at the North Las Vegas facility via the contractor's training database. The EODU Supervisor also reviews and maintains the List of Qualified Individuals Report to ensure personnel training and qualifications are current.

### **B.12.b EODU Personnel**

The information provided in Table 7, EODU Training Matrix, includes functional titles, qualification requirements, and job descriptions for personnel assigned to perform work at the EODU. Current functional titles and job descriptions are maintained by the Training Division.

### **B.12.c Visitors**

Visitors are not permitted within the boundaries of the EODU without an escort. Training requirements for visitors are reviewed on a case-by-case basis by the EODU Supervisor. The amount of training required for a visitor is dependent upon the task the visitor is performing, the type of operations occurring at the EODU at the time of visitation, and whether exposure to waste or hazardous constituents could occur. Visitors include inspectors, auditors, consultants, and treatment, storage, and disposal contractors. In addition, visitors could include personnel not assigned to perform normal day-to-day operations at the EODU. Visitors receive a site safety briefing that, at a minimum, includes the following:

- Elements of the ERP (e.g., alarms, evacuation routes, emergency equipment)
- Hazard communication
- Hazard awareness and personal protective equipment requirements

Non-assigned personnel performing work within the boundaries of the EODU, including management duties and/or movement of materials or equipment, must receive approval from the EODU Supervisor. At a minimum, these non-assigned personnel must present credentials certifying that they have successfully completed Hazardous Waste Site General Site Worker/Annual Refresher. They must also receive a site safety briefing specific to the task to be performed including additional hazard communication if required.

**Table 7. EODU Training Matrix**

<b>FUNCTIONAL TITLE<sup>1</sup></b>	<b>REQUIRED TRAINING</b>	<b>JOB DESCRIPTION</b>
EODU Supervisor (Qualification EODU001)	Heartsaver First Aid General Employee, Hands-On Fire Extinguisher Hazardous Waste Supervisors Training Hazardous Waste Site General Worker Hazardous Waste Site General Worker Refresher Explosives Handler Training Explosives Safety Awareness Required Activity	The EODU Supervisor is qualified to operate the EODU and dispose of explosive waste. EODU Supervisors are qualified to handle, assemble, and install explosives and to initiate explosive events.
UXO Technician (Qualification UXOT001)	DOE Explosives Safety Course Explosives Handler Training Explosives Handler Demolition and Mixing NNSS UXO Briefing Hazardous Waste Site General Worker Hazardous Waste Site General Worker Refresher Required Activity	UXO Technicians are responsible for directing and conducting all aspects of the UXO remediation process including, but not limited to, reconnoiter, locate, and identify/classify UXO; transport ammunition and explosives; conduct disposal operations; and complete all required documentation.
Explosives Handler (Qualification Site Specific)	Heartsaver First Aid General Employee, Hands-On Fire Extinguisher Hazardous Waste Site General Worker Hazardous Waste Site General Worker Refresher Explosives Handler Training Explosives Safety Awareness Required Activity	Explosives Handlers are qualified to handle, assemble, and install explosives and to initiate explosive events.

### B.12.d Training Program Implementation

All new employees assigned to EODU duties must meet the qualification requirements within six months of employment and before working at the EODU. When detonation events are not planned in the six-month new employee training period, the requirement for three days of supervised field training may be delayed until detonation events are conducted.

The contractor's Training Division and the EODU FM or EODU Supervisor will:

- Maintain, update, and revise the qualification program as necessary
- Review regulations and operations to determine the amount of training for each employee
- Ensure that personnel conducting or administering training have the proper credentials and certifications
- Verify that the qualification program is documented and maintained in the EODU personnel training records
- Verify that former employee records are maintained in the EODU personnel training records



- Verify that employees are notified when specific training is required or due and that the training is received and successfully completed
- Verify that employees have successfully completed the required training before working in an unsupervised capacity

#### B.12.e Course Descriptions

- Hazardous Waste Site General Worker/Annual Refresher (**29 CFR 1910.120** and **40 CFR 264.16**) – Workers at a hazardous waste treatment, storage, or disposal facility are required to have a minimum of 40 hours of training with an 8-hour annual refresher. The training includes regulations, personal protective equipment, toxicology, basic chemistry, decontamination techniques, monitoring instruments, risk assessment/hazard evaluation, sampling methods and techniques, and emergency management. (Frequency – one time 40-hour training and annual 8-hour refresher)
- Hazardous Waste Supervisors (**29 CFR 1910.120**) – This course provides a review of the supervisor's responsibilities concerning the health and safety program, associated employee training programs, the personal protective equipment program, the spill containment program, health hazard monitoring procedures and techniques, and the legal aspects of supervising when conducting hazardous waste operations. (Frequency – one time)
- Hands-On Fire Extinguisher Training (required component for all Explosives Handlers Qualification Programs) – This course provides general awareness of fire safety measures, reporting, evacuation procedures, theory and classes of fires, and the operation and use of a portable fire extinguisher. Performance of monthly inspection and types of extinguishers versus types of fires are covered. (Frequency – annual)
- Explosives Handler Training (required component for all Explosives Handlers Qualification Programs) – This course instructs proper explosives storage techniques in order to prevent damage, degradation, and inadvertent detonation. Types of aboveground storage magazines and their use, compatibility of stored explosives, prohibited materials, configuration of explosives in the magazine, inspection criteria, packaging requirements, potential exposure to explosive materials, and inspection criteria for equipment used to transport explosives are covered. (Frequency – biennial)
- Explosives Safety Awareness (required component for all Explosives Handlers Qualification Programs) – This awareness-level course describes characteristics of explosives, common hazards, and methods to control common hazards. Course objectives include characteristics of explosives, identification/meaning of warning labels and placards, explanation of the rule of minimization as it applies to explosive operations, prevention of inadvertent sparks, proper hygiene while working in areas containing explosives, how to deal with inclement weather, and discussion of the roles and responsibilities of supervisors as they applies to explosive operations. (Frequency – one time)
- Heartsaver First Aid Training – (required component for all Explosives Handlers Qualification Programs) – This course instructs proper first aid basics, medical emergencies, injury emergencies, and environmental emergencies. (Frequency – every two years)

- Required Activity (**40 CFR 264.16**) – Site-specific training that covers all aspects of operating the EODU and provides hands-on live explosives training at the EODU. Training includes emergency response actions (notifications, equipment, and communications). (Frequency – annual)

## **B.13 Closure and Post-Closure Care Plan [40 CFR 270.14(b)(13)]**

This information represents the Closure and Post-Closure Care Plan for the EODU. A description of the waste managed at this unit can be found in Section B.2 and the facility operating record. Closure activities are subject to the requirements of **40 CFR 264.112**.

This section presents an interim closure and post-closure care plan for the EODU. New information, technologies, or changes in performance monitoring may warrant an amendment to the closure and post-closure care plan.

A copy of this closure plan is maintained in the EODU operating record.

### **B.13.a Description of Closure [40 CFR 264.112(b)(4)]**

The closure of the EODU is proposed as a clean closure; therefore, it does not include a written post-closure care plan or monitoring.

#### **B.13.a.1 EODU Firing Pad**

Waste explosives detonated at the EODU are similar to those used in road and tunnel construction blasting, small arms ammunition, legacy explosives, and waste explosives from research and testing. Clean closure will require removal of hazardous wastes and constituents from the unit.

Explosive residue in the surface and sub-surface soils have been monitored on a five-year cycle in the detonation area and pit (see Exhibit 4).

#### **B.13.a.2 EODU Storage Magazine**

Hazardous waste will be removed from the EODU storage magazine and detonated or disposed according to regulatory requirements at the time of closure. The magazine will be reused, recycled (metal content), or disposed in an NNSS landfill. If the magazine is landfilled, it will meet the current waste acceptance criteria for disposal in the landfill.

### **B.13.b Closure Performance Standard [40 CFR 264.111]**

As defined in **40 CFR 264.111** and **Nevada Administrative Code 444.8632**, the standard for closure for the EODU will:

- Minimize the need for further maintenance
- Control, minimize, or eliminate, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere

Hazardous wastes and residues will be removed from the site. Container systems and closure equipment will be decontaminated before removal from the unit.

### **B.13.c Closure Plan Implementation**

#### **B.13.c.1 Pre-Closure Activities**

- Existing inventory of waste explosives will be treated or removed for offsite disposal.
- No further waste explosives will be accepted at the unit.
- Estimated amount of waste treated while the unit was active will be calculated based on information in the operating record.

#### **B.13.c.2 Removal of Debris**

After detonation activities are complete, debris (e.g., shrapnel, wire) will be collected. The EODU Supervisor will determine by visual inspection and acceptable knowledge whether the debris is a hazardous waste. If the debris is hazardous for other than its reactive characteristic, the debris will be handled and disposed in compliance with the requirements in effect at the time of closure. If the remaining debris is reactive, it will be detonated so that no reactive debris remains. If the debris is determined to be non-hazardous, it will be disposed in an onsite solid waste disposal unit.

#### **B.13.c.3 Site Investigation**

After debris removal, soil will be sampled and tested for residual contamination (i.e., hazardous constituents normally associated with the materials routinely detonated at the unit). Unless the site characterization results indicate otherwise or subsequent changes occur in the materials being treated at the unit, the soil samples will then be tested as described in the soil characterization plan (see Section B.20). The analytical results will be compared with background soil values using a statistical method (**40 CFR 264, Appendix IV**) to identify whether the EODU soils exhibit significantly increased levels of residual contaminants. The soil characterization plan will be repeated every five years over the active life of the unit. It is anticipated that adequate data will be generated to provide a comprehensive statistical evaluation.

During the operational phase of the unit, it may be necessary to remove residual contaminated soils before closure of the unit. If this occurs, soil removal will be addressed under the operation and maintenance procedures for the unit.

#### **B.13.c.4 Soil Removal and Decontamination**

Soils exhibiting statistically increased levels of residual explosives contaminants will be removed. Additional samples may have to be obtained to determine the extent and depth of the contamination.

Guided by the soil characterization results, residual contaminated soils will be excavated using appropriate equipment. Following soil removal, the excavation area will be sampled to provide data for the closure certification. If these sample results do not show residual contamination that is statistically significant, then no further soil removal activities will be required. Sample locations and the number of samples will be selected following procedures described in EPA publication "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846. Analytical methods will mirror those in the soil characterization plan.

Equipment used in soil removal will be decontaminated, and decontamination residues will be tested to determine the appropriate disposal path.

### B.13.d Closure Schedule

Table 8 depicts a closure activity schedule for the unit.

**Table 8. Area 11 EODU Closure Activity Schedule**

Closure Activity	Duration (days)
(1) Notify NDEP of closure	Within 45 days before commencement of closure activities and within 30 days of treatment of the last known volume of hazardous waste
(2) Conduct closure of the unit	Initiated 45 days after notification of closure and completed within 180 days after treatment of last volume of hazardous waste
(3) Submit certification of closure to NDEP	Within 60 days after completion of closure activities

#### B.13.d.1 Notification of Closure

NDEP will be notified in writing 45 days before commencing closure activities and within 30 days of treatment of the last known volume of hazardous waste.

#### B.13.d.2 Time Allowed for Closure

The unit will be closed within 180 days after treatment of the last volume of hazardous waste.

#### B.13.d.3 Certification of Closure

Within 60 days after closure of the unit, NNSA/NFO will certify that closure was performed according to the approved Closure Plan. This certification will be submitted to NDEP.

### B.13.e Amendment to Closure Plan

Any amendments to the closure plan will be submitted to NDEP for approval as a permit modification at least 60 days before a proposed change in facility design or operation or no later than 60 days after an unexpected event that has affected the closure plan. However, if an unexpected event occurs during the partial or final closure period, NNSA/NFO will request a permit modification no later than 30 days after the unexpected event. The approved closure plan will become a condition of the permit.

Page Intentionally Left Blank

## **B.14 Post-Closure Notices [40 CFR 270.14(b)(14)]**

Closed hazardous waste disposal units on the NNSS are noted in NDEP Permit NEV HW0101, Section 9.

Closure of hazardous waste management sites on the NNSS is carried out through the *Federal Facility Agreement and Consent Order* (FFACO). The FFACO is an agreement between the State of Nevada, the U.S. Department of Defense (DoD), DOE Legacy Management, and NNSA/NFO. The process requires that use restrictions (URs) be instituted at sites where contamination above regulatory limits is being closed in place. Two types of URs are established in the FFACO, administrative and standard. Administrative URs differ from standard URs in that they do not require onsite postings or other physical barriers. Administrative URs apply to remote locations and occasional-use areas where future land use scenarios are used to calculate final action levels.

Each UR site is identified and documented on a UR form with an enclosed map. The completed form and map are the official records documenting the sites where contamination remains in place after closure. The DOE and DoD will maintain UR records as long as the land is under their jurisdiction. The information on the form and the maps are filed in the FFACO database, the DOE Corrective Action Unit/Corrective Action Site files, and in the U.S. Air Force Geographical Information System.

Page Intentionally Left Blank



## **B.15 Closure Cost Estimate [40 CFR 270.14(b)(15)]**

The federal government is exempt from the financial requirements according to **40 CFR 264.140(c)**.

Page Intentionally Left Blank

## **B.16 Post-Closure Cost Estimate [40 CFR 270.14(b)(16)]**

The federal government is exempt from the financial requirements according to **40 CFR 264.140(c)**.

Page Intentionally Left Blank

## **B.17 Liability Requirements [40 CFR 270.14(b)(17)]**

The federal government is exempt from the financial requirements according to **40 CFR 264.140(c)**.

Page Intentionally Left Blank

## B.19 Topographic Map [40 CFR 270.14(b)(19)]

Figure 8, with 6.1 m (20 ft) contour intervals, and Figure 9, with a scale of 2.5 centimeters (cm) (1 inch [in.]) equal to 61 m (200 ft), illustrate the EODU boundaries and extend a distance of approximately 305 m (1,000 ft) outside the unit boundaries. These figures show access roads, access control measures, internal roads, fences, gates, and wells.

Figure 4 illustrates the location of the EODU firing point, storage magazine, and detonation pit. Figure 5 is a view of the storage area from the detonation pit, Figure 6 is a view of the storage area, and figure 7 is a view of the firing point. The EODU is located on a ridge top in the Massachusetts Mountains at an elevation of 1,335 m (4,380 ft). The 7.3-km (4.5-mi) access road to the EODU from Mercury Highway rises 250 m (825 ft), traversing an alluvial fan and its source drainage to the ridge top.

Per **40 CFR 270.14(b)(19)**, the following elements do not currently exist on or within 305 m (1,000 ft) of the Area 11 EODU and require no further detail in Figures 8 and 9:

- Runoff system
- Storm, sanitary, or process sewer systems
- Buildings
- Injection and withdrawal wells
- Surface waters and intermittent streams
- Potable water well supplies

### B.19.a Land Use

Several Public Land Orders (PLOs) withdrew land from the public domain for the NNSS to be established. PLO 805, issued in 1952, withdrew the land where the Area 11 EODU is located. Since then, the land has been used for national defense and energy-related purposes. The NNSS is not open to public entry for any purpose (e.g., agriculture, mining, homesteading, or recreation). Due to the nature of the NNSS land use over the past 50 years, it is unlikely that the area will be returned to public use in the future. Certain areas around Area 11 have been used for atmospheric and underground nuclear weapons testing.

The current land use in proximity to the EODU in Area 5 (approximately 6.5 km [4 mi] south) includes low-level waste disposal; LLMW disposal, controlled hazardous materials spill testing; and hazardous waste accumulation (Figure 1).

Proximity land use in Area 6 includes the Device Assembly Facility (approximately 9.8 km [6 mi] northwest of the EODU) and a radiological countermeasures training facility located directly across Mercury Highway from the access gate to the 6-03 Road (approximately 7.3 km [4.5 mi] from the EODU).

### B.19.b Well Locations

Figure 8 is a topographic map with 6.1-m (20-ft) contour intervals showing the locations of the wells nearest the EODU. There are no wells within approximately 4.0 km (2.5 mi) of the EODU.



**Figure 5. View of the Storage Area from the Detonation Pit**





**Figure 6. View of Storage Area**



**Figure 7. EODU Firing Point**

**Figure 8. Topographic Features**

**NOT AVAILABLE FOR PUBLIC VIEWING**

Page Intentionally Left Blank

**Figure 9. Topographic Features**

**NOT AVAILABLE FOR PUBLIC VIEWING**

Page Intentionally Left Blank

### B.19.c Wind Rose

Wind speed and direction data are shown for the Frenchman Flat area in Figure 10. This diagram indicates that winds in this area are generally from the south during the day when detonations are likely to occur, with wind velocities varying from 0 to 20 m (0 to 66 ft) per second. However, there is a diurnal reversal effect such that winds are predominantly southerly during the day and northerly at night. In a similar manner, there is a seasonal reversal effect such that winds are predominantly southerly during the summer and northerly during the winter. At the EODU, explosive materials are stored in closed magazines, and operations do not occur during inclement weather; therefore, wind dispersion effects are minimal.

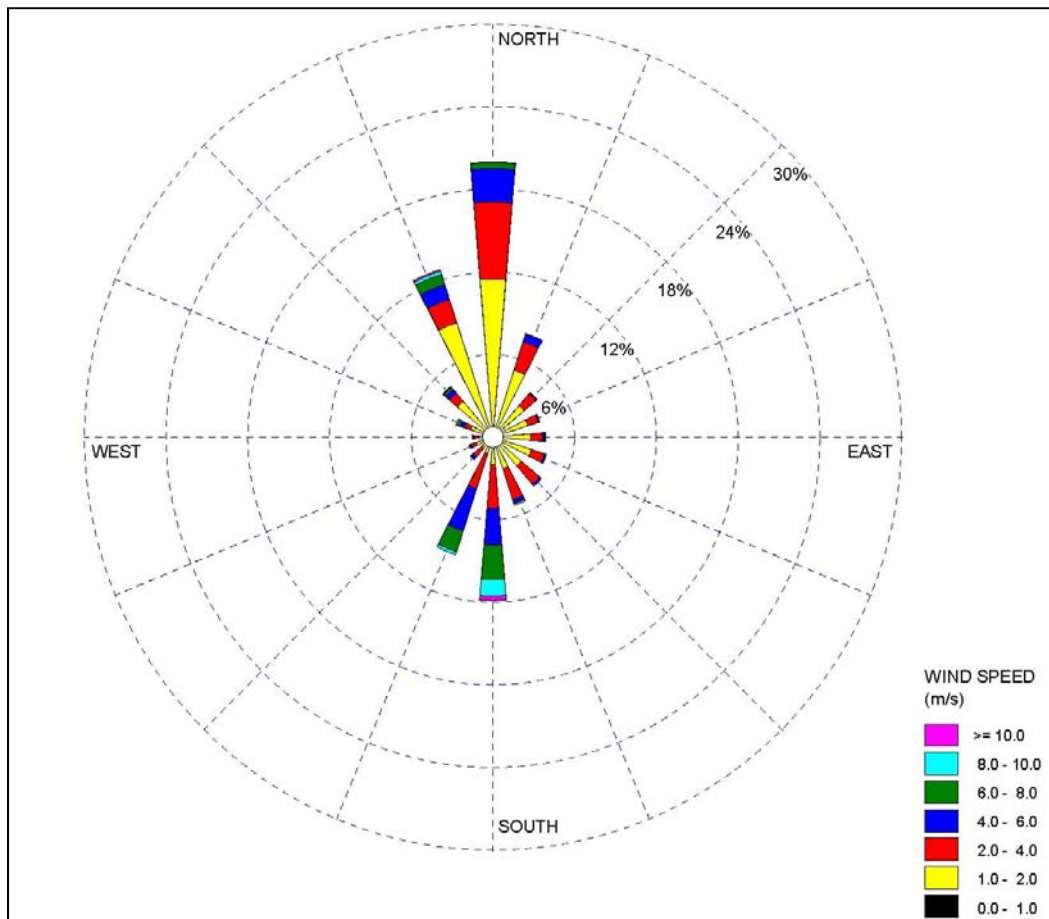


Figure 10. Wind Rose Diagram for the RWMC Meteorology Station

### B.19.d Utility Characteristics

There are no electric, water, sewage utilities, or drainage structures at the EODU.

Page Intentionally Left Blank



## B.20 Additional Information [40 CFR 270.14(b)(20)]

### B.20.a Operations

#### B.20.a.1 Operating Record [40 CFR 264.73]

NNSA/NFO maintains a written operating record. Because the EODU is located in a remote area with no buildings, the operating record is maintained at Building 23-143 in Mercury. NDEP inspections of the current operating record for the EODU acknowledge this separation as functional and compliant with regulatory requirements. The operating record includes:

- A description and quantity of each hazardous waste received/treated and the date of treatment
- Location and quantity of each hazardous waste within the EODU (satellite accumulation)
- Records and results of waste analysis, process knowledge documents, and waste determinations
- Summary reports and details of all incidents that require implementing the contingency plan
- Records and results of inspections for the last three years
- Monitoring, testing, or analytical data and corrective actions resulting from a release

#### B.20.a.2 Unit Description [40 CFR 270.23(a)(1) and (2)]

The EODU was first operated on May 12, 1965. The location of this unit is shown on Figure 1. According to **40 CFR 264.601**, owners or operators choosing to detonate explosives in a miscellaneous unit must do so in a manner that does not threaten human health or the environment. The nearest, most populated area to the Area 11 EODU is Mercury, Nevada, which is approximately 26 km (16 mi) to the south and is occupied 24 hours per day, seven days per week.

The EODU consists of a detonation area surrounded by an earthen pad approximately 20 m (65 ft) by 31 m (100 ft) and ancillary equipment including a storage magazine, remote firing device, and firing point. The unit is located in the Massachusetts Mountains at an elevation of 1,340 m (4,390 ft) above sea level. An aerial view of the EODU and the related areas are shown in Figure 4, which shows the following features:

- A padlocked gate approximately 1.6 km (1.0 mi) from the detonation pad
- The 7.3-km (4.5-mi) compacted dirt access road
- A locked, chained barrier at the entrance to the Area 11 EODU area
- Three graded areas
- Dirt access roads leading up to each graded area
- Storage magazine (including an SAA)
- The Detonation Unit Pad
- Firing point

The access road to the EODU consists of native soil. The access road and graded areas are re-graded approximately every two years, typically after a period of high rainfall. To support activities at the EODU, one explosive storage magazine is located approximately 300 m (984 ft) northeast of the detonation area. The magazine is designated as an SAA for the accumulation of waste explosives before treatment. The southernmost graded area is located on top of a small rise and serves as the EODU detonation area. This area is approximately 20 m (65 ft) by 31 m (100 ft) and is free of magazines and other materials. One small crater is visible on the detonation area.

The firing point is located approximately 1.4 km (0.86 mi) west of the detonation pad adjacent to the access road.

Inspection of the EODU is discussed in Section B.5. The EODU will be clean-closed (see Section B.13.d).

### **B.20.b Standard Detonation Procedures**

The EODU Supervisor is responsible for overseeing all operations conducted at the EODU. The NNSS OCC is notified, as required in current procedures, before any detonation. The NNSS OCC is responsible for scheduling activities to allow for detonations and for controlling air traffic over the EODU during detonations. Detonations are not scheduled during inclement weather or during hours of darkness.

When a detonation is scheduled, waste explosives are removed from the magazine or delivered to the EODU before each event using a designated explosives transportation vehicle and qualified driver. Handling of explosives is conducted by qualified Explosives Workers under the supervision of the EODU Supervisor. Approved, written procedures are followed. The basic components of detonation are loading, priming, and firing. Detonations must be conducted by at least two people meeting the qualification requirements of Section B.12, one of which must be a qualified EODU Supervisor.

The following is an outline of the steps involved in a standard detonation procedure.

#### **B.20.b.1 Set Up Treatment Operations**

- Display red warning flag at EODU gate flag pole and ensure the entrance gates are closed.
- Monitor the Air Resources Laboratory/Special Operations and Research Division system and the radio throughout disposal operations for weather changes.
- Account for all personnel using the High Hazard Facility (HHF) Plan of the Day (POD) Briefing Attendance and Accountability roster (part of the HHF POD) and ensure personnel are either at the Firing Point or completely out of the EODU prior to shot initiation.
- Initiate sweep for unauthorized personnel in the EODU Firing Table Danger Zone.
- Prepare explosive charges in accordance with the prepared work package.
- Ensure that the donor charges are sufficient to consume all the energetic material to be detonated, but do not exceed established explosives limits.
- Direct all personnel not involved in shot setup to proceed to the Firing Point.

### **B.20.b.2 Prepare Shock Tube and Shock Tube Detonators**

- Cut 15.2 cm (6 in.) of shock tube from the roll and discard.
- Lay out the shock tube from the detonation site to the Remote Firing Device (RFD).
- Fit the Tygon tubing or shock tube connector over the detonation site end of the shock tube until the end of the shock tube is flush with the end of the Tygon tubing or seated in the shock tube connector.
- Remove unnecessary personnel from detonation area and direct them to report to the Firing Point.
- Retrieve the shock tube detonator.
- Cut approximately 15.2 cm (6 in.) of shock tube from the shock tube end of the detonator.
- Insert the shock tube end of the detonator into the Tygon tubing or shock tube connector.
- Lay out the shock tube in such a manner that it cannot kink or lay on itself.
- Insert the detonator into the main charge or fasten the detonator to a detonating cord loop using tape as applicable.
- Cut off approximately 15.2 cm (6 in.) of shock tube at the RFD and insert shock tube into the “sparky” (shock tube tip).
- Set up the orange RFD Remote Unit.
- Direct remaining personnel to proceed to the Firing Point.
- Conduct sweep for unauthorized personnel in the EODU Firing Table Danger Zone.

### **B.20.b.3 Initiating the Shot Using the RFD**

- Ensure all personnel are accounted for and in the designated safe area.
- Set up the yellow RFD Controller Unit.
- Give warning in the Safe Area by saying in a loud voice “Fire in the hole” three times.
- Give permission to fire.
- Press and hold both FIRE buttons at the same time for approximately 0.5 seconds.
- If the shot fails to fire, go to “Performing Misfire Procedures.”
- Remove the Controller Unit Key from the key socket on the RFD Controller Unit.
- Turn off the RFD Controller Unit.
- Remove the antenna from the RFD Controller Unit and stow it.
- Wait for dust and smoke to clear before returning to the Firing Table.
- If fire or smoke is visible, then wait until 30 minutes after fire or smoke are no longer visible.
- If detonation was successful, return to the Firing Table.

- If detonation was not successful, go to “Performing Misfire Procedures.”
- Turn off the orange RFD Remote Unit.
- Remove the enable key and the lead line from the RFD Remote Unit.

#### **B.20.b.4 Performing Post-Shot Inspections**

- Inspect the blast site visually for any remaining explosive components, missed holes, and loose explosives.
- If fused explosive components are found to remain in the blast site, then leave them in place and detonate them in accordance with “Performing Disposal Operations at the EODU.”
- If explosive materials are found scattered throughout the blast site, then gather them carefully, place them in one spot, and detonate them in accordance with “Performing Disposal Operations at the EODU.”
- Determine if the blast site is completely safe.
- When the blast site is completely safe, then release the blast site to allow access to other personnel to resume work.

#### **B.20.b.5 Performing Misfire Procedures**

- Attempt to fire firing system again.
- Wait at least 30 minutes after the attempt.
- Approach the blast site to examine the misfire.
- If it appears that the firing system worked correctly but the charge did not fire, then go to “Replacing the Explosive Charge after an Explosive Charge Failure.”
- Disconnect shock tube from shock tube initiator.
- Cut a 0.9-m (3-ft) length of shock tube off the firing system.
- Re-attach the shock tube to the shock tube initiator.
- Refire the system.

#### **B.20.b.6 Replacing the Explosive Charge after an Explosive Charge Failure**

- If it is determined that the firing system worked correctly, and no smoke or flame is observed, then replace the explosive charge as follows.
- If the failed charge was not buried, then place a new charge (countercharge) next to the failed charge.
- If the failed charge was buried, then place a new charge directly above the failed charge.
- Go to “Prepare the Shock Tube and Shock Tube Detonators” to set up detonators for refiring.

### **B.20.b.7 Concluding EODU Disposal Operations – End of Day**

- Perform a walkdown of the EODU Pit Area and remove trash and non-explosive debris.
- Ensure all containers and packages are free of explosives and labeled appropriately.
- Store all remaining explosives properly.
- Verify that all non-hazardous waste has been removed from the EODU and is properly disposed.
- Verify that all empty explosives containers are properly labeled.
- Lower and stow range flag.
- Complete and file explosives inventories.
- Complete the explosives waste inventory to show the description and quantity of each hazardous waste received/treated and the date of treatment, and file the explosives waste inventory with the EODU FM.
- Update the fire symbols on the storage magazine and at facility access points, as required.
- Lock the storage magazine bays and return the keys to the EODU FM.
- Ensure that samples are collected from the PM<sub>10</sub> monitor and prepared for analysis.
- Remove and properly dispose of any large pieces of debris that remain after detonations are complete.
- Lock the EODU gates.
- Notify NNSS OCC of completion of EODU operations.
- Complete Data Sheet B to reflect changes to explosive inventory and submit it by e-mail to the NNSS OCC.
- Provide PM<sub>10</sub> data and final account of amounts and types of explosives actually treated to Environmental Programs within 30 days of the end of the treatment series.
- Complete FRM-2086, “Explosives Expenditure Report,” and file.

### **B.20.b.8 Remote Firing Device**

The RFD operates using a two-way radio controlled remote blast initiation system. The radio system’s signal is digitally encoded. The system has the capability to initiate non-electric shock tube as well as electric blasting caps. Using redundant internal safety circuitry and a timed automatic disarming feature, the remote is disarmed if the encoded firing signal is not properly received within two minutes of being armed. The device is checked out according to the appropriate operating procedure before connecting to the material to be detonated.

### **B.20.c Live Explosives Training**

Live explosives training (including detonation) at the EODU is conducted semi-annually. This training is required to maintain proficiency with operating/emergency procedures, meet annual review requirements of initial training, and provide a larger pool of qualified personnel to support the EODU Supervisor. Additionally, the treatment of experimental explosives from research

projects require that subject matter experts associated with these projects provide consultation and hands-on support to the EODU Supervisor for the treatment of these explosives.

**Title 40 CFR 264.16(a)** requires classroom or on-the-job training to ensure facility compliance. The training includes the following:

- EODU explosives operations and emergency operations
- Procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment
- Communications or alarm systems
- Response to fires or explosions
- Shutdown of operations

Live explosives training involves a maximum of 2 kg (5 lb) of conventional explosives per shot annually. Treatment of waste explosives at any time during a calendar year is counted against the live explosives training events. Documentation of live explosives training is kept in the operating record for the facility and includes date, quantity, and type of explosives used.

Training requirements for EODU personnel are detailed in Section B.12.

#### **B.20.d Transportation**

Suspected waste explosives are transported to the EODU in designated vehicles that are equipped with radio communications and fire extinguishers. DOT-required placards are placed on the front, the rear, and both sides of the vehicle while transporting explosives.

Suspected waste explosives are handled and transported in containers as received from the generator or in approved containers (wood, metal, fiber, or other acceptable material, lined with nonconductive materials and equipped with tight-fitting covers).

The EODU Supervisor is directly contacted for pickup of suspected waste explosives from generators located on the NNSS. The EODU Supervisor determines which explosives are waste and which are useable, separating them accordingly. The type and quantity of explosives delivered to the EODU are then recorded in the EODU Facility Operating Record.

#### **B.20.e Waste Storage**

Waste explosives are stored in the EODU storage magazine that is constructed to the specifications of the DOE STD 1212-2012 except while in transit or in the custody of a for-hire commercial carrier pending delivery to a magazine. The EODU Supervisor controls access to all the magazines and controls the accumulation of waste explosives in an SAA.

The storage magazine is located according to the Quantity and Distance Tables prepared by the DoD to ensure that accidental impact from vehicles and falling objects is avoided. The magazine is 2.44 m high by 2.44 m wide by 7.32 m long (8 ft by 8 ft by 24 ft).

Magazine doors are kept locked except when the EODU personnel are inspecting, loading, or removing explosive wastes and detonation materials.

Waste explosives are stored in a designated magazine in approved containers (if available) until detonated. When waste explosives are present, this magazine contains the SAA in compliance with **40 CFR 262.34**.

#### **B.20.f Surface Water Run-On and Runoff Control**

##### **(1) Run-On**

Run-on is prevented at the EODU because of its location on a topographic saddle (on top of a hill) in the Massachusetts Mountains.

##### **(2) Runoff**

Runoff is prevented by the natural structure of the EODU area, which consists of a pit formed by previous detonations. Precipitation falling inside the pit is allowed to evaporate. The detonation area surrounding the pit is bermed with native soils.

#### **B.20.g Environmental Performance Standards [40 CFR 270.23(b)(c)]**

According to **40 CFR 264.601** and **270.23(b)** and **(c)**, the following information is provided concerning the environmental performance standards that must be maintained to protect human health and the environment:

- Information on the type of waste managed, treatment method, types and quantities of emissions or releases, and the extent of migration or dispersion of the waste in various media
- Detailed assessment of the potential pathways of exposure to humans or environmental receptors from hazardous waste or constituents and the potential magnitude and nature of such exposures
- Evaluation of how the migration of waste constituents in the air, surface water, groundwater, and soils is prevented

##### **(1) Waste Characteristics**

The wastes treated at the EODU are explosives capable of detonation or explosive reaction if subjected to a strong initiating source (**40 CFR 261.23[a][6],[7], and [8]**). NNSA/NFO has evaluated the air emissions capable of being released during normal operations using typical explosive materials as described in Section B.2. In addition, NNSA/NFO has characterized the immediate soils within and adjacent to the treatment zone as described in Section B.20.f.

##### **(2) Treatment Method**

The waste explosives exhibit the characteristic of reactivity and are subject to the Land Disposal Restriction Technology-Based Standard identified in **40 CFR 268.40**, "Treatment Standards for Hazardous Wastes," as deactivation ["explosive subcategory based on **261.23(a)(6),(7), and (8)**"]. Historically, treatment at the EODU included the open burning of explosive materials, which is now prohibited.

## **B.20.g.1 Protection of Groundwater and Subsurface Environment – Hydrogeologic Assessment [40 CFR 270.23(b)(c)]**

### **(1) Patterns of Rainfall**

The EODU is located in an arid area that provides a favorable hydrogeologic setting for waste operations. Average annual rainfall at the EODU is approximately 10 cm (4 in.), as recorded for the Frenchman Flat area. High evaporation rates occur at the Area 11 EODU and are comparable to those observed for the Frenchman Flat Basin. The basin's annual potential evapotranspiration rate is more than ten times higher than the annual precipitation. Low rainfall and high evaporation minimize the potential of groundwater recharge that could provide a pathway for constituent migration.

### **(2) Hydrologic and Geologic Characteristics**

Four hydrogeologic units underlie the EODU (Winograd and Thordarson, 1975). The deepest of these units, the lower carbonate aquifer, contains groundwater at a depth of approximately 550 to 610 m (1,800 to 2,000 ft) below ground surface and is assumed to be the destination of potential contaminants that may migrate downward from the unit. Two of the hydrogeologic units above the lower carbonate aquifer (the welded tuff aquifer and the tuff aquitard) are fractured. As a result, water movement in these units would be expected to occur primarily through fractures and not through pores. The other unit, the bedded tuff aquifer, reportedly transmits groundwater through pores instead of fractures.

Characterization of existing groundwater quality at the site is not proposed because it is unlikely that contamination of groundwater has occurred as a result of unit activities. Depth to groundwater, the presence of a tuff aquitard beneath the site, and the limited amount of combustion products likely to be present suggest that the potential for groundwater contamination from past unit activities is exceedingly low.

### **(3) Proximity to and Withdrawal Rates of Current and Potential Users**

Four wells (two operational) are located within 4.9 km (3 mi) of the EODU. Wells 4 and 4a are located approximately 4.1 km (2.5 mi) and 4.9 km (3 mi), respectively, from the unit. Wells C and C-1 are no longer in use for any purpose. The wells are located west of the unit (Figure 8 and 9), whereas the groundwater flow direction is southward. Withdrawal rates of these wells for 2014 were approximately 174 million L (46 million gal).

### **(4) Regional Land Use Patterns**

Because of the hazards associated with treating (detonating) the waste explosives, a 1.6-km (1-mi) exclusion zone exists around the EODU prohibiting other industrial activities. When the EODU is not in operation, maintenance and site characterization activities may occur within the exclusion zone.

### **(5) Constituent Effects on Domestic Animals and Root Zone of Vegetation**

Food chain crops are not grown in the vicinity of the EODU, and domestic animals are not located on the NNSS. Potential impacts on other vegetation from deposition of waste constituents in the root zone is minimal due to the location of the unit, types of constituents anticipated to be released, and the sparse vegetation present in the region.



### **B.20.g.2 Protection of Surface Water, Wetlands, and Soil Surface**

The surface water and soil surface performance standard addresses the potential for human health or the environment to be adversely impacted because hazardous constituents have migrated from the EODU via surface water or soil.

#### **(1) Existing Water Quality (Surface Waters)**

There are no surface water bodies, including ephemeral streams or wetlands, on or near the Area 11 EODU.

Surface water flooding from channels and run-on from slope wash are not significant at the EODU because it is located on a ridge top. Water drains away from the EODU, except from direct rainfall in the detonation pit. No standing water is present. Surrounding drainage is ephemeral and completely dependent on rainfall. Consequently, surface water contributes very limited capability to transport contaminants and is not of concern.

#### **(2) Existing Soil**

In March 2015, NNSA/NFO completed the “2015 Soil Characterization Report for the Explosive Ordnance Disposal Unit, Nevada National Security Site” (Exhibit 4). This characterization activity was conducted in support of the EODU permit application. The characterization included sampling and analyzing the surface and subsurface soils in and around the detonation pit. The analytical data (Table 1 and Figure 1 of Exhibit 4) indicate that explosive residues were present in the detonation pit and on the detonation pad. Toxicity Characterization Leaching Procedure (TCLP) metal constituents were present at all the sample locations. The release of these constituents is attributed to historic activities, primarily the open burning of explosive material that is now prohibited. This soil characterization activity is required to be repeated every five years over the active life of the unit.

#### **(3) Risk Assessment**

Due to the nature of the treatment (deactivation via detonation), it is unlikely that reactive waste will migrate beyond the treatment zone. The current prohibition on open burning of explosive materials eliminates the generation of explosive residues. Wastes are in solid form and are present in the detonation pit only for brief periods of time before treatment. The remote location of the EODU and the concentrations of constituents in the soil present a minimal exposure risk to humans. Domestic animals and crops are not present within the NNSS and the adjacent NTTR.

### **B.20.g.3 Air Quality**

The EODU is located within Nevada Intrastate Air Quality Control Region (AQCR) 147 and is approximately 13 km (8 mi) from the extreme northwest corner of AQCR-013, the Las Vegas Intrastate AQCR.

Specific operating conditions for the EODU are noted in system 72 of the Class II Air Quality Operating Permit (AP9711-2557.01). Operating parameters (for treating waste explosives) are limited to only those items that are approved under the provisions of the Hazardous Waste Permit NEV HW0101. Reporting requirements include the following:

- Proposed detonations are submitted to the Bureau of Air Pollution Control at least 30 days before treatment.

- Detonation does not proceed without prior written approval from the Bureau Chief.
- Analysis of each treatment is submitted to the Bureau of Air Pollution Control within 60 calendar days of completion the treatment.

PM<sub>10</sub> sampling is conducted at an appropriate safe distance from the detonation site each day a detonation occurs. Records of monitoring are maintained in a contemporaneous log that includes the following:

- Calendar date
- Total detonation rate of explosive material in tons
- Total daily hours of operation
- Corresponding average hourly detonation rate in tons per hour

There are no significant sources of sulfur dioxide, nitrogen oxide, or carbon monoxide at the NNSS. The nearest source is Las Vegas, Nevada, approximately 100 km (62 mi) to the southeast. Instances of high total suspended particulate (TSP) in remote areas are usually caused by high winds. The limited activities conducted at the EODU have minimal short-term local effects on priority pollutants or TSP concentrations and no effect on offsite priority pollutants or TSP concentrations.

According to the Area 11 EODU site characterization program, the potential air emissions generated from detonation activities were modeled and reported to NDEP during a 2012 permit modification. The modeling data indicated that the emissions would result in no significant impact to human health or the environment.

#### **B.20.h Environmental Risk Assessment**

Due to the nature of the treatment (deactivation via detonation), it is unlikely that reactive waste will migrate beyond the treatment zone. The current prohibition on open burning of explosive materials eliminates the generation of explosive residues. Wastes are in solid form and are present in the detonation pit for only brief periods of time before treatment. The remote location of the Area 11 EODU and the minuscule concentrations of constituents in the immediate soils present a minimal exposure risk to humans. Domestic animals and crops are not present within the NNSS or the adjacent NTTR. The lengthy distance to groundwater makes the unit an insignificant potential migration pathway for existing low-risk constituents that could be leached from soils by the infrequent precipitation.

Some wildlife is present on the NNSS and could potentially come in contact with the airborne soils from the Area 11 EODU. Until the amount and type of waste constituents present in the soil are further characterized, the potential for adverse impact to wildlife is not known. Likewise, the sparse vegetation of the area undoubtedly is exposed to waterborne and/or airborne soil particles from the EODU site, but the significance of this exposure is not presently known.

#### **B.20.i Site Characterization**

This section presents data gathered by NNSA/NFO to evaluate potential contamination in the vicinity of the EODU.

### **B.20.i.1 Air Modeling Plan**

Potential air emissions generated from detonation activities at the Area 11 EODU were calculated using a specialized dispersion model that would address the unique dispersion characteristics associated with open detonation (OD) activities. This was accomplished using the Open Burn/Open Detonation Dispersion Model (OBODM). The OBODM has been approved by the EPA specifically for modeling OD and open burn (OB) emission sources.

OBODM is intended for modeling emissions from OB/OD of obsolete munitions and solid propellants at DoD and DOE facilities.

The modeling simulated detonations as instantaneous releases. The effective release height of the initial cloud was calculated by the model. The modeling was conducted using worst-case emissions for both short-term and annual scenarios. These worst-case pollutant emissions were identified from emission factors derived from studies conducted at Dugway Proving Grounds.

After appropriate background concentrations were added, the modeled concentrations for each pollutant were compared with the national and Nevada ambient air quality standards. Results indicated that maximum modeled EODU concentrations were well below the national and Nevada ambient air quality standards for criteria pollutants.

The dispersion model used conservative parameters to present a maximum emission. If the types of waste explosives change or the maximum quantity changes to the extent that the model is not applicable, NNSA/NFO will reissue the report.

Usage rates of 800 lb per day were assumed for the modeling. The 100-lb hourly limit was modeled to represent a single detonation. Therefore, a maximum of eight daily detonations was modeled. The material to be detonated was assumed to be Detagel Water-Gel Explosives, the most common explosives detonated at the site. Rate and quantification of re-entrained dust was estimated based on literature established for blasting emissions associated with mining activities.

### **B.20.i.2 Sampling Plan to Characterize Existing Soil Conditions**

In January 1995, NNSA/NFO conducted an initial characterization of the existing soil conditions at the EODU. This investigation was repeated in November 1999, 2004, and 2009 and in December 2014 (Exhibit 4). Characterization will be repeated every five years over the life of the unit and before closure of the unit. In addition, this investigation outlines the specific tasks to be performed and methods to be used in characterizing the extent of soil contamination, if present, resulting from past activities at the EODU. This plan was designed on the basis of information regarding past site operations.

#### **(1) Objectives and Scope**

The sampling objective of each investigation is to generate data to evaluate site conditions. A report presenting the results of each characterization study will be submitted to NDEP.

Because the vast majority of explosives detonated at the unit are either water-gel or slurry explosives, the sampling plan is designed to characterize existing potential soil contamination that may be associated with these compounds. Water-gel explosives are composed primarily of ammonium nitrate, sodium nitrate, ammonium perchlorate, hexamine nitrate, aluminum, and

water. Slurry explosives are composed primarily of nitroglycerin, sodium nitrate, nitrocellulose, carbonaceous material, sulfur, and antacid (Exhibit 1).

However, few data are available regarding the explosion products of water-gel and slurry explosives. Based on discussions with a representative of the U.S. Army Toxic and Hazardous Waste Division, it appears that potential contaminants associated with these explosives would be minor amounts of undetonated explosives.

The scope of each investigation involves obtaining samples from the detonation pit, the detonation pad, and the immediate area near the pad. Historically, the detonation pit has been disturbed by past detonations and the periodic backfilling of the area. Samples are collected from two locations within the existing pit and from two locations adjacent to the pit. Additional samples are collected from a location immediately southeast of the detonation area where constituents appear most likely to migrate after a detonation. In addition, background samples are obtained from a location approximately 30 m (100 ft) northwest of the unit.

Samples are collected as described in Exhibit 4, properly sealed, labeled, and placed in an ice chest. The samples, with the completed chain of custody and laboratory request forms, are shipped or delivered to the approved laboratory for analysis as soon as possible.

## (2) Chemical Analysis

Sample locations and number of samples are selected following procedures described in the EPA publication "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846 (latest edition). Table 9 provides the rationale for EODU site characterization analytical methods. PETN (water-gel) and nitroglycerin analyses can be obtained by adjusting the instrumental parameters of EPA Method 8330. Background samples will not be analyzed by EPA Methods 8330 or 8332 because the background is assumed to be zero.

**Table 9. Area 11 EODU Site Characterization Analytical Methods Rationale**

Type of Waste Explosive/ Active Ingredients	Analytical Methods/Rationale
Water-Gel Explosives (PETN)	EPA Method 8330/8332 for the detection of Active Ingredients (D003) EPA Method 1010 (Ignitability) for the detection of Ignitable Waste (D001)
TNT	EPA Method 8330/8332 for the detection of Active Ingredients (D003)
RDX pellets	EPA Method 8330/8332 for the detection of Active Ingredients (D003)
Small Arms Ammunition (RDX, HMX, TNT, Heavy Metals)	EPA Method 8330/8332 for the detection of Active Ingredients (D003) EPA Method 1010 (Ignitability) for the detection of Ignitable Waste (D001) EPA Method 1311 (TCLP Metals) for the detection of metals found in explosive formulations
Blasting Caps, Boosters, Squibs (RDX, HMX, TNT, PETN)	EPA Method 8330/8332 for the detection of Active Ingredients (D003) EPA Method 1311 (TCLP Metals) for the detection of metal found in explosive formulations EPA Method 1010 (Ignitability) for the detection of Ignitable Waste (D001)

Type of Waste Explosive/ Active Ingredients	Analytical Methods/Rationale
Black Powder (RDX, HMX, TNT, PETN)	EPA Method 8330/8332 for the detection of Active Ingredients (D003) EPA Method 1010 (Ignitability) for the detection of Ignitable Waste (D001)
Propellants (Ammonium Perchlorate)	EPA Method 1010 (Ignitability) for the detection of Ignitable Waste (D001) EPA Method 8015 (Diesel Range only) for the detection of TPH

Other potential contaminants may have originated from explosive metal casings containing copper and/or zinc. In addition, SDSs (Exhibit 1) indicate that squibs, detonating cord boosters, and blasting caps may contain lead, mercury, and/or selenium. Therefore, samples are collected and analyzed for TCLP metals using EPA Method 1311. To evaluate the hazardous waste characteristics of the soil, samples are collected and analyzed for ignitability using EPA Method 1010.

Also, to be consistent with other site characterization projects and due to the possibility of petroleum previously being openly burned in the area, samples are collected and analyzed by EPA Method 8015M for total petroleum hydrocarbons (TPH) (Diesel Range only). Labels containing the following information will be affixed to all samples: sample number, sample depth, date and time of sampling, sample collector's name, and the name of the unit.

### (3) Data Reduction and Evaluation

Data generated during characterization generally consist of field and laboratory data. Data are organized and evaluated (1) the presence of contaminated soils onsite, (2) the chemical nature of identified contaminants in soil, (3) physical properties of the shallow subsurface material in the unit vicinity, and (4) the need for additional characterization of the site.

The analytical soil results will be evaluated as to the chemical nature of any identified soil contamination. Concentrations of contaminants detected are compared to background concentrations of the same compounds to determine false positive/false negative validity. Subsequent to the reduction and evaluation of the field and laboratory data, an evaluation of the need for additional characterization of the EODU is determined.

### (4) Report Preparation

A report summarizing the results of the sampling and analysis of the existing soil conditions at the EODU is included as Exhibit 4 of this Part B Application.

#### B.20.j Other Federal Laws [40 CFR 270.3]

Other federal laws that apply to operations at the EODU are as follows:

- Endangered Species Act – Waste treatment activities at the EODU are not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect their critical habitats.
- Clean Air Act – Air dispersion modeling for the EODU was conducted in February 2012 as part of an NNSS air permit. Results of the modeling as reported to NDEP indicated that emissions from treatment of wastes at the EODU resulted in no significant impact to human health or the environment.

In addition, NNSA/NFO provides NDEP with a treatment plan and estimated emissions for each detonation event occurring at the EODU. Particulate monitoring is also conducted as part of NNSS Class II Air Quality Operating Permit AP9711-2557.01.

**B.20.k Exposure Information Report [40 CFR 270.10(j)]**

According to **40 CFR 270.10(j)** an exposure information report for this operational unit is not required.

**B.20.l Compliance Schedule [40 CFR 270.33]**

Soil Characterization pursuant to the EODU Sampling Plan to Characterize Existing Soil Conditions in Section B.20.i.2 will be completed during the final year of the effective life of the permit and submitted to NDEP.

**EXHIBIT 4. 2015 SOIL CHARACTERIZATION REPORT FOR THE  
AREA 11 EXPLOSIVE ORDNANCE DISPOSAL UNIT,  
NEVADA NATIONAL SECURITY SITE, NEVADA**

Page Intentionally Left Blank





**2015 SOIL CHARACTERIZATION REPORT FOR THE AREA 11  
EXPLOSIVE ORDNANCE DISPOSAL UNIT**

**NEVADA NATIONAL SECURITY SITE, NEVADA**



**Prepared for:  
U.S. Department of Energy  
National Nuclear Security Administration  
Nevada Field Office**

## **Disclaimer**

This report was prepared as an account of work sponsored by an agency of the U.S. Government. Neither the U.S. Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors or their employees, makes any warranty or representation, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately own rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the U.S. Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the U.S. Government or any agency thereof.

## **1.0 Introduction**

The Explosive Ordnance Disposal Unit (EODU), located in Area 11 of the Nevada National Security Site (NNSS), is an explosive detonation unit for the treatment of onsite generated waste explosives that are hazardous waste as defined under Title 40 Code of Federal Regulations (CFR) Part 261.23(a)(6), (7), and (8), and also 40 CFR 265.832.

The EODU began operations on May 12, 1965, for the open burning and detonation of waste explosives. Open burning of waste explosives was discontinued in the 1980s. In May 1995, the Nevada Division of Environmental Protection (NDEP) issued a Resource Conservation and Recovery Act (RCRA) Permit (NEV HW0009) to the U.S. Department of Energy, Nevada Operations Office (DOE/NV) for the thermal treatment of waste explosives at the EODU. This unit is currently operated according to the RCRA Part B Permit (NEV HW0101), the NNSS Class II Air Quality Operating Permit (AP9711-2557), U.S. Department of Energy Orders, and other applicable Federal and State regulations.

The controlled area containing the unit encompasses approximately 8.1 hectares (20 acres) of land located in the Massachusetts Mountains, between Frenchman Flat and Yucca Flat. The EODU consists of three graded areas, including a detonation pit surrounded by an earthen pad approximately 20 meters (m) (61 feet [ft]) by 30 m (98 ft); a storage magazine, which is also used as a satellite accumulation area for waste explosives; and a firing point that is located approximately 1,423 m (4,670 ft) from the firing pad along the 6-03 road.

Most of the explosives detonated at the EODU are water-gel pentaerythritol tetranitrate (PETN) and slurry explosives. Other explosives detonated include trinitrotoluene (TNT), cyclotrimethylenetrinitriamine (RDX) pellets, cyclotetramethylenetetranitramine (HMX), small arms ammunition, solid rocket propellant, black powder, ammonium nitrate/fuel oil (ANFO), and sensitized heavy ammonium nitrate/fuel oil (SHANFO). Explosive waste is generated by tunneling and construction activities, high explosives testing, experimental explosives testing, special projects, and the security force firing range.

No radioactive or radioactive-contaminated materials are accepted or detonated at the EODU. The unit has an annual operations capacity of 1,870 kilograms (kg) (4,123 pounds [lb]) of waste explosive. The process design capacity of the EODU is approximately 45.4 kg/hr (100 lb/hr).

In 1994, both NDEP and the DOE Nevada Site Office (later to become DOE National Nuclear Security Administration, Nevada Field Office [NNSA/NFO]) agreed that soil samples should be taken from the detonation pit to determine the impact to soils from historic operations. In January 1995, NNSA/NFO submitted the first characterization report. This characterization indicated the presence of Toxicity Characterization Leaching Procedure (TCLP) metals and explosive

residues. The RCRA permit issued in December 2010 required that this characterization be repeated on a five-year cycle.

**2.0 Purpose**

This soil characterization report summarizes sampling activities and analytical results, and meets the requirements of Section 7.6.2 of the RCRA permit (NEV HW0101) and Section B.20.i.2 of the Permit Application.

**3.0 Scope**

The objective of soil characterization is to attempt to establish baseline conditions and to determine if the continued operations of the EODU are adversely impacting the environment adjacent to the unit. The characterization data may also provide supporting data for the eventual closure of the unit. Four areas were identified for sampling: (1) the detonation pad, (2) the detonation pit, (3) the area designated as downwind, and (4) the area designated as background. Each sampling area selection is based on the activities conducted at, and physical characteristics of, the EODU.

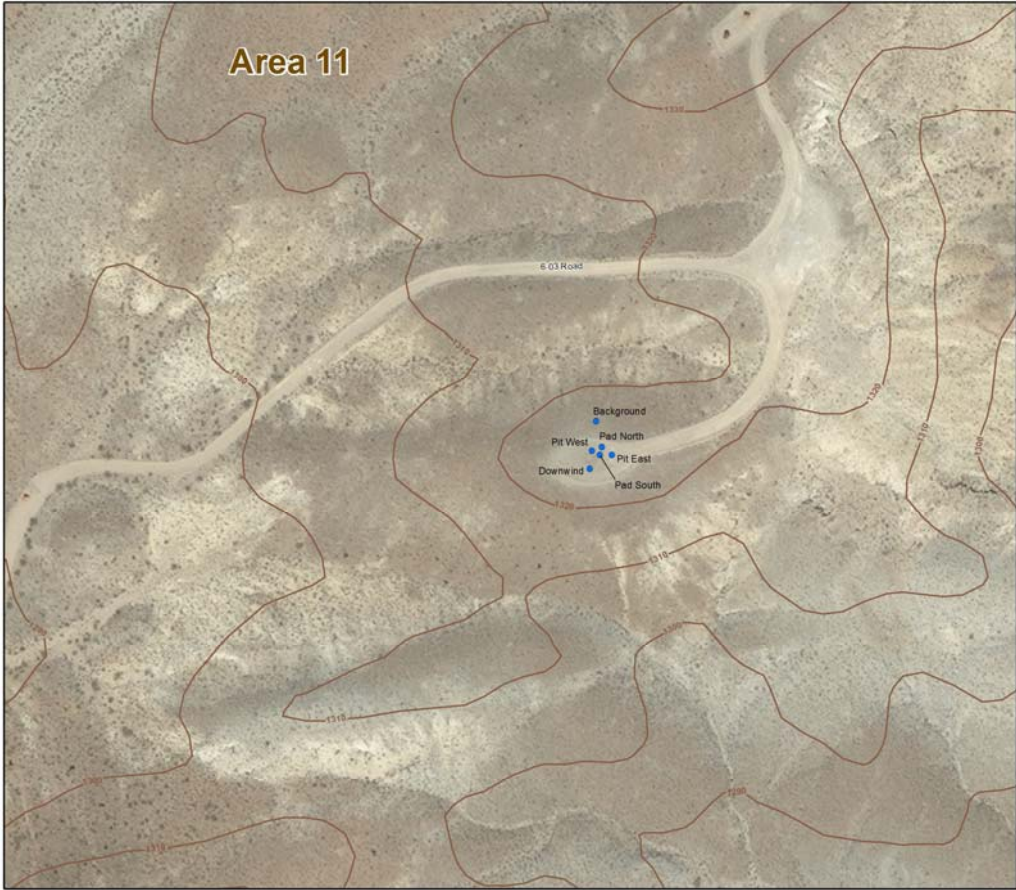
**4.0 Monitoring Activities**

The soil sampling was conducted on December 2, 2014. Personnel conducting the sampling were briefed on unit conditions and operations by the EODU Operations Supervisor prior to entering the unit. Sampling locations are noted in Figure 1. The background location selected was approximately 31 m (100 ft) northwest of the detonation pit.

The surface and subsurface samples were collected from each location in a systematic manner. After surface gravel and debris were removed, clean stainless steel trowels were used to gather the surface sample from approximately 0 to 15 centimeters (cm) (0-6 inches [in.]) below the surface. Each subsurface sample was collected from approximately 15 to 30 cm (6-12 in.) below the surface in the same manner as the surface sample. All samples were immediately containerized, labeled, and placed in a cooler with ice. Chain of custody procedures were followed as prescribed by Environmental Protection Agency (EPA) Publication SW-846.

Samples from each location were analyzed for the following constituents using EPA-approved methods. The background location was not required to be sampled for explosives residue.

<u>Constituent</u>	<u>Analytical Method</u>
Explosive Residues (nitrolycerin)	8330B
PETN, RDX, HMX, TNT	8330B
TCLP Metals	3010C, 6010C, 7470A
Ignitability (flashpoint)	1020B
Nitrates	9056
Total Petroleum Hydrocarbon (diesel range)	3541/8015C



**Figure 1.**  
**2014 Sampling Locations**  
**Area 11 EODU**  
 Map Date: February 11, 2015

**Explanation**

- Sample Location<sup>1</sup>
- Surface Elevation<sup>2</sup>  
 (Contour Interval = 10 m)

<sup>1</sup> Sample locations provided by NSTec Environmental Programs, February 2015.  
<sup>2</sup> Elevation contours are derived from 10-meter horizontal spacing Digital Elevation Models acquired 1987-1988.

Background scene from ESRI World Imagery  
 ©2015 ArcGIS Online  
<http://www.arcgis.com/home/item.html?id=1042279964a4487a70384a246>  
 accessed 10 February 2015 (Data: HERE, DeLorme, USGS, Intermap, increment P Corp., GEBCO, Esri, Aero, METI, Euro-Geo-Survey, Airphoto, Swisstopo, IGN, Esri, Swisstopo, Mapbox, © OpenStreetMap contributors, and the GIS User Community)

Map Projection: UTM (Zone 11, meters/NAD83)  
 Map produced by the NSTec GIS Group  
 Product ID: 20150303.01.F1602.R00

**Map Location**

Unless otherwise noted, all information contained herein should be treated as preliminary. Neither National Security Technologies, LLC (NSTec) nor any agency of the U.S. Government makes any warranty or representation or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information contained herein. Reference to any product, process, or service by trade name, trademark, manufacturer, or otherwise does not constitute an implied endorsement by NSTec or any agency of the U.S. Government. Information contained herein may be used within the National Nuclear Security Administration (NNSA)/NNSS. Field Office (NFO) community. NNSA/NFO or higher authority must approve access to this information for requestors outside the NNSA/NFO community per (2)1813.

**NNSA** **NSTec**

**Figure 1. 2014 Sampling Locations, Area 11 EODU**

## 5.0 Analytical Results

Results of the 2014 sampling are summarized in Table 1 on the following page. Variations in the results from previous sampling events are compatible with the fact the detonation pad is only used every one to two years. Non-detect concentrations recorded on laboratory documentation indicate that a sample is below the analytical method's detection limit.

## 6.0 Conclusions

In accordance with Section B.20.i.2(3) of the Permit Application, the data have been organized and evaluated in terms of the following:

1. **The presence of contaminated soils on site** – Soil contamination has been identified in the five sampling events (1995, 2000, 2005, 2009, and 2014).
2. **The chemical nature of identified contaminants in the soil** – Explosive residues, TCLP metals, nitrates, and nitroglycerin were detected in the samples.
3. **Physical properties of the shallow subsurface material in the unit vicinity** – The shallow subsurface material is colluvium.
4. **The need for additional characterization of the site** – Additional characterization of the site is not needed at this time. Sampling under the Part B Permit will continue on a five-year schedule until closure.
5. **Health concerns** – There are no short-term or long-term health concerns given the concentrations and activity levels at the EODU.

Table 1 Area 11 EODU Analytical Results

Method	Analyte	Unit	Sample Concentrations											
			Background		Downwind		Detonation Pad (North)		Detonation Pad (South)		Detonation Pad (East)		Detonation Pad (West)	
			Surface	Subsurface	Surface	Subsurface	Surface	Subsurface	Surface	Subsurface	Surface	Subsurface	Surface	Subsurface
Sample No: EODU143##			08	09	10	11	12	13	14	15	16	17	18	19
8330B	TNT	ug/kg	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	PETN	ug/kg	NS	NS	ND	ND	ND	ND	ND	185 J	ND	243 J	268 J	273 J
	Nitroglycerin	ug/kg	NS	NS	ND	301 J	2,230	1,310	ND	ND	251 J	ND	616	756
	HMX	ug/kg	NS	NS	723	332 J	2,780	3,650	278 J	302 J	1,040	ND	854 J	1,580
	RDX	ug/kg	NS	NS	1,290	ND	20,400	16,900	ND	ND	3,780	1,160	3,670	2,510
3541/ 8015C	TPH (Diesel)	mg/kg	ND	ND	ND	ND	4.12 J	ND	ND	ND	ND	ND	ND	ND
3010A/ 6010C	Arsenic	ug/L	ND	ND	ND	ND	61.0 B	ND	ND	ND	75.5 B	65.5 B	66.2 B	79.7 B
	Barium	ug/L	164	163	229	229	200	200	71.6	154	69.1	171	209	203
	Cadmium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Chromium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Lead	ug/L	676	329	221	115	886	1,120	198	206	94.2 B	ND	3,970	4,220
	Selenium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Silver	ug/L	ND	12.7 B	26.0 B	15.1 B	22.1 B	19.0 B	ND	12.8 B	19.7 B	17.3 B	21.3 B	16.2 B
7470A	Mercury	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1020B	Ignitability	°F	> 140	> 140	> 140	> 140	> 140	> 140	> 140	> 140	> 140	> 140	> 140	> 140
9056	Nitrates	mg/kg	24.1	7.21	10.3	8.18	748	730	93.3	88.9	165	173	368	366

NS - Not Sampled

ND - None Detected

J - Estimated concentration; concentration between the method detection limit and method reporting limit

B - Presence of analyte detected in the associated blank

Page Intentionally Left Blank



## **C.1 EODU Groundwater Protection [40 CFR 270.14(c)]**

Additional information regarding protection of groundwater, including a groundwater monitoring plan, is required for regulated units under **40 CFR 270.14(c)**. A regulated unit is a surface impoundment, waste pile, land treatment unit, or landfill (**40 CFR 264.90 [a][2]**). The EODU is a miscellaneous unit (**40 CFR 260.1**). Since the EODU is miscellaneous unit, it does not require a groundwater monitoring plan under **40 CFR 270.14(c)**. Also, a groundwater monitoring plan is not required in **40 CFR 264 Subpart X**, “Miscellaneous Units.”

Page Intentionally Left Blank

## **D.1 Characterize Solid Waste Management Units (SWMUs) [40 CFR 270.14(d)]**

Closed SWMUs on the NNSS are noted in NDEP Permit NEV HW0101, Section 9.

Closure reports for each unit are maintained in NNSA/NFO contractor files; copies are provided to NDEP. Reports contain characterization parameters, location maps, a description of each facility, time of operation, wastes managed, and the sampling and analysis results of characterization.

Page Intentionally Left Blank