

Permit



**Department of Energy**  
National Nuclear Security Administration  
Albuquerque Operations Office  
Office of Los Alamos Site Operations  
Los Alamos, New Mexico 87544

**OCT 23 2002**

Mr. Steve Pullen  
Permits Management Program  
Hazardous Waste Bureau  
New Mexico Environment Department  
2905 Rodeo Park Drive East, Building 1  
Santa Fe, NM 87505-6303



Dear Mr. Pullen:

**Subject:** Response to Information Request by the New Mexico Environment Department regarding the Los Alamos National Laboratory (LANL) General Part B Resource Conservation and Recovery Act (RCRA) Permit Application Waste Analysis Plan (WAP) Tables

The purpose of this letter is to respond to your information request regarding the contents of several waste description tables included in the WAP referenced above. We received your request in a telephone communication on July 25, 2002. This response was also discussed by letter with your office on August 20, 2002.

Based upon those communications, this submittal consists of revised waste stream description tables for the DOE/UC General Part B permit application WAP, and an electronic copy of the database query used to provide the majority of the information added to the tables. The tables have been revised, including additional Environmental Protection Agency Hazardous Waste Numbers and by adding a column with underlying hazardous constituents as defined by the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, (20.4.1 NMAC) Subpart VIII, incorporating 40 CFR 268.2(i), pursuant to the Land Disposal Restrictions. The enclosed compact disc contains an Excel database file with over 5900 individual waste items that supports the table additions. As discussed in the August 20 letter, the query contains calendar year (CY) 2001 data as a representative sampling typical of routine waste management activities at LANL.

The submittal includes a certification of the data by facility representatives as the information supplements the permit application. If you should have any further questions concerning this issue, please contact Gene Turner, DOE/OLASO, at (505) 667-5794 or Gian Bacigalupa, University of California, at (505) 667-1579.

Sincerely,

A handwritten signature in black ink, appearing to read "Joseph C. Vozella".

Joseph C. Vozella  
Associate Director  
Office of Facility Operations

OFO:1GT-013



16114

Steve Pullen

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OCT 23 2012

Enclosure

cc w/enclosure:

Carl Will  
Permits Management Program  
Hazardous Waste Bureau  
New Mexico Environment Department  
2905 Rodeo Park Drive East, Building 1  
Santa Fe, NM 87505-6303

cc w/o enclosure:

G. Turner, OFO, OLASO  
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LA-UR-02-6564  
October 2002

**Response to Information Request  
by the New Mexico Environment Department  
Regarding Los Alamos National Laboratory's  
General Part B RCRA Permit Application Waste  
Analysis Plan Tables**

**Los Alamos National Laboratory  
EPA ID # NM0890010515**

Prepared by:

*Los Alamos National Laboratory  
Solid Waste and Regulatory Compliance Group (SWRC)  
Los Alamos, New Mexico 87545*

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**Cross Reference Table  
For  
LANL Waste Analysis Plan (WAP) Tables  
Waste Stream Numbers in Database vs. Waste Descriptions in WAP**

WAP Waste Stream Number in Database	WAP Tables Waste Descriptions
<b>Hazardous Wastes Stored (Table B-2)</b>	
1	Spent Solvents
2	Contaminated Solid Wastes
3	Paint and Related Wastes
4	Photographic and Photocopier Wastes
5	Corrosive Liquid Wastes
6	Solid Metals and Metallic Compounds
7	Contaminated Noncorrosive Aqueous and Nonaqueous Solutions and Sludges
8	Mercury Wastes
9	Used Batteries and Battery Fluids
10	Unused/Off-specification Commercial Chemical Products
11	Gas Cylinder Waste
12	Environmental Restoration (ER) Soils and Sludges
13	ER Aqueous Liquids
14	ER Debris
<b>Mixed Low-Level Solid Wastes Stored (Table B-3)</b>	
15	Soils with Heavy Metals
16	Environmental Restoration Soils
17	Inorganic Solid Oxidizers
18	Lead Waste
19	Noncombustible Debris
20	Combustible Debris
21	Organic-Contaminated Noncombustible Solids
22	Organic-Contaminated Combustible Solids
23	Water-Reactive Wastes
24	Mercury Wastes
25	Unused Solid Reagent Chemical Wastes
<b>Mixed Low-Level Liquid Wastes Stored (Table B-3)</b>	
26	Spent Solvents and Contaminated Solvent Mixtures
27	Corrosive Liquid Wastes
28	Aqueous and Nonaqueous Liquids Contaminated with Heavy Metals and/or Organics
29	Oil Wastes
30	Unused Liquid Reagent Chemical Wastes
<b>Mixed Low-Level Gas Cylinder Wastes Stored (Table B-3)</b>	
31	Gas Cylinder Waste

Document: LANL General Part B

Revision No.: 2.1

Date: October 2002

**Table B-2**  
**Descriptions of Hazardous Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste-Generating Process <sup>a</sup>	Basis for Characterization <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents	
Spent Solvents	Research and development (R&D) activities; laser research; organic and inorganic chemistry research (e.g., solvent extractions, liquid chromatography solvents, polymer synthesis, and distillations); cleaning; and degreasing operations	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>e</sup>	Acetone, Acetonitrile, Antimony, Benzene, Cadmium, Cyanides (Total), 1,2-Dichloroethane, 1,4-Dioxane, Ethyl ether, Methanol, Methylene chloride, Toluene, Trichloroethylene, Triethylamine	
			D002	Corrosivity	NA <sup>e</sup>		
			D003	Reactivity	NA <sup>e</sup>		
			Sampling and Analysis	D004	Arsenic		5.0
				D005	Barium		100.0
				D006	Cadmium		1.0
				D007	Chromium		5.0
				D008	Lead		5.0
				D009	Mercury		0.2
				D010	Selenium		1.0
		D011		Silver	5.0		
		D018		Benzene	0.5		
		D019		Carbon tetrachloride	0.5		
		D021		Chlorobenzene	100.0		
		D022		Chloroform	6.0		
		D026		Cresol	200.0 <sup>h</sup>		
		D027		1,4-Dichlorobenzene	7.5		
		D028		1,2-Dichloroethane	0.5		
		D029		1,1-Dichloroethylene	0.7		
		D030		2,4-Dinitrotoluene	0.13		
		D032		Hexachlorobenzene	0.13		
		D034		Hexachloroethane	3.0		
		D035		Methyl ethyl ketone	200.0		
		D036	Nitrobenzene	2.0			
		D037	Pentachlorophenol	100.0			
		D038	Pyridine	5.0			
		D040	Trichloroethylene	0.5			
		D041	2,4,5-Trichlorophenol	400.0			
		D042	2,4,6-Trichlorophenol	2.0			
		D043	Vinyl chloride	0.2			
F001	Spent halogenated solvents	NA <sup>e</sup>					
F002	Spent halogenated solvents	NA <sup>e</sup>					
F003	Spent non-halogenated solvents	NA <sup>e</sup>					
F004	Spent non-halogenated solvents	NA <sup>e</sup>					
F005	Spent non-halogenated solvents	NA <sup>e</sup>					
U213	Tetrahydrofuran	NA <sup>e</sup>					

**Table B-2 (continued)**  
**Descriptions of Hazardous Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste-Generating Process <sup>a</sup>	Basis for Characterization <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents
Contaminated Solid Wastes	Machining operations, chemistry research, decontamination and decommissioning projects, metal finishing operations, HE wastewater filtration, and general maintenance operations	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>e</sup>	Barium, Beryllium, Cadmium, Carbon disulfide, Chloroform, Chromium (Total), Ethel ether, Lead, Mercury-all others, Methanol, Methyl ethyl ketone, Methylene chloride, Nickel, Phenol, p,p'-DDT, Selenium, Silver, Thallium, Trichloroethylene
			D003	Reactivity	NA <sup>e</sup>	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D019	Carbon tetrachloride	0.5	
			D021	Chlorobenzene	100.0	
			D022	Chloroform	6.0	
			D023	o-Cresol	200.0 <sup>h</sup>	
		D024	m-Cresol	200.0 <sup>h</sup>		
		D025	p-Cresol	200.0 <sup>h</sup>		
		D026	Cresol	200.0 <sup>h</sup>		
		D027	1,4-Dichlorobenzene	7.5		
		D028	1,2-Dichloroethane	0.5		
		D029	1,1-Dichloroethylene	0.7		
		D030	2,4-Dinitrotoluene	0.13		
		D031	Heptachlor (and its epoxide)	0.008		
		D032	Hexachlorobenzene	0.13		
		D033	Hexachlorobutadiene	0.5		
		D034	Hexachloroethane	3.0		
		D035	Methyl ethyl ketone	200.0		
		D036	Nitrobenzene	2.0		
		D037	Pentachlorophenol	100.0		
		D038	Pyridine	5.0 <sup>f</sup>		
		D039	Tetrachloroethylene	0.7		
		D040	Trichloroethylene	0.5		
		D041	2,4,5-Trichlorophenol	400.0		
		D042	2,4,6-Trichlorophenol	2.0		
		D043	Vinyl chloride	0.2		
		F001	Spent halogenated solvents	NA <sup>e</sup>		
		F002	Spent halogenated solvents	NA <sup>e</sup>		
		F003	Spent non-halogenated solvents	NA <sup>e</sup>		
		F004	Spent non-halogenated solvents	NA <sup>e</sup>		
		F005	Spent non-halogenated solvents	NA <sup>e</sup>		
		K045	Spent carbon	NA <sup>e</sup>		

Refer to footnotes at end of table.

**Table B-2 (continued)**  
**Descriptions of Hazardous Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste-Generating Process <sup>a</sup>	Basis for Characterization <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents
Paint and Related Wastes	Painting and finishing operations, and general facility maintenance	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>e</sup>	Lead, Methyl ethyl ketone
			D005	Barium	100.0	
		Sampling and Analysis	D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D011	Silver	5.0	
			D036	Nitrobenzene	2.0	
F003	Spent non-halogenated solvents	NA <sup>e</sup>				
F005	Spent non-halogenated solvents	NA <sup>e</sup>				
Photographic and Photocopier Wastes	Photographic film processing and photocopier operations	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>e</sup>	Silver
			D002	Corrosivity	NA <sup>e</sup>	
		Sampling and Analysis	D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
D011	Silver	5.0				

**Table B-2 (continued)**  
**Descriptions of Hazardous Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste-Generating Process <sup>a</sup>	Basis for Characterization <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents
Corrosive Liquid Wastes	Analytical chemistry research, electro-etching, and electro-polishing	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>e</sup>	Acetone, Arsenic, Barium, Cadmium, Chromium (Total), Cyanides (Total), 2,4-Dinitrophenol, Fluoride, Isobutyl alcohol, Lead, Mercury-all others, Methanol, Nickel, o-Nitrophenol, Selenium, Silver, Sulfide, Thallium, Triethylamine, Zinc
			D002	Corrosivity	NA <sup>e</sup>	
			D003	Reactivity	NA <sup>e</sup>	
		Sampling and Analysis	D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D022	Chloroform	6.0	
			D038	Pyridine	5.0	
			F002	Spent halogenated solvents	NA <sup>e</sup>	
F003	Spent non-halogenated solvents	NA <sup>e</sup>				
F005	Spent non-halogenated solvents	NA <sup>e</sup>				
P023	Chloroacetaldehyde	NA <sup>e</sup>				
Solid Metals and Metallic Compounds	Machining and cutting operations; synthesis reactions; solder from electronic manufacturing, repair, and brazing operations; and grinding operations	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>e</sup>	Arsenic, Lead, Nickel, Silver
			D003	Reactivity	NA <sup>e</sup>	
			D004	Arsenic	5.0	
		Sampling and Analysis	D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	

**Table B-2 (continued)**  
**Descriptions of Hazardous Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste-Generating Process <sup>a</sup>	Basis for Characterization <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents	
Contaminated Noncorrosive Aqueous and Nonaqueous Solutions and Sludges	Vacuum pump maintenance, analytical spectrometry, equipment cleaning and maintenance, vehicle maintenance, synthesis reactions, metal-polishing operations, and chemical research	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>e</sup>	Acetone, Acetonitrile, Antimony, Arsenic, Barium, Benzene, Cadmium, Carbon tetrachloride, Chromium (Total), Chrysene, p-Cresol, m-Dichlorobenzene, 1,2-Dichloroethane, 4,6-Dinitro-o-cresol, 1,4-Dioxane, Fluorene, Indeno(1,2,3-c,d) pyrene, Lead, Mercury-all others, Methanol, Methyl ethyl ketone, Methylene chloride, Naphthalene, p-Nitrophenol, Pyridine, Selenium, Silver, Tetrachloroethylene, Toluene, Trichloroethylene, 2,4,6-Trichlorophenol, Zinc	
			D002	Corrosivity	NA <sup>e</sup>		
			D003	Reactivity	NA <sup>e</sup>		
			Sampling and Analysis	D004	Arsenic		5.0
				D005	Barium		100.0
				D006	Cadmium		1.0
				D007	Chromium		5.0
				D008	Lead		5.0
				D009	Mercury		0.2
				D010	Selenium		1.0
		D011		Silver	5.0		
		D018		Benzene	0.5		
		D019		Carbon tetrachloride	0.5		
		D021		Chlorobenzene	100.0		
		D022		Chloroform	6.0		
		D023		o-Cresol	200.0 <sup>h</sup>		
		D024		m-Cresol	200.0 <sup>h</sup>		
		D025		p-Cresol	200.0 <sup>h</sup>		
		D026		Cresol	200.0 <sup>h</sup>		
		D027		1,4-Dichlorobenzene	7.5		
		D028		1,2-Dichloroethane	0.5		
		D029		1,1-Dichloroethylene	0.7		
		D030		2,4-Dinitrotoluene	0.13 <sup>f</sup>		
		D032		Hexachlorobenzene	0.13 <sup>f</sup>		
		D033		Hexachlorobutadiene	0.5		
		D034		Hexachloroethane	3.0		
		D035	Methyl ethyl ketone	200.0			
		D036	Nitrobenzene	2.0			
		D037	Pentachlorophenol	100.0			
		D038	Pyridine	5.0			
		D039	Tetrachloroethylene	0.7			
		D040	Trichloroethylene	0.5			
		D041	2,4,5-Trichlorophenol	400.0			
D042	2,4,6-Trichlorophenol	2.0					
D043	Vinyl chloride	0.2					
F001	Spent halogenated solvents	NA <sup>e</sup>					
F002	Spent halogenated solvents	NA <sup>e</sup>					
F003	Spent non-halogenated solvents	NA <sup>e</sup>					
F004	Spent non-halogenated solvents	NA <sup>e</sup>					
F005	Spent non-halogenated solvents	NA <sup>e</sup>					

**Table B-2 (continued)**  
**Descriptions of Hazardous Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste-Generating Process <sup>a</sup>	Basis for Characterization <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents
Mercury Wastes	Lamp replacement, chemical research, mercury spill cleanup, and equipment cleaning and maintenance	Acceptable Knowledge <sup>d</sup>  Sampling and Analysis	D003 D008 D009 D011 U151	Reactivity Lead Mercury Silver Mercury	NA <sup>e</sup> 5.0 0.2 5.0 NA <sup>e</sup>	Barium, Chromium (Total), Mercury-all others, Thallium, Zinc
Used Batteries and Battery Fluids	Equipment maintenance	Acceptable Knowledge <sup>d</sup>	D002 D003 D006 D007 D008 D009 D011 D038	Corrosivity Reactivity Cadmium Chromium Lead Mercury Silver Pyridine	NA <sup>e</sup> NA <sup>e</sup> 1.0 5.0 5.0 0.2 5.0 5.0 <sup>f</sup>	Cadmium, Lead, Pyridine, Silver
Unused/Off-specification Commercial Chemical Products	R&D, spill residues, and general facility operations	Acceptable Knowledge <sup>d</sup>  Sampling and Analysis	D001 D002 D003 D004 through D043  All P- and U-listed EPA Hazardous Waste Numbers <sup>g</sup>	Ignitability Corrosivity Reactivity Toxicity characteristic wastes  Discarded commercial chemical products and off-specification species	NA <sup>e</sup> NA <sup>e</sup> NA <sup>e</sup> - <sup>c</sup>  NA <sup>e</sup>	Acetonitrile, Barium, Cadmium, Chromium (Total), Lead, Mercury-all others, Nickel, Selenium, Silver, Toluene

**Table B-2 (continued)**  
**Descriptions of Hazardous Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste-Generating Process <sup>a</sup>	Basis for Characterization <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents
Gas Cylinder Waste	R&D and general facility operations	Acceptable Knowledge <sup>d</sup>	D001 D002 D003 Potential D-coded EPA Hazardous Waste Numbers Potential P-and U-listed EPA Hazardous Waste Numbers <sup>d</sup>	Ignitability Corrosivity Reactivity Toxicity characteristic wastes  Discarded commercial chemical products and off-specification species	NA <sup>e</sup> NA <sup>e</sup> NA <sup>e</sup> - <sup>c</sup>  NA <sup>e</sup>	
Environmental Restoration (ER) Soils and Sludges	Site decommissioning, site characterization, and site remediation; includes septic tank and detention basin closure, removal actions, and other remedial actions and site closures	Acceptable Knowledge <sup>d</sup>  Sampling and Analysis	D001 D003 D004 D005 D006 D007 D008 D009 D010 D011 D018 D022 D030 D032 D033 D034 D036 D039 D040 D042 F001 F002 F003 F005	Ignitability Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Chloroform 2,4-Dinitrotoluene Hexachlorobenzene Hexachlorobutadiene Hexachloroethane Nitrobenzene Tetrachloroethylene Trichloroethylene 2,4,6-Trichlorophenol Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	NA <sup>e</sup> NA <sup>e</sup> 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 6.0 0.13 <sup>f</sup> 0.13 <sup>f</sup> 0.5 3.0 2.0 0.7 0.5 2.0 NA <sup>e</sup> NA <sup>e</sup> NA <sup>e</sup> NA <sup>e</sup>	Barium, Cadmium, Lead

**Table B-2 (continued)**  
**Descriptions of Hazardous Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste-Generating Process <sup>a</sup>	Basis for Characterization <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents
ER Aqueous Liquids	Decontamination of remedial equipment, drilling fluids and well development fluids, septic tank liquids, and contaminated storm water runoff	Acceptable Knowledge <sup>d</sup>  Sampling and Analysis	D001	Ignitability	NA <sup>e</sup>	
			D002	Corrosivity	NA <sup>e</sup>	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D038	Pyridine	5.0	
			F002	Spent halogenated solvents	NA <sup>e</sup>	
			F003	Spent non-halogenated solvents	NA <sup>e</sup>	
F005	Spent non-halogenated solvents	NA <sup>e</sup>				
ER Debris	Site decommissioning, site characterization, and site remediation; includes septic tank and detention basin closure, removal actions, and other remedial actions and site closures	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>e</sup>	Barium, Lead
			D003	Reactivity	NA <sup>e</sup>	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D022	Chloroform	6.0	
			D030	2,4-Dinitrotoluene	0.13 <sup>f</sup>	
			D032	Hexachlorobenzene	0.13 <sup>f</sup>	
			D033	Hexachlorobutadiene	0.5	
			D034	Hexachloroethane	3.0	
			D036	Nitrobenzene	2.0	
			D039	Tetrachloroethylene	0.7	
D040	Trichloroethylene	0.5				
D042	2,4,6-Trichlorophenol	2.0				

**Table B-2 (continued)**  
**Descriptions of Hazardous Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste-Generating Process <sup>a</sup>	Basis for Characterization <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents
ER Debris (continued)			F001 F002 F003 F005	Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	NA <sup>e</sup> NA <sup>e</sup> NA <sup>e</sup> NA <sup>e</sup>	

a Denotes information from the Los Alamos National Laboratory waste characterization documentation database.

b U.S. Environmental Protection Agency.

c A solid waste exhibits the characteristics of toxicity if, using the Toxicity Characteristic Leaching Procedure, Test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA, 1986), the extract from a representative sample of the waste contains any of the contaminants listed (D004-D043) at a concentration equal to or greater than the respective value given in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), Subpart II, Part 261, Subpart C [6-14-00].

d Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994. "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," OSWER 9938.4-03, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

e Not applicable. Refers to the absence of regulatory limits for ignitable, corrosive, and reactive characteristic wastes and F-, P-, and U-listed wastes.

f The quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level (20.4.1 NMAC, Subpart II, 261.24, Table 1) [6-14-00].

g Refers to the P- and U-listed wastes found in the "Los Alamos National Laboratory General Part A Permit Application," Revision 3.0, 2002, Los Alamos National Laboratory, Los Alamos, New Mexico.

h If o-, m-, and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 milligrams per liter.

Note: Fluoride, sulfide, vanadium, and zinc are not "underlying hazardous constituents" in characteristic wastes, according to the definition in § 268.2(i). Selenium is not an underlying hazardous constituent as defined at § 268.2(i) because its Universal Treatment Standard level is greater than its Toxicity Characteristic level, thus a treated selenium waste would always be characteristically hazardous, unless it is treated to below its characteristic level.

Table B-3

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents
<b>Solid Wastes</b>						
Soils with Heavy Metals	Decontamination and decommissioning (D&D) and Environmental Restoration (ER) activities	Acceptable Knowledge <sup>d</sup> and Preliminary Analysis <sup>e</sup>	D004 D005 D006 D007 D008 D009 D010 D011	Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0	Arsenic, Barium, Chromium (Total), Mercury-all others, Selenium, Vanadium, Zinc
Environmental Restoration Soils	Remediation of release sites and D&D activities	Acceptable Knowledge <sup>d</sup>  Sampling and Analysis	D005 D006 D007 D008 D009 D028 D029 F001 F002 F004 F005	Barium Cadmium Chromium Lead Mercury 1,2-Dichloroethane 1,1-Dichloroethylene Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	100.0 1.0 5.0 5.0 0.2 0.5 0.7 NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>	Chromium (Total), Lead
Inorganic Solid Oxidizers	D&D of research laboratories and research and development (R&D)	Acceptable Knowledge <sup>d</sup>	D001 D003 D005	Ignitability Reactivity Barium	NA <sup>f</sup> NA <sup>f</sup> 100.0	
Lead Waste	Radioisotope experiments and other reactor, accelerator, laser, and x-ray activities	Acceptable Knowledge <sup>d</sup>	D002 D003 D007 D008 D009	Corrosivity Reactivity Chromium Lead Mercury	NA <sup>f</sup> NA <sup>f</sup> 5.0 5.0 0.2	Lead
Noncombustible Debris	Maintenance, D&D, R&D, and ER activities	Acceptable Knowledge <sup>d</sup>	D001 D003 D004 D005 D006 D007 D008 D009 D010 D011 F002 F005	Ignitability Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Spent halogenated solvents Spent non-halogenated solvents	NA <sup>f</sup> NA <sup>f</sup> 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 5.0 NA <sup>f</sup> NA <sup>f</sup>	Arsenic, Cadmium, Chromium (Total), Lead, Mercury-all others

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents
<b>Solid Wastes (Continued)</b>						
Combustible Debris	Maintenance, R&D, D&D, and ER activities	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>f</sup>	Lead, Mercury-all others, Nickel, Zinc
			D003	Reactivity	NA <sup>f</sup>	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			F001	Spent halogenated solvents	NA <sup>f</sup>	
			F002	Spent halogenated solvents	NA <sup>f</sup>	
			F003	Spent non-halogenated solvents	NA <sup>f</sup>	
			F005	Spent non-halogenated solvents	NA <sup>f</sup>	
			Organic-Contaminated Noncombustible Solids	Vacuum pump maintenance, R&D, D&D, and ER activities	Acceptable Knowledge <sup>d</sup>	
D004	Arsenic	5.0				
D005	Barium	100.0				
D006	Cadmium	1.0				
D007	Chromium	5.0				
D008	Lead	5.0				
D009	Mercury	0.2				
D010	Selenium	1.0				
D011	Silver	5.0				
D018	Benzene	0.5				
D027	1,4-Dichlorobenzene	7.5				
D030	2,4-Dinitrotoluene	0.13 <sup>g</sup>				
D032	Hexachlorobenzene	0.13 <sup>g</sup>				
D033	Hexachlorobutadiene	0.5				
D034	Hexachloroethane	3.0				
D035	Methyl ethyl ketone	200.0				
D037	Pentachlorophenol	100.0				
D038	Pyridine	5.0 <sup>g</sup>				
D041	2,4,5-Trichlorophenol	400.0				
D042	2,4,6-Trichlorophenol	2.0				
F001	Spent halogenated solvents	NA <sup>f</sup>				
F002	Spent halogenated solvents	NA <sup>f</sup>				
F004	Spent non-halogenated solvents	NA <sup>f</sup>				
F005	Spent non-halogenated solvents	NA <sup>f</sup>				

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents
<b>Solid Wastes (Continued)</b>						
Organic-Contaminated Combustible Solids	Maintenance, D&D, and ER activities	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>f</sup>	
			D003	Reactivity	NA <sup>f</sup>	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D030	2,4-Dinitrotoluene	0.13 <sup>g</sup>	
			D035	Methyl ethyl ketone	200.0	
			F001	Spent halogenated solvents	NA <sup>f</sup>	
			F002	Spent halogenated solvents	NA <sup>f</sup>	
			F003	Spent non-halogenated solvents	NA <sup>f</sup>	
			F005	Spent non-halogenated solvents	NA <sup>f</sup>	
Water-Reactive Wastes	Cleanup of HE firing-site debris, machining and disassembly of test components	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>f</sup>	
			D003	Reactivity	NA <sup>f</sup>	
			D005	Barium	100.0	
			F002	Spent halogenated solvents	NA <sup>f</sup>	
Mercury Wastes	Cleanup operations	Acceptable Knowledge <sup>d</sup>	D005	Barium	100.0	Mercury-all others
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			F001	Spent halogenated solvents	NA <sup>f</sup>	
Unused Solid Reagent Chemical Wastes	R&D activities	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>f</sup>	
			D002	Corrosivity	NA <sup>f</sup>	
			D003	Reactivity	NA <sup>f</sup>	
			All P- and U-listed EPA Hazardous Waste Numbers <sup>i</sup>	Discarded commercial chemical products and off-specification species	NA <sup>f</sup>	

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents
<b>Liquid Wastes</b>						
Spent Solvents and Contaminated Solvent Mixtures	Maintenance, cleaning, and degreasing activities: R&D; processing operations, such as extraction, bench-scale experimental inorganic chemistry, environmental analysis, radiochemistry	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>f</sup>	Tribromomethane (Bromoform)
			D002	Corrosivity	NA <sup>f</sup>	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D019	Carbon tetrachloride	0.5	
			D021	Chlorobenzene	100.0	
			D022	Chloroform	6.0	
			D027	1,4-Dichlorobenzene	7.5	
			D028	1,2-Dichloroethane	0.5	
			D030	2,4-Dinitrotoluene	0.13 <sup>g</sup>	
			D032	Hexachlorobenzene	0.13 <sup>g</sup>	
			D033	Hexachlorobutadiene	0.5	
			D034	Hexachloroethane	3.0	
			D036	Nitrobenzene	2.0	
D042	2,4,6-Trichlorophenol	2.0				
D043	Vinyl chloride	0.2				
F001	Spent halogenated solvents	NA <sup>f</sup>				
F002	Spent halogenated solvents	NA <sup>f</sup>				
F003	Spent non-halogenated solvents	NA <sup>f</sup>				
F005	Spent non-halogenated solvents	NA <sup>f</sup>				

Table B-3 (Continued)

## Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents
<b>Liquid Wastes (Continued)</b>						
Corrosive Liquid Wastes	Radiochemistry research, plutonium-processing operations, and analytical chemistry	Acceptable Knowledge <sup>d</sup>	D001 D002 D004 D006 D007 D008 D009 D010 D011 D036 D043 F001 F002 F005	Ignitability Corrosivity Arsenic Cadmium Chromium Lead Mercury Selenium Silver Nitrobenzene Vinyl chloride Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents	NA <sup>f</sup> NA <sup>f</sup> 5.0 1.0 5.0 5.0 0.2 1.0 5.0 2.0 0.2 NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>	Arsenic, Barium, Bromodichloromethane, Chromium (Total), Lead, Nickel, Silver
Aqueous and Nonaqueous Liquids Contaminated with Heavy Metals and/or Organics	ER activities, metal-polishing operations, and radiochemistry research	Acceptable Knowledge <sup>d</sup> Sampling and Analysis <sup>i</sup>	D001 D003 D004 D005 D006 D007 D008 D009 D010 D011 D018 D019 D021 D022 D023 D024 F002 F005	Ignitability Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Carbon tetrachloride Chlorobenzene Chloroform o-Cresol m-Cresol Spent halogenated solvents Spent non-halogenated solvents	NA <sup>f</sup> NA <sup>f</sup> 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 0.5 100.0 6.0 200.0 <sup>h</sup> 200.0 <sup>h</sup> NA <sup>f</sup> NA <sup>f</sup>	Chromium (Total), 1,2-Dichloroethane, Selenium

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents
<b>Liquid Wastes (Continued)</b>						
Oil Wastes	Equipment maintenance operations	Acceptable Knowledge <sup>d</sup>	D004	Arsenic	5.0	Diethylphthalate, Di-n-butyl phthalate, Hexachlorobenzene, Hexachlorocyclopentadiene, Nitrobenzene, Thallium, 2,4,5-Trichlorophenol, Silver
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D018	Benzene	0.5	
			D019	Carbon tetrachloride	0.5	
			D027	1,4-Dichlorobenzene	7.5	
			D028	1,2-Dichloroethane	0.5	
			D030	2,4-Dinitrotoluene	0.13 <sup>g</sup>	
			D032	Hexachlorobenzene	0.13 <sup>g</sup>	
			D033	Hexachlorobutadiene	0.5	
			D034	Hexachloroethane	3.0	
			D036	Nitrobenzene	2.0	
			D037	Pentachlorophenol	100.0	
			D038	Pyridine	5.0 <sup>g</sup>	
			D041	2,4,5-Trichlorophenol	400.0	
			D042	2,4,6-Trichlorophenol	2.0	
D043	Vinyl chloride	0.2				
F001	Spent halogenated solvents	NA <sup>f</sup>				
F002	Spent halogenated solvents	NA <sup>f</sup>				
F003	Spent non-halogenated solvents	NA <sup>f</sup>				
F005	Spent non-halogenated solvents	NA <sup>f</sup>				
Unused Liquid Reagent Chemical Wastes	R&D activities	Acceptable Knowledge <sup>d</sup>	D001 D002 D035 All P- and U-listed EPA Hazardous Waste Numbers <sup>e</sup>	Ignitability Corrosivity Methyl ethyl ketone Discarded commercial chemical products and off-specification species	NA <sup>f</sup> NA <sup>f</sup> 200.0 NA <sup>f</sup>	

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents
<b>Gas Cylinder Waste</b>						
Gas Cylinder Waste	R&D and general facility operations	Acceptable Knowledge <sup>d</sup>	D001 D002 D003 Potential D-coded EPA Hazardous Waste Numbers  Potential P- and U-listed EPA Hazardous Waste Numbers <sup>i</sup>	Ignitability Corrosivity Reactivity Toxicity characteristic wastes  Discarded commercial chemical products and off-specification species	NA <sup>e</sup> NA <sup>e</sup> NA <sup>e</sup> - <sup>c</sup>  NA <sup>e</sup>	

<sup>a</sup> Denotes information from the Los Alamos National Laboratory waste characterization documentation database.

<sup>b</sup> U.S. Environmental Protection Agency.

<sup>c</sup> A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, Test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA, 1986), the extract from a representative sample of the waste contains any of the contaminants listed (D004-D043) at a concentration equal to or greater than the respective value given in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), Subpart II, Part 261, Subpart C [6-14-00].

<sup>d</sup> Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," OSWER 9938.4-03, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

<sup>e</sup> Limited and/or preliminary analysis: In reference to the basis for hazardous waste classification, indicates that sampling and analysis has been performed but that the data may not be completely documented or that data may exist but may not be verifiable.

<sup>f</sup> Not applicable: Refers to the absence of regulatory limits for ignitable, corrosive, and reactive characteristic wastes and F-, P-, and U-listed wastes.

<sup>g</sup> The quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level (20.4.1 NMAC, Subpart II, 261.24, Table 1 [6-14-00]).

<sup>h</sup> If o-, m-, and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 milligrams per liter.

<sup>i</sup> Refers to the P- and U-listed wastes found in the "Los Alamos National Laboratory General Part A Permit Application," Revision 3.0, 2002, Los Alamos National Laboratory, Los Alamos, New Mexico.

Note: Fluoride, sulfide, vanadium, and zinc are not "underlying hazardous constituents" in characteristic wastes, according to the definition in § 268.2(i). Selenium is not an underlying hazardous constituent as defined at § 268.2(i) because its Universal Treatment Standard level is greater than its Toxicity Characteristic level, thus a treated selenium waste would always be characteristically hazardous, unless it is treated to below its characteristic level.

Table B-5

Descriptions of Mixed Transuranic Waste Stored at LANL<sup>a</sup>

TRUCON Codes	Waste Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents <sup>g</sup>
LA 111/211	Stabilized Inorganic Process Solids and Aqueous Waste	Plutonium (Pu)-processing operations and decontamination and decommissioning (D&D) activities	Acceptable Knowledge <sup>d</sup>	D004 D005 D006 D007 D008 D009 D010 D011 D018 D019 D021 D022 D035 D038 D039 D040 F001 F002 F003 F005	Arsenic Barium hydroxide Cadmium Chromium Lead Mercury Selenium Silver Benzene Carbon tetrachloride Chlorobenzene Chloroform Methyl ethyl ketone Pyridine Tetrachloroethylene Trichloroethylene Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 0.5 100.0 6.0 200.0 5.0 <sup>h</sup> 0.7 0.5 NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>	

Table B-5 (continued)

Descriptions of Mixed Transuranic Waste Stored at LANL<sup>a</sup>

TRUCON Codes	Waste Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents <sup>g</sup>
LA 112/212	Absorbed Organics on Vermiculite	Organics absorbed on vermiculite as a result of Pu-processing	Acceptable Knowledge <sup>d</sup>	D005 D006 D007 D008 D009 D011 D019 D021 F001 F002 F005	Barium Cadmium Chromium Lead Mercury Silver Carbon tetrachloride Chlorobenzene Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents	100.0 1.0 5.0 5.0 0.2 5.0 0.5 100.0 NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>	Acetone, Barium, Bis(2-ethylhexyl) phthalate, Bromodichloromethane, Bromomethane (Methyl bromide), Cadmium, Carbon disulfide, Chloroethane, Chloromethane (Methyl chloride), Chromium (Total), Di-n-butyl phthalate, Dibromomethane, Lead, Mercury-all others, Methanol, Methyl isobutyl ketone, Methylene chloride, n-Butyl alcohol, Selenium, Silver, Toluene, Tribromomethane (Bromoform), Trichloromonofluoromethane, Xylenes (Total)

Table B-5 (continued)

Descriptions of Mixed Transuranic Waste Stored at LANL<sup>a</sup>

TRUCON Codes	Waste Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents <sup>g</sup>
LA 114/214	Solidified Inorganic Process Solids	Process residue from evaporator bottoms and other discardable solutions; process-leached solids, ash, filter cakes, salts, metal oxides, and fines generated as a result of Pu-processing	Acceptable Knowledge <sup>d</sup>	D002 D004 D005 D006 D007 D008 D009 D010 D011 D018 D019 D021 D022 D035 D038 D039 D040 F001 F002 F003 F005	Corrosivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Carbon tetrachloride Chlorobenzene Chloroform Methyl ethyl ketone Pyridine Tetrachloroethylene Trichloroethylene Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	NA <sup>f</sup> 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 0.5 100.0 6.0 200.0 5.0 <sup>h</sup> 0.7 0.5 NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>	Cadmium, Chromium (Total), Lead, Mercury-all others, Nickel, Silver, Zinc

Table B-5 (continued)

Descriptions of Mixed Transuranic Waste Stored at LANL<sup>a</sup>

TRUCON Codes	Waste Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents <sup>g</sup>
LA115/215	Graphite Waste	Discarded graphite molds, furnace equipment, and a small fraction of combustible waste generated from Pu-processing and casting operations	Acceptable Knowledge <sup>d</sup>	D004 D005 D006 D007 D008 D009 D010 D011 D018 D019 D021 D022 D035 D038 D039 D040 F001 F002 F003 F005	Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Carbon tetrachloride Chlorobenzene Chloroform Methyl ethyl ketone Pyridine Tetrachloroethylene Trichloroethylene Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 0.5 100.0 6.0 200.0 5.0 <sup>h</sup> 0.7 0.5 NA <sup>h</sup> NA <sup>h</sup> NA <sup>h</sup> NA <sup>h</sup>	Beryllium, Nickel

Table B-5 (continued)

Descriptions of Mixed Transuranic Waste Stored at LANL<sup>a</sup>

TRUCON Codes	Waste Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents <sup>g</sup>
LA 116/216	Combustible Waste	Combustible solids (e.g., paper, rags, plastic, rubber) and a small fraction of noncombustible solids (e.g., scrap metal) generated from research and development (R&D), process and recovery, and D&D operations	Acceptable Knowledge <sup>d</sup>  Sampling and Analysis	D002 D004 D005 D006 D007 D008 D009 D010 D011 D018 D019 D021 D022 D028 D035 D038 D039 D040 F001 F002 F003 F005 U080	Corrosivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Carbon tetrachloride Chlorobenzene Chloroform 1,2-Dichloroethane Methyl ethyl ketone Pyridine Tetrachloroethylene Trichloroethylene Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents Methylene chloride	NA <sup>i</sup> 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 0.5 100.0 6.0 0.5 200.0 5.0 <sup>h</sup> 0.7 0.5 NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>	Beryllium, Cadmium, Chloroform, Chromium (Total), Lead, Methyl ethyl ketone, Mercury-all others, Nickel, Trichloroethylene, 1,1,2-Trichloro-1,2,2-trifluoroethane

Table B-5 (continued)

Descriptions of Mixed Transuranic Waste Stored at LANL<sup>a</sup>

TRUCON Codes	Waste Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents <sup>g</sup>
LA 117/217	Metal Waste	Metal waste (e.g., motors, pumps, tools, process equipment) with a small fraction of combustible waste (e.g., plastics) generated by R&D, process and recovery, and D&D operations	Acceptable Knowledge <sup>d</sup>  Sampling and Analysis	D002 D004 D005 D006 D007 D008 D009 D010 D011 D018 D019 D021 D022 D035 D038 D039 D040 F001 F002 F003 F005	Corrosivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Carbon tetrachloride Chlorobenzene Chloroform Methyl ethyl ketone Pyridine Tetrachloroethylene Trichloroethylene Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	NA <sup>f</sup> 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 0.5 100.0 6.0 200.0 5.0 <sup>h</sup> 0.7 0.5 NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>	Beryllium, Cadmium, Chloroform, Chromium (Total), Lead, Methyl ethyl ketone, Mercury-all others, Nickel, Trichloroethylene, 1,1,2-Trichloro-1,2,2-trifluoroethane, Vanadium, Zinc

Table B-5 (continued)

Descriptions of Mixed Transuranic Waste Stored at LANL<sup>a</sup>

TRUCON Codes	Waste Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents <sup>g</sup>
LA 118/218	Glass Waste/Non-combustible Waste	Glass waste (e.g., discarded labware, windows, bottles) with a small fraction of combustible waste (e.g., plastics) generated from Pu-processing	Acceptable Knowledge <sup>d</sup>  Sampling and Analysis	D002 D004 D005 D006 D007 D008 D009 D010 D011 D018 D019 D021 D022 D035 D038 D039 D040 F001 F002 F003 F005	Corrosivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Carbon tetrachloride Chlorobenzene Chloroform Methyl ethyl ketone Pyridine Tetrachloroethylene Trichloroethylene Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	NA <sup>f</sup> 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 0.5 100.0 6.0 200.0 5.0 <sup>h</sup> 0.7 0.5 NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>	Acetone, Bromodichloromethane, Bromomethane (Methyl bromide), Cadmium, Carbon disulfide, Chlorodibromomethane, Chloroethane, Chloromethane (Methyl chloride), Chromium (Total), Dibromomethane, Lead, Mercury-all others, Methyl ethyl ketone, Methyl isobutyl ketone, Methylene chloride, Nickel, Silver, Toluene, Tribromomethane (Bromoform), Trichloromonofluoromethane, Xylenes (Total)

Table B-5 (continued)

Descriptions of Mixed Transuranic Waste Stored at LANL<sup>a</sup>

TRUCON Codes	Waste Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents <sup>9</sup>
LA 119/219	High-Efficiency Particulate Air (HEPA) Filters	HEPA filters from exhaust air systems associated with Pu-processing	Acceptable Knowledge <sup>d</sup>	D004 D005 D006 D007 D008 D009 D010 D011 D018 D019 D021 D022 D035 D038 D039 D040 F001 F002 F003 F005	Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Carbon tetrachloride Chlorobenzene Chloroform Methyl ethyl ketone Pyridine Tetrachloroethylene Trichloroethylene Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 0.5 100.0 6.0 200.0 5.0 <sup>h</sup> 0.7 0.5 NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>	
LA 120/220	Isotopic Source Waste	R&D activities	Acceptable Knowledge <sup>d</sup>	TBD <sup>e</sup>	TBD <sup>e</sup>	TBD <sup>e</sup>	

Table B-5 (continued)

Descriptions of Mixed Transuranic Waste Stored at LANL<sup>a</sup>

TRUCON Codes	Waste Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents <sup>g</sup>
LA 122/222	Inorganic Solid Waste	Noncombustible building debris, glovebox debris, and other solid waste debris generated by R&D, process and recovery, and D&D operations	Acceptable Knowledge <sup>d</sup>	D004 D005 D006 D007 D008 D009 D010 D011 D018 D019 D021 D022 D035 D038 D039 D040 F001 F002 F003 F005	Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Carbon tetrachloride Chlorobenzene Chloroform Methyl ethyl ketone Pyridine Tetrachloroethylene Trichloroethylene Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 0.5 100.0 6.0 200.0 5.0 <sup>h</sup> 0.7 0.5 NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>	

Table B-5 (continued)

Descriptions of Mixed Transuranic Waste Stored at LANL<sup>a</sup>

TRUCON Codes	Waste Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents <sup>g</sup>
LA 123	Lead-Lined Gloves and Metal Waste	Lead-lined glovebox gloves and metal waste (e.g., motors, tools, discarded metals) generated from Pu-processing	Acceptable Knowledge <sup>d</sup>  Sampling and Analysis	D002 D004 D005 D006 D007 D008 D009 D010 D011 D018 D019 D021 D022 D035 D038 D039 D040 F001 F002 F003 F005	Corrosivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Carbon tetrachloride Chlorobenzene Chloroform Methyl ethyl ketone Pyridine Tetrachloroethylene Trichloroethylene Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	NA <sup>f</sup> 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 0.5 100.0 6.0 200.0 5.0 <sup>h</sup> 0.7 0.5 NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>	Lead, Nickel

Table B-5 (continued)

Descriptions of Mixed Transuranic Waste Stored at LANL<sup>a</sup>

TRUCON Codes	Waste Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents <sup>g</sup>
LA 124/224	Uncemented Inorganics	Used chloride salts from pyrochemical processes (e.g., electrorefining, molten salt extraction, salt stripping, fluoride reduction, direct oxide reduction) and a small fraction of combustible waste (e.g., plastic) generated from Pu-processing	Acceptable Knowledge <sup>d</sup>	D004	Arsenic	5.0	Cadmium, Chromium (Total), Lead, Mercury (Retort residues), Mercury-all others, Nickel
				D005	Barium	100.0	
				D006	Cadmium	1.0	
			Sampling and Analysis	D007	Chromium	5.0	
				D008	Lead	5.0	
				D009	Mercury	0.2	
				D010	Selenium	1.0	
				D011	Silver	5.0	
				D018	Benzene	0.5	
				D019	Carbon tetrachloride	0.5	
				D021	Chlorobenzene	100.0	
				D022	Chloroform	6.0	
				D035	Methyl ethyl ketone	200.0	
				D038	Pyridine	5.0 <sup>h</sup>	
				D039	Tetrachloroethylene	0.7	
D040	Trichloroethylene	0.5					
F001	Spent halogenated solvents	NA <sup>f</sup>					
F002	Spent halogenated solvents	NA <sup>f</sup>					
F003	Spent non-halogenated solvents	NA <sup>f</sup>					
F005	Spent non-halogenated solvents	NA <sup>f</sup>					

Table B-5 (continued)

Descriptions of Mixed Transuranic Waste Stored at LANL<sup>a</sup>

TRUCON Codes	Waste Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents <sup>g</sup>
LA 125/225	Combustible/Non-combustible Waste	Metal equipment from decommissioning (e.g., gloveboxes, process equipment, ductwork); small volumes of combustibles from decommissioning, sectioning, and packaging	Acceptable Knowledge <sup>d</sup>	D004 D005 D006 D007 D008 D009 D010 D011 D018 D019 D021 D022 D035 D038 D039 D040 F001 F002 F003 F005	Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Carbon tetrachloride Chlorobenzene Chloroform Methyl ethyl ketone Pyridine Tetrachloroethylene Trichloroethylene Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 0.5 100.0 6.0 200.0 5.0 <sup>h</sup> 0.7 0.5 NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>	Lead

Table B-5 (continued)

Descriptions of Mixed Transuranic Waste Stored at LANL<sup>a</sup>

TRUCON Codes	Waste Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits <sup>c</sup> (milligrams per liter)	Potential Underlying Hazardous Constituents <sup>g</sup>
LA 126	Solidified Organic Process Solids	Solidified process residues (e.g., evaporator bottoms and other discardable solutions; processed leached solids, ash, filter cakes, salts, metal oxides, fines that are immobilized in cement) generated from Pu-processing operations	Acceptable Knowledge <sup>d</sup>	D002 D004 D005 D006 D007 D008 D009 D010 D011 D018 D019 D021 D022 D028 D035 D038 D039 D040 F001 F002 F003 F005	Corrosivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Carbon tetrachloride Chlorobenzene Chloroform 1,2-Dichloroethane Methyl ethyl ketone Pyridine Tetrachloroethylene Trichloroethylene Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	NA <sup>f</sup> 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 0.5 100.0 6.0 0.5 200.0 5.0 <sup>h</sup> 0.7 0.5 NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>	Acetone, Beryllium, Methanol, Methylene chloride, n-Butyl alcohol, Toluene, Xylene

Table B-5 (continued)

Descriptions of Mixed Transuranic Waste Stored at LANL<sup>a</sup>

- <sup>a</sup> This table is based on information from the Los Alamos National Laboratory Transuranic Waste Characterization Acceptable Knowledge Information Summary (AKIS), RRES-AT record number TWCP-PLAN-0.2.7-001, R.5 (LA-UR-02-0248).
- <sup>b</sup> U.S. Environmental Protection Agency.
- <sup>c</sup> A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, Test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA, 1986), the extract from a representative sample of the waste contains any of the contaminants listed at a concentration equal to or greater than the respective value given in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, Subpart II, Part 261, Subpart C [6-14-00].
- <sup>d</sup> Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," OSWER 9938.4-03, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.
- <sup>e</sup> To be determined.
- <sup>f</sup> Not Applicable.
- <sup>g</sup> Potential underlying hazardous constituents (UHC) have been included, where the information is available. UHC characterization for the purpose of Land Disposal Restrictions will not apply for mixed transuranic waste to be disposed of at the Waste Isolation Pilot Plant.
- <sup>h</sup> Quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level.

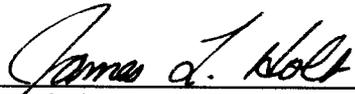
Note: Fluoride, sulfide, vanadium, and zinc are not "underlying hazardous constituents" in characteristic wastes, according to the definition in § 268.2(i). Selenium is not an underlying hazardous constituent as defined at § 268.2(i) because its Universal Treatment Standard level is greater than its Toxicity Characteristic level, thus a treated selenium waste would always be characteristically hazardous, unless it is treated to below its characteristic level.

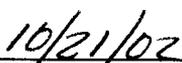
## CERTIFICATION

**Response to Information Request by the New Mexico Environment Department  
Regarding Los Alamos National Laboratory's General Part B RCRA Permit  
Application Waste Analysis Plan Tables  
Los Alamos National Laboratory EPA ID# NM0890010515**

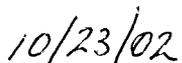
**October 2002**

I certify under penalty of law that this Information Request Response was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

  
\_\_\_\_\_  
James L. Holt  
Associate Director, Operations  
Los Alamos National Laboratory  
Operator

  
\_\_\_\_\_  
Date Signed

  
\_\_\_\_\_  
Ralph E. Erickson  
Director, Office of Los Alamos Site Operations  
U.S. Department of Energy  
National Nuclear Security Administration  
Owner/Operator

  
\_\_\_\_\_  
Date Signed

**Index**

**New Index, "Example High Explosive (HE) and HE Contaminated Waste Streams,"  
dated August, 2000**

***Replaces***

**Index, same title, dated June, 2000**

## **Example High Explosive (HE) and HE Contaminated Waste Streams**

1. HE-Contaminated Water with Trace Solvents and/or Metals, WPF#: 30547
  - Analysis Report: Assaigai Analytical Laboratories, Inc.
  - DX-2 Analytical Report
2. HE-Contaminated Spent Solvent Waste, WPF#: 30508
  - Chemical Hygiene Plan
3. HE-Contaminated Water, WPF#: 27835
  - MSDS Forms
  - Summary of Impurities and Transformations of Explosives
  - Analytical Data For Machining
4. HE-Contaminated Used Oil, WPF#: 30335
  - ESA Standard Operating Procedure 1.1, Table 1
  - MSDS Forms
5. Solid and Scrap HE, WPF#: 29124
  - MSDS Forms
6. HE-Contaminated ER Soil and/or Debris, WPF#: 31193
  - ESA Standard Operating Procedure 1.1
7. HE-Contaminated Commercial Chemical Products
8. Wastewater Treatment Residuals, WPF#: 27830
  - Waste Profile Form
  - MSDS Forms
9. HE-Contaminated Solid Wastes, WPF#: 29586
  - ESA Standard Operating Procedure 1.1, Table 1
  - MSDS Forms
10. HE-Contaminated Equipment, WPF#: 31825
  - DX-DO Standard Operating Procedure For Waste Management and Generator Waste Certification Program in DX-Division.
11. HE-Contaminated Rags, Wipes, and other Combustibles, WPF#: 27828
  - ESA Standard Operating Procedure 1.1
  - MSDS Forms
12. HE-Contaminated Liquid Acids, Bases, and/or Inorganic Salt Solutions, WPF#: 31773
  - DX-DO Standard Operating Procedure For Chemical Reactions in the 2-Liter Parr Reactor
13. Liquid Process Explosive Wastes

**4. HE-Contaminated Used Oil, WPF#: 30335**

**ESA Standard Operating Procedure 1.1, Table 1**

*Replaces*

**DX-DO:SOP 01, Standard Operating Procedure for Waste Management and  
Generator Waste Certification in DX-Division**

NAME OR CODE	COMPOSITION
AI/ANFO <sup>a</sup>	Ammonium nitrate/fuel oil/aluminum powder
AN	Ammonium nitrate
ANFO	Ammonium nitrate/fuel oil
Baratol	75 wt% Barium nitrate/25 wt% TNT
BDNPA	Bis(dinitropropyl) acetal
BDNPF	Bis(dinitropropyl) formal
Black powder	74 wt% Potassium nitrate/15.6 wt% charcoal/10.4 wt% sulfur
Boracitol	60 wt% Boric acid/40 wt% TNT
BTX <sup>b</sup>	5,7-Dinitro-1-picrylbenzotriazole
Composition A-3	91 wt% RDX/9 wt% beeswax
Composition A-4	97 wt% RDX/3 wt% beeswax
Composition A-5	98.5 wt% RDX/1.5 wt% beeswax
Composition B and B-3	60 wt% RDX/40 wt% TNT
Composition C-3	88 wt% RDX/12 wt% wax
Composition C-4	91 wt% RDX/2.1 wt% polyisobutylene/1.6 wt% motor oil/ 5.3 wt% di(2-ethylhexyl) sebacate
Cyclotol, 75/25	75 wt% RDX/25 wt% TNT
Cyclotol, 70/30	70 wt% RDX/30 wt% TNT
DATB	Diaminotrinitrobenzene
DBA-1 (a)	AN/NaNO <sub>3</sub> /TNT/H <sub>2</sub> O/thickener
Detasheet C	63 wt% PETN/8 wt% NC/29 wt% elastomeric binder
Detasheet D	75 wt% PETN/25 wt% elastomeric binder <b>NOTE: Although this material may be red in color, it is an explosive and not an inert material</b>
DINGU	Dinitroglucuril
DNPA	2,2-Dinitropropyl acrylate polymer
DNT	Dinitrotoluene
EDC-8 <sup>c</sup>	76 wt% PETN/24 wt% Silicone rubber, MS 2420
EDC-28 <sup>d</sup>	94 wt% RDX/6 wt% FPC 461
EDC-32 <sup>e</sup>	85 wt% HMX/15 wt % Viton A
EDC-37 <sup>f</sup>	91 wt% HMX/1 wt% nitrocellulose/8 wt% K-10 liquid
EDC-38 <sup>g</sup>	94.5 wt% HMX/3.5 wt% K-10 Liquid/2 wt% Polyurethane
HBX-1	40 wt% RDX/38 wt% TNT/17 wt% Al/5 wt% Wax/ 0.5 wt% CaCl <sub>2</sub>
High Energy Propellants <sup>h</sup>	Solid propellants generally used in missile systems
HMX	Cyclotetramethylenetetranitramine
HNS	Hexanitrostilbene

<sup>a</sup> For transportation only to and from DX and ESA Division Groups and storage by Group ESA-WMM.

<sup>b</sup> For transportation only - SEE HED-037

<sup>c</sup> EDC-8 is the United Kingdom's version of XTX-8003

<sup>d</sup> EDC-28 is the United Kingdom's version of PBX 9407

<sup>e</sup> EDC-32 is the United Kingdom's version of LX-04

<sup>f</sup> For shipping, storage and experimental evaluation of quantities less than 5 g and for assembly of finished charges into test devices only.

<sup>g</sup> For shipping, storage, and analytical evaluation of molding powder and assembly of finished pieces into test devices.

<sup>h</sup> After approval by the Explosives Development Committee

NAME OR CODE	COMPOSITION
K-10 <sup>1</sup>	65.3 wt% dinitroethylbenzene/34.7 wt% trinitroethylbenzene
LX-04	85 wt% HMX/15 wt% Viton A
LX-07	90 wt% HMX/10 wt% Viton A
LX-14	95.5 wt% HMX/4.5 wt % Estane 5702 F-1
Methane/oxyben (i)	Explosive mixtures of methane and oxygen gases
NC	Nitrocellulose, cellulose nitrate
Nitromethane	Nitromethane
NQ	Nitroguanidine
NTO	1,2,4-nitro-triazole-5-one
Octol	75 wt% HMX/25 wt% TNT
PBX-9001	90 wt% RDX/8.5 wt% polystyrene/1.5 wt% dioctylphthalate
PBX-9007	90 wt% RDX/9.1 wt% polystyrene/0.5 wt% dioctylphthalate/ 0.4 wt % resin
PBX-9010	90 wt% RDX/10 wt% Kel-F 3700 elastomer
PBX-9011	90 wt% HMX/10 wt% Estane 5703 F-1
PBX-9205	92 wt% RDX/6 wt% polystyrene/2 wt% dioctylphthalate
PBX-9206	92 wt% HMX/8 wt% Kel-F 3700 elastomer
PBX-9401	94.2 wt% RDX/3.6 wt% polystyrene/2.2 wt% trioctyl phosphate
PBX-9404	94 wt% HMX/3 wt% nitrocellulose/3 wt% chloroethyl phosphate
PBX-9405	94 wt% RDX/3 wt% nitrocellulose/3 wt% chloroethyl phosphate
PBX-9407	94 wt% RDX/6 wt% Exon 461
PBX-9501	95 wt% HMX/2.5 wt% Estane/2.5 wt% BDNPA/F
PBX-9502	95 wt% TATB/5 wt% Kel-F 800
PBX-9503	80 wt% TATB (Class 2)/15 wt% HMX (Class 2)/5 wt% Kel-F 800
PBXW-113	88 wt% HMX/12 wt% rubber/plasticizer binder
Pentolite	50 wt% PETN/50 wt% TNT
PETN	Pentaerythritol tetranitrate
Picric Acid	DuPont 85 wt% pure
PYX	2,6-Bis(picrylamino)-3,5-dinitropyridine
RDX	Cylonite, cyclotrimethylenetrinitramine
Smokeless Powder (Single Base)	Standard Military grades. Single or multi-perforated grains of colloided nitrocellulose. Stabilizers, plasticizers, inorganic nitrates, and other modifying agents may also be present.
Smokeless Powder (Double Base)	Standard Military grades. Single or multi-perforated grains of colloided nitrocellulose containing nitroglycerin or nitroglycol. Stabilizers, plasticizers, inorganic nitrates, and other modifying agents may also be present.
STRATABLAST C (a)	Slurry blasting explosive
TAGN (i)	Triaminoguanidine nitrate
TAL-1005E (a)	Slurry blasting explosive
TATB	Triaminotrinitrobenzene
Tetryl	2,4,6-Trinitrophenylmethylnitramine
TNS	Trinitrostilbene

<sup>1</sup> For shipping, storage and experimental evaluations on less than 5 g quantities.  
 ( ) With letter inserted is cross-reference to footnote.

NAME OR CODE	COMPOSITION
TNT	Trinitrotoluene
TNT/NC	80 wt% TNT/20 wt% NC
TPM	Tripicrylmelamine
Tritonal	80 wt% TNT/20 wt% aluminum powder
XTX-8003	80 wt% Recrystallized PETN/20 wt% Sylgard 182
XTX-8004	80 wt% RDX/20 wt% Sylgard 182

**Reviewed on April 2, 1998 - NO CHANGES**

Reviewed by: \_\_\_\_\_ DATE: \_\_\_\_\_

Larry Hatler  
ESA-WMM HE Processing Team Leader

**6. HE-Contaminated ER Soil and/or Debris, WPF:# 31193**

**ESA Standard Operating Procedure 1.1**

*Replaces*

**DX-DO:SOP 01, Standard Operating Procedure for Waste Management and  
Generator Waste Certification in DX-Division**

**WEAPON MATERIALS & MANUFACTURING**

**SAFE OPERATING PROCEDURE**

**FOR**

**HIGH EXPLOSIVES**

Approved by: Larry E. Hatler Date: 6/2/98  
Larry Hatler, ESA-WMM HE Processing Team Leader

Approved by: Ricardo V. Ortiz Date: 6/3/98  
Ricardo V. Ortiz, ESA-WMM Group Leader

Approved by: Daniel G. McDaniel Date: 6/26/98  
ESA-FM/ESH Safety Officer

**LOS ALAMOS**  
National Laboratory  
ESA-WMM

**CONTROLLED DOCUMENT**

**Users have the ultimate responsibility to ensure that they are working with the latest revision of the controlled document. Uncontrolled if cover sheet is not printed in red.**

## **1.0 SCOPE**

This SOP governs the high explosives (HE) that may be processed, assembled, transported, and stored at S-Site by Group ESA-WMM. Restrictions on the use of some of these explosives in processing operations may be imposed in the pertinent individual SOPs and High Explosive Development (HED) procedures and authorization.

## **2.0 Nature and Uses of Explosives**

### **2.1 Types**

Explosives are compounds that will burn or explode if they are heated, exposed to some type of impact, pinched between moving surfaces, or subjected to an electric discharge or a strong shock pressure. Not all explosives behave in the same way and, because they are not all the same, they have been divided into four classes: (1) Primary or initiating, (2) Boostering, (3) Secondary high explosives (main charge or bursting charge), and (4) Insensitive high explosives.

#### **2.1.1 Primary or Initiating**

Primary or initiating explosives are those explosives that can be detonated with very little energy. They are very sensitive to friction, heat, and impact, and some of them to a static electrical discharge. When involved in a fire, primary explosives can be expected to detonate without burning. These explosives are used to "trigger" other explosives that are less sensitive and require a little more energy to get started. Explosives such as lead azide and lead styphnate fall into this category.

Primary explosives are not processed at S-Site, but are often used indirectly. Small quantities are used in squibs that are stored and used for special applications. In addition, some items that contain primary explosives, such as fuses, low-energy detonators, and explosive bolts and fasteners, are assembled into test devices. These initiation devices are received and handled as individual preassembled components. They are generally classified as 1.4 explosive devices, per the United Nation Organization (UNO) Classification. Class 1.4 is defined as moderate fire, no blast.

### 2.1.2 Boostering

Booster explosives are used in initiation trains to ensure a detonation wave (reaction) is transferred between the detonator, "trigger", and the main charge HE. Booster explosives are generally secondary and are less sensitive than primary HEs. High explosives such as PETN, RDX, HMX, HNS and tetryl typically fall into this class of materials. These materials can be used in small quantities (few grams) as pure materials or mixed with plastic binders which make them less sensitive than the pure explosives. These materials, in their pure form, can be used in detonator applications. PETN is the most sensitive HE used at Los Alamos for weapon system applications.

The pure HEs, PETN, RDX, HMX and HNS are processed in the first steps of making plastic bonded explosives (PBXs) and extrudable explosives such as extex (XTX) for initiation train and booster explosives applications. Booster charge applications generally require relatively small amounts of HE for their applications, usually less than one pound.

These secondary HEs, in their pure form or in their PBX formulations, are categorized as Class 1.1 mass detonating HEs per UNO. Additional restrictions require the pure HEs, PETN, RDX, HMX and HNS to be stored and transported wet with a mixture of water and alcohol.

### 2.1.3 Secondary High Explosives (Main Charge or Bursting Charges)

Secondary HEs are used as main charges for weapon applications in assemblies built at S-Site. The term bursting charge is generally used by the DoD for conventional ordnance applications. These charges are used as the principal source of energy to drive metals, generate fragments or create blast overpressures depending on their specific design requirements. Main charge applications generally require large quantities of HE ranging from a few pounds to, in some cases, several hundred pounds. Processing and operational limits are further restricted by quantity distance requirements and the type of HE formulation and their safety properties. All secondary HEs require more energy for initiation than primary HEs. Within the HE formulations used for main charge applications, some are more sensitive than others. In a few cases these same materials are used for booster applications. The quantity of these materials are restricted depending on sensitivity

and design applications, in operation specific SOPs. All HEs in this class will detonate if they receive strong enough shock pressures from an impact or from a booster HE. When exposed to a fire, they will burn without detonating unless confined. The normal method of disposal is by open air burning. HEs such as TNT, Baratol, Cyclotols and most PBXs are used for main charge applications. Most high energy PBXs use the pure HEs (RDX and HMX) as the explosive material. These PBXs are referred to as Conventional HEs (CHEs). These materials are Class 1.1, mass detonating, per UNO requirements.

#### 2.1.4 Insensitive High Explosives (IHE)

Two secondary HEs, TATB and NQ and their PBX formulations, have been shown to be extremely insensitive and require very high levels of shock energy for these materials to react or detonate. The sensitivity or safety properties of these HEs provide a greatly increased safety margin, compared to other secondary main charge HEs, for all processing operations; however, these materials are still high explosives and are treated and handled as HEs. These types of HEs may, in some cases provide a "second chance" if severely abused by mishandling or misapplication of unintended energy, while other HE formulations may not afford a second chance. These IHEs are also used for main charge applications similar to the other secondary main charge explosives. The IHEs are typically initiated with a booster train, including a detonator and booster pellet, providing a strong shock input pressure. When exposed to a fire, these materials also burn without detonating in unconfined geometry's and are typically disposed of by open air burning. The TATB, NQ and PBX formulations are also Class 1.1 materials per the UNO requirements.

## 2.2 Health Hazards

Most of the explosives processed at S-Site present a possible health hazard. For this reason, one must avoid taking them into the body through either the mouth, lungs, or skin. ESH Division and ESA-FM Industrial Hygiene and safety personnel are aware of these hazards and keep site personnel informed of the allowable exposures for the various operating conditions, as well as, recommending the proper protective equipment such as respirators, gloves, etc. as required for a specific operation.

## 2.3 Compatibility with Other Materials

2.3.1 There are times when HEs are mixed with other materials or come in contact with non-HE materials that cause the HE to become less stable and increase its sensitivity, creating an unsafe condition. The non-HE material is said to be incompatible with the HE. As an example many commercial adhesives contain amine compounds which can react with HEs during the curing process and cause the HE to become less stable. Therefore, all adhesives to be used with HEs must be checked for compatibility before use. Other materials such as mold releases and potting compounds that come in direct contact with HEs must be approved before use, to avoid incompatibilities.

2.3.2 To help assess material incompatibilities with HEs, compatibility safety checks are run. The results of these tests are used as a guide in using these materials and often cause the limitations to be placed on how and where these materials may be used. A list of acceptable materials that may be used in specific applications is available to operating supervisors. Copies of the HE Safety Compatibility Check List (Compatibility Approval Index) can be found in the ESA-WMM Group Office or from the ESA-WMM Materials Team Leader. WMM SOP 11.5.0, Table 3, lists compatible adhesives that may be used with HEs. When the material in question does not appear on the list or its use is limited and there is a requirement for its use, additional safety compatibility checks should be requested. The Group DX-2 Analytical Laboratory Request for HE Safety Compatibility Check form shall be submitted along with a sample to the DX-2 Analytical Laboratory Team Leader. Upon completion of evaluation and testing (if required), DX-2 will submit their recommendations and restrictions to the ESA-WMM requester and ESA-WMM management, for approval for use of the material at S-Site.

## 2.4 HE Lot/Batch Approval

Before any explosive material can be used or processed at S-Site, each lot or batch must be identified analytically by the DX-2, Analytical Laboratory. Signed copies of the approved Material Release Memo must be furnished to the operating personnel of Groups DX-2 and ESA-WMM before the identified material is used or processed.

### **3.0 Explosives Operations**

#### **3.1 Explosives Area**

All activities at S-Site that involve explosives are conducted in the High Explosives Exclusion Area (HEEA), except laundry, transportation to and from other sites and Class 1.4 HE operations conducted at TA-16-207. Explosives must not be removed from the HEEA, except for those transported to other locations per ESA-WMM delivery orders or Laboratory shipping requests. Minimal HE contamination in the form of fine dust particles on issued apparel and HE transportation vehicles are permitted to be removed from the HEEA as a part of normal day-to-day operations. Transportation of explosives to and from the S-Site HEEA must be through the K-Site road gate near Building TA-16-220.

#### **3.2 Administrative Area (see WMM SOP 1.0.0 for definition)**

Explosives are not allowed in the Administrative Area except for minimal contamination in the form of fine dust particles on issued apparel or HE transportation vehicles. The issued apparel is cleaned in the ESA-WMM laundry in Building TA-16-193. Although the quantity of explosives involved is very small, these operations are also governed by SOPs. HE transportation vehicles must not contain visible amounts of explosives when driven or parked in the Administrative Area. Delivery of only Class 1.4 HE materials to building TA-16-207 is permitted.

#### **3.3 All equipment and nonexplosive materials removed from the Explosives Area and brought into the Administrative Area, or taken off-site through Security Posted Guard Stations or K-Site road gate near TA-16-220, must be certified clean of explosives by a Certifying Agent; exceptions are noted in Section 3.1, above. HE transportation vehicles must be certified clean before they are sent off-site for maintenance or repairs or are released to another organization (reference WMM SOP 1.8.2).**

### **4.0 ALLOWABLE EXPLOSIVES AT S-SITE**

Explosives that may be processed at S-Site are called allowable explosives and fall into the categories of established explosives, developmental explosives and detonators. In some cases, nonexplosive additives are incorporated into these explosives. These additives are usually included in the allowable explosives in the individual SOP for a given operation.

#### 4.1 Established Explosives

Some of these explosives are identified by popular names or groups of letters that are widely known in the explosives and propellants industries. The other explosives, PBX and XTX, are identified by material code numbers. These material codes are four-digit numbers that are usually written with PBX or XTX preceding them. The established explosives are listed in Table 1, of this SOP along with their nominal compositions.

#### 4.2 Developmental Explosives

These are explosives that have been approved for development according to the procedures in the document "Los Alamos High Explosives Development (HED) Procedures and Authorization". These explosives are identified by an experimental code number of four digits preceded by X. The developmental explosives are listed in Table 2, of this SOP along with their nominal compositions, pertinent references, and weight limit restrictions.

#### 4.3 Detonators

##### 4.3.1 Types of Detonators

##### 4.3.1.1 High Energy

Detonators used in the test assembly devices for initiation of the main charge HEs require high energy electrical power for firing. These high energy detonators are generally divided into two types: (1) Exploding Bridge Wire (EBWs) and (2) Slappers.

4.3.1.1.1 The EBW detonators have a small amount of a pure explosive, such as PETN, placed in direct contact with an electrically conductive wire. The bridge wire explodes when high energy current is applied, which in turn initiates the explosive pellet.

4.3.1.1.2 The slapper detonator assembly contains an electrical conductive foil with a narrow bridge positioned over a cup containing a pure explosive pellet, generally PETN. The space or "air gap" between the bridge and the pellet is referred to as the "barrel". When a high

energy current is applied, the bridge explodes forming a flier plate from the insulating material around the bridge. This flier plate then travels down the barrel and "slaps" the explosive pellet resulting in initiation.

These types of detonators are insensitive to normally encountered static electrical charges and electromagnetic radiation and offer increased safety properties in handling and assembly operations. These detonators are received and handled as individual preassembly components. These detonators are not appreciably more sensitive than the other HEs used at S-Site. The EBWs and Slappers are classed as 1.4 explosive devices, per the UNO Classification. Table 3 lists the detonators approved for use at S-Site.

#### 4.3.1.2 Low Energy

In certain applications, detonators that can be initiated by relatively low levels of energy are used. These detonators contain primary explosives. To preclude the possibility of accidental initiation from static charges or the accidental application of test voltages, all low-energy detonators received at S-Site will be equipped with shorting clips. These shorting clips must remain in place at all times while the detonators are under the jurisdiction of ESA-WMM personnel.

4.3.1.3 Precautions to be taken in the assembly of devices with low-energy detonators are delineated in SOP 11.1.2. Low-energy detonators approved for use at S-Site are listed in Table 3.

#### 4.3.1.4 Approval for Use

Before a new type of detonator may be ordered for use at S-Site, its design must be checked by the ESA-WMM HE Processing Team Leader or the Assembly Team Leader. Upon his recommendation, the new type detonator will be listed as an approved detonator in Table 3.

#### 4.3.1.5 Transportation and Storage

**Detonators must be transported and stored in containers that are designed to prevent propagation from detonator to detonator and container to container. When detonators are installed into devices, they will be transported and stored with the devices.**

#### 4.4 Squibs

Electrically fired squibs used by the ESA-WMM Disposal Operations Team are covered under SOPs in Chapter 12. The squibs are transported and stored in the DOT-approved containers in which they are received or in the ESA-WMM approved container (13Y-100279, SOP 13.1.0). The squibs approved for these operations are DuPont S-94, ESA-WMM Code Number 225-03, or other similar DuPont S-series squibs.

#### 4.5 Munitions

Pending approval by the Explosives Review Committee (ERC), munitions with or without their fuse and arming systems can be received and stored at S-Site. The ESA-WMM HE Transportation and Handling Supervisor or the PMA Supervisor must receive documentation recording ERC approval prior to long-term storage of any munitions. In the instance that munitions are received without proper documentation, the munitions will be held in short-term storage for a period of thirty days. If written approval has not been given after thirty days, the munitions will either be returned or disposed of.

NAME OR CODE	COMPOSITION
AI/ANFO <sup>a</sup>	Ammonium nitrate/fuel oil//aluminum powder
AN	Ammonium nitrate
ANFO	Ammonium nitrate/fuel oil
Baratol	75 wt% Barium nitrate/25 wt% TNT
BDNPA	Bis(dinitropropyl) acetal
BDNPF	Bis(dinitropropyl) formal
Black powder	74 wt% Potassium nitrate/15.6 wt% charcoal/10.4 wt% sulfur
Boracitol	60 wt% Boric acid/40 wt% TNT
BTX <sup>b</sup>	5,7-Dinitro-1-picrylbenzotriazole
Composition A-3	91 wt% RDX/9 wt% beeswax
Composition A-4	97 wt% RDX/3 wt% beeswax
Composition A-5	98.5 wt% RDX/1.5 wt% beeswax
Composition B and B-3	60 wt% RDX/40 wt% TNT
Composition C-3	88 wt% RDX/12 wt% wax
Composition C-4	91 wt% RDX/2.1 wt% polyisobutylene/1.6 wt% motor oil/ 5.3 wt% di(2-ethylhexyl) sebacate
Cyclotol, 75/25	75 wt% RDX/25 wt% TNT
Cyclotol, 70/30	70 wt% RDX/30 wt% TNT
DATB	Diaminotrinitrobenzene
DBA-1 (a)	AN/NaNO <sub>3</sub> /TNT/H <sub>2</sub> O/thickener
Detasheet C	63 wt% PETN/8 wt% NC/29 wt% elastomeric binder
Detasheet D	75 wt% PETN/25 wt% elastomeric binder <b>NOTE: Although this material may be red in color, it is an explosive and not an inert material</b>
DINGU	Dinitroglycoluril
DNPA	2,2-Dinitropropyl acrylate polymer
DNT	Dinitrotoluene
EDC-8 <sup>c</sup>	76 wt% PETN/24 wt% Silicone rubber, MS 2420
EDC-28 <sup>d</sup>	94 wt% RDX/6 wt% FPC 461
EDC-32 <sup>e</sup>	85 wt% HMX/15 wt % Viton A
EDC-37 <sup>f</sup>	91 wt% HMX/1 wt% nitrocellulose/8 wt% K-10 liquid
EDC-38 <sup>g</sup>	94.5 wt% HMX/3.5 wt% K-10 Liquid/2 wt% Polyurethane
HBX-1	40 wt% RDX/38 wt% TNT/17 wt% Al/5 wt% Wax/ 0.5 wt% CaCl <sub>2</sub>
High Energy Propellants <sup>h</sup>	Solid propellants generally used in missile systems
HMX	Cyclotetramethylenetetranitramine
HNS	Hexanitrostilbene

<sup>a</sup> For transportation only to and from DX and ESA Division Groups and storage by Group ESA-WMM.

<sup>b</sup> For transportation only - SEE HED-037

<sup>c</sup> EDC-8 is the United Kingdom's version of XTX-8003

<sup>d</sup> EDC-28 is the United Kingdom's version of PBX 9407

<sup>e</sup> EDC-32 is the United Kingdom's version of LX-04

<sup>f</sup> For shipping, storage and experimental evaluation of quantities less than 5 g and for assembly of finished charges into test devices only.

<sup>g</sup> For shipping, storage, and analytical evaluation of molding powder and assembly of finished pieces into test devices.

<sup>h</sup> After approval by the Explosives Development Committee

NAME OR CODE	COMPOSITION
K-10 <sup>1</sup>	65.3 wt% dinitroethylbenzene/34.7 wt% trinitroethylbenzene
LX-04	85 wt% HMX/15 wt% Viton A
LX-07	90 wt% HMX/10 wt% Viton A
LX-14	95.5 wt% HMX/4.5 wt % Estane 5702 F-1
Methane/oxyben (i)	Explosive mixtures of methane and oxygen gases
NC	Nitrocellulose, cellulose nitrate
Nitromethane	Nitromethane
NQ	Nitroguanidine
NTO	1,2,4-nitro-triazole-5-one
Octol	75 wt% HMX/25 wt% TNT
PBX-9001	90 wt% RDX/8.5 wt% polystyrene/1.5 wt% dioctylphthalate
PBX-9007	90 wt% RDX/9.1 wt% polystyrene/0.5 wt% dioctylphthalate/ 0.4 wt % resin
PBX-9010	90 wt% RDX/10 wt% Kel-F 3700 elastomer
PBX-9011	90 wt% HMX/10 wt% Estane 5703 F-1
PBX-9205	92 wt% RDX/6 wt% polystyrene/2 wt% dioctylphthalate
PBX-9206	92 wt% HMX/8 wt% Kel-F 3700 elastomer
PBX-9401	94.2 wt% RDX/3.6 wt% polystyrene/2.2 wt% trioctyl phosphate
PBX-9404	94 wt% HMX/3 wt% nitrocellulose/3 wt% chloroethyl phosphate
PBX-9405	94 wt% RDX/3 wt% nitrocellulose/3 wt% chloroethyl phosphate
PBX-9407	94 wt% RDX/6 wt% Exxon 461
PBX-9501	95 wt% HMX/2.5 wt% Estane/2.5 wt% BDNPA/F
PBX-9502	95 wt% TATB/5 wt% Kel-F 800
PBX-9503	80 wt% TATB (Class 2)/15 wt% HMX (Class 2)/5 wt% Kel-F 800
PBXW-113	88 wt% HMX/12 wt% rubber/plasticizer binder
Pentolite	50 wt% PETN/50 wt% TNT
PETN	Pentaerythritol tetranitrate
Picric Acid	DuPont 85 wt% pure
PYX	2,6-Bis(picrylamino)-3,5-dinitropyridine
RDX	Cylonite, cyclotrimethylenetrinitramine
Smokeless Powder (Single Base)	Standard Military grades. Single or multi-perforated grains of colloided nitrocellulose. Stabilizers, plasticizers, inorganic nitrates, and other modifying agents may also be present.
Smokeless Powder (Double Base)	Standard Military grades. Single or multi-perforated grains of colloided nitrocellulose containing nitroglycerin or nitroglycol. Stabilizers, plasticizers, inorganic nitrates, and other modifying agents may also be present.
STRATABLAST C (a)	Slurry blasting explosive
TAGN (i)	Triaminoguanidine nitrate
TAL-1005E (a)	Slurry blasting explosive
TATB	Triaminotrinitrobenzene
Tetryl	2,4,6-Trinitrophenylmethylnitramine
TNS	Trinitrostilbene

<sup>1</sup> For shipping, storage and experimental evaluations on less than 5 g quantities.

( ) With letter inserted is cross-reference to footnote.

NAME OR CODE	COMPOSITION
TNT	Trinitrotoluene
TNT/NC	80 wt% TNT/20 wt% NC
TPM	Tripicrylamine
Tritonal	80 wt% TNT/20 wt% aluminum powder
XTX-8003	80 wt% Recrystallized PETN/20 wt% Sylgard 182
XTX-8004	80 wt% RDX/20 wt% Sylgard 182

Reviewed on April 2, 1998 - NO CHANGES

Reviewed by: Larry E Hatler DATE: 4/2/98  
Larry Hatler  
ESA-WMM HE Processing Team Leader

## TABLE 2 DEVELOPMENTAL EXPLOSIVES

The explosives listed in this table have been approved for development according to the procedures in "Group - High Explosives Development Procedures and Authorization". Any limitations or special instructions relative to these explosives, other than those contained in the Safe Operating Procedures (SOPs) will be found in the referenced High Explosives Development Proposal (HED). Any such limitations or instructions must be observed, in addition to, and in the same manner as those in the appropriate SOPs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0001	HMX Indowax 170/175	86.1 13.9	001	5 lbs.
X-0002	HMX Indowax 170/175	89.2 10.8	001	5 lbs.
X-0003	HMX Indowax 170/175	92.1 7.9	001	5 lbs.
X-0004	HMX Indowax 170/175	94.9 5.1	001	5 lbs.
X-0005	HMX Indowax 170/175	97.5 2.5	001	5 lbs.
X-0006	HMX Estane 5740X-2	82.6 17.4	001	5 lbs.
X-0007	HMX Estane 5740X-2	86.4 13.6	001	1500 lbs.
X-0009	HMX Estane 5740X-2	93.4 6.6	001	1500 lbs.
X-0010	HMX Estane 5740X-2	96.8 3.2	001	5 lbs.
X-0011	HMX CPR 1-46A	82.6 17.4	001	5 lbs.
X-0012	HMX CPR 1-46A	86.4 13.6	001	5 lbs.
X-0013	HMX CPR 1-46A	90.0 10.0	001	5 lbs.
X-0014	HMX CPR 1-46A	93.4 6.6	001	5 lbs.
X-0015	HMX CPR 1-46A	96.8 3.2	001	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0016	HMX CPR 1-46C	82.6 17.4	001	5 lbs.
X-0017	HMX CPR 1-46C	86.4 13.6	001	5 lbs.
X-0018	HMX CPR 1-46C	90.0 10.0	001	5 lbs.
X-0019	HMX CPR 1-46C	93.4 6.6	001	5 lbs.
X-0020	HMX CPR 1-46C	96.8 3.2	001	5 lbs.
X-0021	HMX Halowax 1001	78.3 21.7	001	5 lbs.
X-0022	HMX Halowax 1001	82.8 17.2	001	5 lbs.
X-0023	HMX Halowax 1001	87.2 12.8	001	5 lbs.
X-0024	HMX Halowax 1001	91.5 8.5	001	5 lbs.
X-0025	HMX Halowax 1001	95.8 4.2	001	5 lbs.
X-0026	HMX Halowax 1013	77.3 22.7	001	5 lbs.
X-0027	HMX Halowax 1013	82.0 18.0	001	5 lbs.
X-0028	HMX Halowax 1013	86.6 13.4	001	5 lbs.
X-0029	HMX Halowax 1013	91.1 8.9	001	5 lbs.
X-0030	HMX Halowax 1013	95.6 4.4	001	5 lbs.
X-0031	HMX Halowax 1014	76.2 23.8	001	5 lbs.
X-0032	HMX Halowax 1014	81.0 19.0	001	5 lbs.
X-0033	HMX Halowax 1014	85.8 14.2	001	5 lbs.
X-0034	HMX Halowax 1014	90.6 9.4	001	5 lbs.
X-0035	HMX Halowax 1014	95.3 4.7	001	5 lbs.

<b>CODE NUMBER</b>	<b>NOMINAL COMPOSITION</b>	<b>WEIGHT %</b>	<b>HED</b>	<b>WEIGHT LIMIT</b>
X-0036	HMX Halowax 1051	74.0 26.0	001	5 lbs.
X-0037	HMX Halowax 1051	79.2 20.8	001	5 lbs.
X-0038	HMX Halowax 1051	84.3 15.7	001	5 lbs.
X-0039	HMX Halowax 1051	89.5 10.5	001	5 lbs.
X-0040	HMX Halowax 1051	94.8 5.2	001	5 lbs.
X-0041	HMX Epolene LV	86.0 14.0	001	5 lbs.
X-0042	HMX Epolene LV	89.1 10.9	001	5 lbs.
X-0043	HMX Epolene LV	92.1 7.9	001	5 lbs.
X-0044	HMX Epolene LV	94.9 5.1	001	5 lbs.
X-0045	HMX Epolene LV	97.5 2.5	001	5 lbs.
X-0046	HMX Epolene HD	85.9 14.1	001	5 lbs.
X-0047	HMX Epolene HD	89.0 11.0	001	5 lbs.
X-0048	HMX Epolene HD	92.0 8.0	001	5 lbs.
X-0049	HMX Epolene HD	94.8 5.2	001	5 lbs.
X-0050	HMX Epolene HD	97.5 2.5	001	5 lbs.
X-0051	HMX Chlorowax 70	77.6 22.4	001	5 lbs.
X-0052	HMX Chlorowax 70	82.2 17.8	001	5 lbs.
X-0053	HMX Chlorowax 70	86.7 13.3	001	5 lbs.
X-0054	HMX Chlorowax 70	91.2 8.8	001	5 lbs.
X-0055	HMX Chlorowax 70	95.6 4.4	001	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0056	HMX Kel-F Wax 200	73.0 27.0	001	5 lbs.
X-0057	HMX Kel-F Wax 200	78.3 21.7	001	5 lbs.
X-0058	HMX Kel-F Wax 200	83.6 16.4	001	5 lbs.
X-0059	HMX Kel-F Wax 200	89.0 11.0	001	5 lbs.
X-0060	HMX Kel-F Wax 200	94.5 5.5	001	5 lbs.
X-0061	HMX Kel-F Elastomer L1107	75.5 24.5	001	5 lbs.
X-0062	HMX Kel-F Elastomer L1107	80.4 19.6	001	5 lbs.
X-0063	HMX Kel-F Elastomer L1107	85.3 14.7	001	5 lbs.
X-0064	HMX Kel-F Elastomer L1107	90.2 9.8	001	5 lbs.
X-0065	HMX Kel-F Elastomer L1107	95.1 4.9	001	5 lbs.
X-0066	HMX Kel-F Elastomer 3700	75.5 24.5	001	5 lbs.
X-0067	HMX Kel-F Elastomer 3700	80.4 19.6	001	5 lbs.
X-0068	HMX Kel-F Elastomer 3700	85.3 14.7	001	5 lbs.
X-0069	HMX Kel-F Elastomer 3700	90.2 9.8	001	5 lbs.
X-0070	HMX Kel-F Elastomer 3700	95.1 4.9	001	5 lbs.
X-0071	HMX Exon 461	77.0 23.0	001	5 lbs.
X-0072	HMX Exon 461	81.7 18.3	001	5 lbs.
X-0073	HMX Exon 461	86.4 13.6	001	5 lbs.
X-0074	HMX Exon 461	91.0 9.0	001	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0075	HMX Exon 461	95.5 4.5	001	5 lbs.
X-0076	RDX Indowax 170/175	85.6 14.4	001	5 lbs.
X-0077	RDX Indowax 170/175	88.7 11.3	001	5 lbs.
X-0078	RDX Indowax 170/175	91.7 8.3	001	5 lbs.
X-0079	RDX Indowax 170/175	94.6 5.4	001	5 lbs.
X-0080	RDX Indowax 170/175	97.4 2.6	001	5 lbs.
X-0081	RDX Estane 5740X-2	81.9 18.1	001	5 lbs.
X-0082	RDX Estane 5740X-2	85.7 14.3	001	5 lbs.
X-0083	RDX Estane 5740X-2	89.5 10.5	001	5 lbs.
X-0084	RDX Estane 5740X-2	93.1 6.9	001	5 lbs.
X-0085	RDX Estane 5740X-2	96.6 3.4	001	5 lbs.
X-0086	RDX CPR 1-46A	81.9 18.1	001	5 lbs.
X-0087	RDX CPR 1-46A	85.7 14.3	001	5 lbs.
X-0088	RDX CPR 1-46A	89.5 10.5	001	5 lbs.
X-0089	RDX CPR 1-46A	93.1 6.9	001	5 lbs.
X-0090	RDX CPR 1-46A	96.6 3.4	001	5 lbs.
X-0091	RDX Halowax 1013	76.4 23.6	001	5 lbs.
X-0092	RDX Halowax 1013	81.2 18.8	001	5 lbs.
X-0093	RDX Halowax 1013	86.0 14.0	001	5 lbs.
X-0094	RDX Halowax 1013	90.7 9.3	001	5 lbs.

<b>CODE NUMBER</b>	<b>NOMINAL COMPOSITION</b>	<b>WEIGHT %</b>	<b>HED</b>	<b>WEIGHT LIMIT</b>
X-0095	RDX Halowax 1013	95.4 4.6	001	5 lbs.
X-0096	RDX Epolene LV	85.4 14.6	001	5 lbs.
X-0097	RDX Epolene LV	88.6 11.4	001	5 lbs.
X-0098	RDX Epolene LV	91.7 8.3	001	5 lbs.
X-0099	RDX Epolene LV	94.6 5.4	001	5 lbs.
X-0100	RDX Epolene LV	97.4 2.6	001	5 lbs.
X-0101	RDX Kel-F 3700	74.5 25.5	002	5 lbs.
X-0102	RDX Kel-F 3700	79.6 20.4	001	5 lbs.
X-0103	RDX Kel-F 3700	84.7 15.3	001	5 lbs.
X-0104	RDX Kel-F 3700	89.8 10.2	001	5 lbs.
X-0105	RDX Kel-F 3700	94.9 5.1	001	5 lbs.
X-0106	RDX Exon 461	76.1 23.9	001	5 lbs.
X-0107	RDX Exon 461	80.9 19.1	001	5 lbs.
X-0108	RDX Exon 461	85.7 14.3	001	5 lbs.
X-0109	RDX Exon 461	90.5 9.5	001	5 lbs.
X-0110	RDX Exon 461	95.3 4.7	001	5 lbs.
X-0111	HMX NQ Estane 5740X-2	94.8 0.0 5.2	002	5 lbs.
X-0112	HMX NQ Estane 5740X-2	85.9 9.9 5.2	002	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0113	HMX NQ Estane 5740X-2	76.7 18.0 5.3	002	400 lbs.
X-0114	HMX NQ Estane 5740X-2	67.6 27.1 5.3	002	5 lbs.
X-0115	HMX NQ Estane 5740X-2	58.3 36.4 5.3	002	5 lbs.
X-0116	HMX NQ Estane 5740X-2	48.9 45.8 5.3	002	5 lbs.
X-0117	HMX NQ Estane 5740X-2	39.3 55.3 5.4	002	5 lbs.
X-0118	HMX NQ Estane 5740X-2	29.7 64.9 5.4	002	400 lbs.
X-0119	HMX NQ Estane 5740X-2	19.9 74.6 5.5	002	5 lbs.
X-0120	HMX NQ Estane 5740X-2	10.0 84.5 5.5	002	5 lbs.
X-0121	HMX NQ Halowax 1013	92.9 0.0 7.1	002	5 lbs.
X-0122	HMX NQ Halowax 1013	84.1 8.8 7.1	002	5 lbs.
X-0123	HMX NQ Halowax 1013	75.2 17.6 7.2	002	5 lbs.
X-0124	HMX NQ Halowax 1013	66.2 26.6 7.2	002	5 lbs.
X-0125	HMX NQ Halowax 1013	57.1 35.6 7.3	002	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0126	HMX NQ Halowax 1013	47.9 44.8 7.3	002	5 lbs.
X-0127	HMX NQ Halowax 1013	38.5 54.1 7.4	002	5 lbs.
X-0128	HMX NQ Halowax 1013	29.1 63.5 7.4	002	5 lbs.
X-0129	HMX NQ Halowax 1013	19.5 73.1 7.4	002	5 lbs.
X-0130	HMX NQ Halowax 1013	9.8 82.7 7.5	002	5 lbs.
X-0131	HMX NQ Exon 461	92.8 0.0 7.2	002	5 lbs.
X-0132	HMX NQ Exon 461	84.0 8.7 7.3	002	5 lbs.
X-0133	HMX NQ Exon 461	75.1 17.6 7.3	002	5 lbs.
X-0134	HMX NQ Exon 461	66.1 26.5 7.4	002	5 lbs.
X-0135	HMX NQ Exon 461	57.0 35.6 7.4	002	5 lbs.
X-0136	HMX NQ Exon 461	47.8 44.8 7.4	002	5 lbs.
X-0137	HMX NQ Exon 461	38.5 54.0 7.5	002	5 lbs.
X-0138	HMX NQ Exon 461	29.0 63.5 7.5	002	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0139	HMX NQ Exon 461	19.5 72.9 7.6	002	5 lbs.
X-0140	HMX NQ Exon 461	9.8 82.6 7.6	002	5 lbs.
X-0142	HMX DATB Estane 5740X-2	90.2 4.6 5.2	004	5 lbs.
X-0143	HMX DATB Estane 5740X-2	85.6 9.2 5.2	004	400 lbs.
X-0144	HMX DATB Estane 5740X-2	76.3 18.5 5.2	004	400 lbs.
X-0145	HMX DATB Estane 5740X-2	67.0 27.8 5.2	004	400 lbs.
X-0146	HMX DATB Estane 5740X-2	57.7 37.1 5.2	004	400 lbs.
X-0147	HMX DATB Estane 5740X-2	48.2 46.5 5.3	004	400 lbs.
X-0148	HMX DATB Estane 5740X-2	38.6 56.1 5.3	004	5 lbs.
X-0149	HMX DATB Estane 5740X-2	29.1 65.6 5.3	004	5 lbs.
X-0150	HMX DATB Estane 5740X-2	19.5 75.2 5.3	004	5 lbs.
X-0151	HMX DATB Estane 5740X-2	9.7 84.9 5.4	004	5 lbs.
X-0152	HMX DATB Estane 5740X-2	4.9 89.7 5.4	004	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0154	HMX DATB Halowax 101	88.4 4.5 37.1	004	5 lbs.
X-0155	HMX DATB Halowax 1013	83.9 9.0 7.1	004	5 lbs.
X-0156	HMX DATB Halowax 1013	74.8 18.1 7.1	004	5 lbs.
X-0157	HMX DATB Halowax 1013	65.6 27.2 7.2	004	5 lbs.
X-0158	HMX DATB Halowax 1013	56.4 36.4 7.2	004	5 lbs.
X-0159	HMX DATB Halowax 1013	47.2 45.6 7.2	004	5 lbs.
X-0160	HMX DATB Halowax 1013	37.9 54.9 7.2	004	5 lbs.
X-0161	HMX DATB Halowax 1013	38.5 64.2 7.3	004	5 lbs.
X-0162	HMX DATB Halowax 1013	19.0 73.7 7.3	004	5 lbs.
X-0163	HMX DATB Halowax 1013	9.6 83.1 7.3	004	5 lbs.
X-0164	HMX DATB Halowax 1013	4.8 87.9 7.3	004	5 lbs.
X-0165	HMX DATB KFE 3700	92.2 0.0 7.8	004	5 lbs.
X-0166	HMX DATB KFE 3700	87.7 4.5 7.8	004	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0167	HMX DATB KFE 3700	83.3 8.9 7.8	004	5 lbs.
X-0168	HMX DATB KFE 3700	74.2 17.9 7.9	004	5 lbs.
X-0169	HMX DATB KFE 3700	65.1 27.0 7.9	004	400 lbs.
X-0170	HMX DATB KFE 3700	56.0 36.1 7.9	004	5 lbs.
X-0171	HMX DATB KFE 3700	46.8 45.3 7.9	004	5 lbs.
X-0172	HMX DATB KFE 3700	37.6 54.5 7.9	004	5 lbs.
X-0173	HMX DATB KFE 3700	28.3 63.7 8.0	004	400 lbs.
X-0174	HMX DATB KFE 3700	18.9 73.1 8.0	004	5 lbs.
X-0175	HMX DATB KFE 3700	9.5 82.5 8.0	004	5 lbs.
X-0176	HMX DATB KFE 3700	4.8 87.2 8.0	004	5 lbs.
X-0177	75/25 Cyclotol $\alpha$ -nitronaphthalene	99.7 0.3	003	40 lbs.
X-0178	75/25 Cyclotol $\alpha$ -nitronaphthalene	99.6 0.4	003	40 lbs.
X-0179	75/25 Cyclotol $\alpha$ -nitronaphthalene	99.5 0.5	003	40 lbs.
X-0180	HMX NQ KFE 3700	92.2 0.0 7.8	002	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0181	HMX NQ KFE 3700	83.5 8.7 7.8	002	5 lbs.
X-0182	HMX NQ KFE 3700	74.6 17.5 7.9	002	5 lbs.
X-0183	HMX NQ KFE 3700	65.7 26.4 7.9	002	400 lbs.
X-0184	HMX NQ KFE 3700	56.6 35.4 8.0	002	5 lbs.
X-0185	HMX NQ KFE 3700	47.5 44.5 8.0	002	5 lbs.
X-0186	HMX NQ KFE 3700	38.2 53.7 8.1	002	5 lbs.
X-0187	HMX NQ KFE 3700	28.8 63.1 8.1	002	5 lbs.
X-0188	HMX NQ KFE 3700	19.3 72.5 8.2	002	5 lbs.
X-0189	HMX NQ KFE 3700	9.7 82.1 8.2	002	5 lbs.
X-0190	RDX KFE 3700 Beeswax w/Alox	89.11 9.90 0.99	006	300 lbs.
X-0191	HMX NC CEF Beeswax w/Alox	93.14 2.97 2.90 0.99	006	500 lbs.
X-0192 (LX-04)	HMX Viton	85.0 15.0	007	1000 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0193	Experimental detonating fuse Explosives. Compositions range from HMX Sylgard 182 HMX Sylgard 182	73.1 26.9 98.9 1.1	008	Footnote <sup>1</sup>
X-0194	Experimental detonating fuse Explosives. Compositions range from PETN Sylgard 182 PETN Sylgard 182	70.0 30.0 80.0 20.0	008 $\Phi 3$ <sup>2</sup> Add 2 <sup>3</sup>	20 lbs.
X-0195	HMX DATB Estane	55.9 36.1 8.0	004	400 lbs.
X-0196	HMX DATB Estane	56.8 36.6 6.6	004	400 lbs.
X-0197	HMX Teflon	88.7 11.3	001	5 lbs.
X-0198	HMX Teflon	67.1 32.9	001	5 lbs.
X-0199	HMX Teflon w /wax and Alox	89.7 10.3	001	5 lbs.
X-0200	HMX Teflon w/wax and Alox	67.4 32.6	001	5 lbs.
X-0201	TNT RDX	60.0 40.0	009	200 lbs.
X-0202	Barium Nitrate TNT	40.0 60.0	005	800 lbs.
X-0204	HMX Teflon	83.2 16.8	001 Add 8	1000 lbs.
X-0205	HMX Teflon w/wax and Alox	84.2 15.8	001 Add 8	1000 lbs.

<sup>1</sup> Weight limit for any given composition is 500 grams. Within this limit, material may be replaced as cross-linked batches and are sent for disposal.

<sup>2</sup> Phase =  $\Phi$

<sup>3</sup> Addendum - Add

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0206	HMX Nitroso elastomer	84.2 15.8	011	150 lbs.
X-0207	HMX Sylgard 182	80.0 20.0	008	20 lbs.
X-0208	RDX Sylgard 182	80.0 20.0	008	20 lbs.
X-0209	HMX Elvax 460 Be-Square 170/175 wax	95.50 2.25 2.25	012	1000 lbs.
X-0210	HMX Estane BDNPF	94.10 2.95 2.95	013	1000 lbs.
X-0211 LX-07	HMX Viton A	90.0 10.0	014 Add 1	500 lbs.
X-0212	HMX CPR X9B-78B	90.0 10.0	015	1000 lbs.
X-0213	HMX Estane BDNPF Be-Square 170/175 wax	94.6 2.0 2.0 1.4	016	1000 lbs.
X-0214	HMX Viton A	90.0 10.0	017	1000 lbs.
X-0215	HMX Viton A Beeswax	90.0 8.5 1.5	017	1000 lbs.
X-0217	HMX DNPA BDNPF BDNPA Wax Surface Active Agents	25-94 0-50 0-50 0-50 0-5 0-0.25	019	1000 lbs.
X-0218	HMX Halowax 1014 Hydrocarbon Waxes Alox Estane Surface Active Agents	90-95 0-10 0-5 0-2 0-2 0-1	020	1000 lbs.
X-0219	TATB HMX Kel-F 800	0-92 0-92 9-15	021	5000 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0220	DATB Urea-formaldehyde Microballoons Epoxy resin/chlorendic anhydride	40-60 20-40 10-30	022	200 lbs.
X-0221	RDX Urea-formaldehyde Microballoons Epoxy resin/chlorendic anhydride	40-60 20-40 10-30	022	See HED-022, V. D.
X-0222	DATB Phenol-formaldehyde Microballoons Epoxy resin/chlorendic anhydride	30-60 20-50 10-30	022	See HED-022, V. D.
X-0223	RDX Phenol-formaldehyde Microballoons Epoxy resin/chlorendic anhydride	30-60 20-50 10-30	022	See HED-022, V. D.
X-0224	RDX Aluminum Be-Square 170/175 wax Elvax 460 Coating compounds	74.0 20.0 5.4 0.1 0-0.5	023	4000 lbs. Uncoated  2000 lbs. Coated
X-0225	HMX DNPA FEFO	94.0 3.5 2.5	024	1000 lbs.
X-0226	RDX Estane	80-90 20-10	001	See HED-001 Add 9, VI. C.
EDC-8	PETN RTV Silicone	76.0 24.0	025	See HED-025 IV. E.
X-0227	Nitroguanidine Kel-F elastomer	70-100 0-30	026	1000 lbs.
X-0228	Nitroguanidine Estane 5703	70-100 0-30	026	1000 lbs.
X-0229	Nitroguanidine DNPA polymer BDNPF/A nitroplasticizer	70-100 0-18 0-12	026	1000 lbs.
X-0230	RDX Be-square 170/175 wax-Elvax 460	94.0 6.0	023	See HED-023 Add 1, V.C.
X-0231	HMX Tungsten Exon 461 Plasticizer	5-40 40-95 0-10 0-5	027	See HED-027 VI. D.
X-0232	HMX Tungsten Kel-F Plasticizer	5-40 40-95 0-10 0-5	027	See HED-027 VI. D.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0233	HMX Tungsten Polystyrene Plasticizer	5-40 40-95 0-10 0-5	027	See HED-027 VI. D.
X-0234	HMX DNPA CEF Surface-active agents	90-95 0-10 0-5 0-0.5	019	See HED-019 VI. D.
X-0235	HMX DNPA BDNPF/BDNPA Estane Surface active agents	90-95 0-10 0-10 0-5 0-0.5	019	See HED 019 VI. D.
X-0236	TATB Polystyrene-DOP Surface active agents	≤95 ≥5 ≤1	028	See HED-028 V. D.
X-0237	TATB Wax-Elvax Surface active agents	≤95 ≥5 ≤1	028	See HED-028 V. D.
X-0238	TATB Estane Surface active agents	≤95 ≥5 1	028	See HED 028 V. D.
X-0239	HMX Tungsten Estane Plasticizer	5-40 40-95 0-10 0-5	027	See HED-027 VI.D.
X-0240 LX-10	HMX Viton	95.0 5.0	029	See HED-029 IV
X-0241	Nitroguanidine Wax-Elvax	90-100 0-10	026 Add 1	1000 lbs.
X-0242	HMX BDNPF/A Estane Calcium Stearate	90-95 0-5 0-5 0-0.5	013 Add 2	5000 lbs.
X-0243	DATB Polystyrene DOP	≤95 ≥5	028 Add 1	500 lbs.
X-0244	DATB Polystyrene TOF	≤95 ≥5	028 Add 1	500 lbs.

<b>CODE NUMBER</b>	<b>NOMINAL COMPOSITION</b>	<b>WEIGHT %</b>	<b>HED</b>	<b>WEIGHT LIMIT</b>
X-0245	DATB Wax Elvax	≤95 ≥5	028 Add 1	500 lbs.
X-0246	DATB Estane	≤95 ≥5	028 Add 1	500 lbs.
X-0247	DATB Kel-F	≤95 ≥5	028 Add 1	500 lbs.
X-0248	DATB DNPA/BDNPA-F	≤95 ≥5	028 Add 1	500 lbs.
X-0249	RDX Sylgard 182 Barium carbonate	≤42.9 0-40 0-70	008 Add 1	5 lbs.
X-0250	RDX Sylgard 182 Cyanuric acid	≤57.5 0-40 0-70	008 Add 1	5 lbs.
X-0251	DATB Sylgard 182 Barium carbonate	≤42.6 0-40 0-70	008 Add 1	5 lbs.
X-0252	DATB Sylgard 182 Cyanuric acid	≤57.1 0-40 0-70	008 Add 1	5 lbs.
X-0253	TATB Dapon M	≤95 ≥5	028 Add 2	500 lbs.
X-0254	RDX Estane Barium Carbonate	≤47.3 ≥6.3 ≥46.4	030	5 lbs.
X-0255	RDX Estane Oxamide	≤66.5 ≥8.9 ≥24.6	030	5 lbs.
X-0256	RDX Viton Barium Carbonate	≤45.7 ≥9.4 ≥44.9	030	5 lbs.
X-0257	RDX Viton Oxamide	≤63.5 ≥13.0 ≥23.5	030	5 lbs.
X-0258	RDX Polystyrene DOP Barium Carbonate	≤47.7 ≥4.1 ≥1.4 ≥46.8	030	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0259	RDX Polystyrene DOP Oxamide	≤67.4 ≥5.8 ≥1.9 ≥24.9	030	5 lbs.
X-0260	RDX Wax Elvax Barium Carbonate	≤47.9 ≥2.9 ≥2.9 ≥47.1	030	5 lbs.
X-0261	RDX Wax Elvax Oxamide	≤67.9 ≥3.6 ≥3.5 ≥25.0	030	5 lbs.
X-0262	DATB Estane Barium Carbonate	≤47.0 ≥6.3 ≥46.7	030	5 lbs.
X-0263	DATB Estane Oxamide	≤66.3 ≥8.9 ≥24.8	030	5 lbs.
X-0264	DATB Viton Barium Carbonate	≤45.4 ≥9.4 ≥24.8	030	5 lbs.
X-0265	DATB Viton Oxamide	≤63.2 ≥13.1 ≥23.7	030	5 lbs.
X-0266	DATB Polystyrene DOP Barium Carbonate	≤47.4 ≥4.1 ≥1.4 ≥47.1	030	5 lbs.
X-0267	DATB Polystyrene DOP Oxamide	≤67.1 ≥5.8 ≥2.0 ≥25.1	030	5 lbs.
X-0268	DATB Wax Elvax Barium Carbonate	≤47.6 ≥2.5 ≥2.5 ≥27.4	030	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0269	DATB Wax Elvax Oxamide	≤67.6 ≥3.6 ≥3.5 ≥25.3	030	5 lbs.
X-0270	RDX Exon	50-85 15-50	022 Add 3	200 lbs.
X-0271	Barium Nitrate TNT Decylgallophenone or Nitrocellulose	~76.0 ~24.0 ~0.5	031	2000 lbs.
X-0272	HMX TATB Estane Calcium Stearate	≤95 0-10 0-5 0-0.5	013 Add 3	500 lbs.
X-0273	HMX DATB Kel-F	≤92.0 ≤92.0 8-15	021 Add 1	500 lbs.
X-0274	RDX TNT AN (Ammonium Nitrate) Compatible surface active agent	0-60 35-100 0-70 0-2	032 Add 1	1000 lbs.
X-0275	TATB TNT Aluminum	40 40 20	033	50 kg
X-0276	RDX Copper Be-square wax Elvax	59.5 35.9 4.1 0.5	023 Add 3	50 kg
X-0277	RDX Iron Be-square wax Elvax 460	62.2 33.0 4.3 0.5	023 Add 3	50 kg
X-0278	RDX Barium Nitrate Be-square wax Elvax	42.2 52.9 4.4 0.5	023 Add 3	50 kg
X-0279	RDX Cesium Nitrate Be-square wax Elvax	54.1 40.8 4.6 0.5	023 Add 3	50 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0280	RDX Estane	95.0 5.0	013 Add 5	250 kg
X-0281	RDX Estane BDNPA/F	95.0 2.5 2.5	013 Add 5	150 kg
X-0282	HMX Estane	95.5 5.5	034 Φ 3	500 kg
X-0283	HMX Viton Kel-F elastomer various plasticizers	≤95.0 2.5-10.0 2.5-10.0 2.5-5.0	029 Φ 3 Add 1	500 kg
X-0284	RDX TNT AN/Potassium Nitrate Compatible surface active agents	0-60 35-100 0-70 0-2	032 Φ 3 Add 2	500 kg
X-0285	HMX Vibrathane	95.5 4.5	034 Φ 3 Add 1	500 kg
X-0286	HMX Kraton High-vacuum oil plasticizer	97±0.5 1.35 1.65	035 Φ 3	250 kg
X-0287	HMX Kraton B3 wax	97.4±0.5 1.43 1.17	035 Φ 3 Add 1	250 kg
X-0288	HMX Fluorolube MO-10 Cab-O-Sil	≤75.0 ≥22.0 ≤3.0	008 Φ 2 Add 2	5 kg
X-0289	HMX Fluorolube LG-260 Cab-O-Sil	≤75.0 ≥22.0 ≤3.0	008 Φ 2 Add 2	5 kg
X-0290	TATB Kel-F 800	95.0 5.0	021 Φ 3 Add 7	2000 kg
X-0291	TATB Kel-F 800	92.5 7.5	021 Φ 3 Add 5	500 kg
X-0292	TATB Vibrathanes	92-98 2-8	021 Φ 3 Add 5	500 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0293	RDX AN	40±2 60±2	036 Φ 3	45.4 kg
X-0294	RDX AN MAN	40±2 45±2 15±2	036 Φ 3	45.4 kg
X-0295	RDX AN MAN	40±2 30±2 30±2	036 Φ 3	45.4 kg
X-0296	TATB Kraton	90-99 10-1	021 Φ 3 Add 5	500 kg
X-0297	TATB Kel-F 800	97.5 2.5	021 Φ 3 Add 5	500 kg
X-0298	HMX Kraton Hyvac Oil 930503	97.50 1.12 1.38	035 Φ 3 Add 2	250 kg
X-0299	DATB Viton A 5±2	95±2 5±2	004 Φ3 Add 5	25 kg
X-0300	DATB Estane	95±2 5±2	004 Φ3 Add 5	25 kg
X-0301	RDX Viton A	95.0 5.0	029 Φ 3 Add 2	100 kg
X-0302	FKM Propellants	100	040 Φ 2	5 kg
X-0303	RDX Estane Polyester fibers	95.0 4.5 0.5	013 Φ 3 Add 7 Rev 1	2000 kg
X-0304	RDX Estane Polyester fibers	95.0 3.5 1.5	013 Φ 3 Add 7 Rev 1	2000 kg
X-0305	TATB Kel-F 800 Fluorolube plasticizer	95.0 2.5 2.5	021 Φ 3 Add 5	2000 kg

<b>CODE NUMBER</b>	<b>NOMINAL COMPOSITION</b>	<b>WEIGHT %</b>	<b>HED</b>	<b>WEIGHT LIMIT</b>
X-0306	Nitroguanidine Viton A	95.0 5.0	026 Φ3 Add 3	500 kg
X-0307	Nitroguanidine Viton A Fluorolube plasticizer	95.0 4.0 1.0	026 Φ 3 Add 3	500 kg
X-0308	RDX Estane Polyethylene fibers	95.0 4.5 0.5	013 Φ3 Add 7, R1	2000 kg
X-0309 (Destex)	TNT Aluminum 18.7 D-2 Acetylene black (carbon)	74.2 18.7 4.8 1.9	041 Φ 3	500 kg
X-0310	NQ Viton LM	95.0 5.0	026 Φ3 Add 4	100 kg
X-0311	NQ Viton 10	95.0 5.0	026 Φ 3 Add 4	100 kg
X-0312	RDX Estane Polyethylene fibers	95.0 3.5 1.5	013 Φ3 Add 7 Rev 1	100 kg
X-0313	NQ Viton A-HV	95.0 5.0	026 Φ 3 Add 4	100 kg
X-0314	NQ Viton C-10	95.0 5.0	026 Φ3 Add 4	100 kg
X-0315	NQ Viton L-31	95.0 5.0	026 Φ3 Add 4	100 kg
X-0316	NQ RDX Viton A	91.0 4.0 5.0	026 Φ 3 Add 5	1 kg
X-0317	NQ RDX Viton A	87.0 8.0 5.0	026 Φ 3 Add 5	1 kg
X-0318	HNS Sylgard 182	80.0 20.0	018 Φ 2	0.1 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0319	TATB HMX Kel-F 800	50.0 45.0 5.0	021 Φ3 Add 10	100 kg
X-0320	TATB HMX Kel-F 800	60.0 35.0 5.0	021 Φ3 Add 10	100 kg
X-0321	TATB HMX Kel-F 800	75.0 20.0 5.0	021 Φ 3 Add 10	100 kg
X-0322	Fairy Dust 2/1	100	042 Φ2	1 kg
X-0323	NQ Kraton G/Hyvac oil	95.0 5.0	026 Φ 3 Add 6	100 kg
X-0324	NQ HMX Viton A	50.0 45.0 5.0	026 Φ 3 Add 6	100 kg
X-0325	NQ HMX Viton A	60.0 35.0 5.0	026 Φ3 Add 6	100 kg
X-0326	NQ HMX Viton A	75.0 20.0 5.0	026 Φ 3 Add 6	100 kg
X-0327	NQ HMX Kraton G/Hyvac oil	50.0 45.0 5.0	026 Φ 3 Add 6	100 kg
X-0328	NQ HMX Kraton G/Hyvac oil	60.0 36.0 5.0	026 Φ3 Add 6	100 kg
X-0329	TATB Phenoxy	96.9 3.1	021 Φ 3 Add 5	227 kg
X-0330	TATB Polystyrene/polyphenylene-oxide	97.2 2.8	021 Φ 3 Add 5	227 kg
X-0331	TATB Kel-F 800	99.5 0.5	021 Φ3 Add 5	227 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0332	TATB Kel-F 800	99.0 1.0	021 Φ 3 Add 5	227 kg
X-0333	TATB Kel-F 800	98.0 2.0	021 Φ 3 Add 5	227 kg
X-0334	NQ HMX Kraton G/Hyvac oil	75.0 20.0 5.0	026 Φ 3 Add 6	100 kg
X-0335	NQ HMX Kraton G/Hyvac oil	45.0 45.0 10.0	026 Φ3 Add 6	100 kg
X-0336	NQ Polyvinyl alcohol	95.0 5.0	026 Φ 3 Add 6	100 kg
X-0337	NQ Kel-F 800	95.0 5.0	026 Φ3 Add 6	100 kg
X-0338	NQ Viton A	99.5 0.5	026 Φ3 Add 6	100 kg
X-0339	TATB Kel-F 800 Polyethylene fibers	95.0 4.5 0.5	021 Φ 3 Add 5	90.8 kg
X-0340	NQ Nylon	95.0 5.0	026 Φ 3 Add 4	3 kg
X-0341	TATB HMX Kel-F 800	90.25 4.75 5.00	021 Φ 3 Add 10	100 kg
X-0342	TATB HMX Kel-F 800	85.5 9.5 5.0	021 Φ 3 Add 10	100 kg
X-0343	TATB HMX Kel-F 800	80.75 14.25 5.00	021 Φ 3 Add 10	100 kg
X-0344	TATB HMX Kel-F 800	71.25 23.75 5.00	021 Φ 3 Add 10	90.8 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0345	TATB Kraton G Hyvac oil	97.6 1.68 0.72	021 Φ 3 Add 5	90.8 kg
X-0346	Nitromethane	100.0	043 Φ 2	5.0 lbs.
X-0347	Nitromethane Aluminum powder	80.0 20.0	043 Φ2	5.0 lbs.
X-0348	Nitromethane Aluminum powder Polymethyl methacrylate	75.0 20.0 5.0	043 Φ 2	5.0 lbs.
X-0349	TATB, Superfine HMX Kel-F 800	90.0 5.0 5.0	021 Φ3 Add 10	90.8 kg
X-0350	TATB, Superfine HMX Kel-F 800	85.0 10.0 5.0	021 Φ 3 Add 10	90.8 kg
X-0351	TATB, Superfine HMX Kel-F 800	80.0 15.0 5.0	021 Φ3 Add 10	90.8 kg
X-0352	TATB, Superfine HMX Kel-F 800	75.0 20.0 5.0	021 Φ3 Add 10	90.8 kg
X-0353	TATB, Superfine HMX Kel-F 800	92.5 5.0 2.5	021 Φ 3 Add 11	100 kg
X-0354	TATB, Superfine HMX Kel-F 800	87.5 10.0 2.5	021 Φ 3 Add 11	100 kg
X-0355	TATB, Superfine HMX Kel-F 800	82.5 15.0 2.5	021 Φ3 Add 11	100 kg
X-0356	TATB, Superfine HMX Kel-F 800	77.5 20.0 2.5	021 Φ3 Add 11	100 kg
X-0357	TATB, Superfine HMX Kel-F 800	82.5 12.5 5.0	021 Φ 3 Add 10	90.8 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0358	TATB, Superfine HMX Kel-F 800	85.0 12.5 2.5	021 Φ3 Add 11	100 kg
X-0359	TNT NQ	25-75 25-75	044 Φ 3	100 kg
X-0360	RDX Polyurethane binder	82.0 18.0	046 Φ2	3 kg
X-0361	RDX Aluminum Polyurethane binder	67.0 18.0 15.0	046 Φ2	3 kg
X-0362	ANFO Aluminum	90.0 10.0	047 Φ3	50 g
X-0363	ANFO Aluminum	80.0 20.0	047 Φ 3	50 g
X-0364	AN ADNT KN	40.4 52.4 7.2	042 Φ 2 Add 2	1 kg
X-0365	AN ADNT EDD KN	42.0 11.0 39.0 5.0	042 Φ 2 Add 2	1 kg
X-0366	AN EDD	50.0 50.0	042 Φ 2 Add 2	1 kg
X-0367	AN EDD KN	44.1 48.1 7.8	042 Φ 2 Add 2	1 kg
X-0368	EDD AN KN	50.0 42.5 7.5	048 Φ 3	25 kg
X-0369	RDX EDD AN Aluminum	14.2 40.3 40.3 5.2	048 Φ 3	25 kg
X-0370	RDX EDD AN Aluminum	12.8 36.2 36.2 14.8	048 Φ3	25 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0371	TATB HMX Estane	51.00 46.00 3.00	021 Φ 3 Add 13	100 kg
X-0372	TATB HMX Kraton/Oil	51.40 46.30 2.30	021 Φ 3 Add 13	100 kg
X-0373	TATB HMX Estane	43.00 55.00 2.00	021 Φ 3 Add 13	200 kg
X-0374	TATB HMX Kraton/Oil	43.00 55.00 2.00	021 Φ 3 Add 13	100 kg
X-0375	RDX TNT Al D-2 Wax	45.00 30.00 20.00 5.00	049 Φ3	100 kg
X-0376	TATB Oil	27.51 72.49	021 Φ 3 Add 12	3 kg
X-0377	TATB Oil	46.06 53.94	021 Φ 3 Add 12	3 kg
X-0378	TATB Oil	77.35 22.65	021 Φ 3 Add 12	3 kg
X-0379	TATB Oil	80.00 20.00	021 Φ 3 Add 12	3 kg
X-0380	TATB Oil	85.00 15.00	021 Φ 3 Add 12	3 kg
X-0381	BTX (5,7-dinitro-1-picryl-benzotriazole) Sylgard	80.00 20.00	038 Φ 2	3 kg
X-0382	NQ EDD AN RN	50.00 25.00 21.25 3.75	048 Φ 3 Add 1	500 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0383	BTF Sylgard	80.00 20.00	038 Φ 2 Add 1	500 g
X-0384	DATB Sylgard	80.00 20.00	038 Φ 2 Add 1	500 g
X-0385	PYX Sylgard	80.00 20.00	038 Φ 2 Add 1	500 g
X-0386	EDD AN RN AI	42.50 36.10 6.40 15.00	048 Φ 3 Add 2	227 kg
X-0387	EDD AN RN RDX	49.00 41.60 7.40 2.00	048 Φ 3 Add 2	227 kg
X-0388	EDD AN RN NQ AI	32.50 27.60 4.90 25.00 10.00	048 Φ 3 Add 2	227 kg
X-0389	TATB Tungsten Polystyrene DOP	13.46 85.24 0.80 0.50	027 Φ 3 Add 3	100 kg
X-0390	TATB HMX Tungsten Polystyrene DOP	6.74 6.60 85.36 0.80 0.50	027 Φ 3 Add 3	100 kg
X-0391	TNT LiF	80.00 20.00	050 Φ 3	91 kg
X-0392	TPM RTV-619	80.00 vol % 20.00 vol %	045 Φ 2	3 kg
X-0393	TPM Epoxy	80.00 vol % 20.00 vol %	045 Φ 2	3 kg
X-0394	TATB HMX Estane	47.50 48.70 3.80	021 Φ 3 Add 13	100 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0395	PETN FPC 461	96.5 3.5	051 Φ 3	10 kg
X-0396	TATB HMX Estane	70.0 25.0 5.0	021 Φ 3 Add 13	100 kg
X-0397	TATB HMX Kraton G	70.0 25.0 5.0	021 Φ 3 Add 13	100 kg
X-0398	TATB HMX Kraton G HyVac Oil	70.0 25.0 2.24 2.76	021 Φ 3 Add 13	100 kg
X-0399	TATB Viton A	95.0 5.0	021 Φ 3 Add 13	100 kg
X-0400	PETN FPC-461 Exon	99.5 0.5	051 Φ 3 Add 1	5 kg
X-0401	PETN Kel-F 800	99.5 0.5	051 Φ 3 Add 1	5 kg
X-0402	PETN Kel-F 800	96.5 3.5	051 Φ 3 Add 1	5 kg
X-0403	HMX Kraton G Hyvac Oil	96.50 1.57 1.93	035 Φ 3	90 kg
X-0404	HMX Kraton G Hyvac Oil	98.50 0.67 0.83	035 Φ 3	90 kg
X-0405	HMX Kraton. Hyvac	98.00 0.89 1.11	035 Φ 3	90 kg
X-0406	HMX Kraton G Hyvac Oil	97.20 1.27 1.53	035 Φ 3	200 lbs.
X-0407	TATB PETN Kel-F 800 Dye	69.8 25.0 5.0 0.2	021 Φ 2	3 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0408	HMX Vistalon 503	97.5 2.5	052	150 g
X-0409	HMX Royalene 100	97.5 2.5	052	150 g
X-0410	HMX Polysar 306 Tufflo 6026	97.5 1.25 1.25	052	150 g
X-0411	HMX Kraton G 1650 Vistalon 457 Tufflo 6026	97.5 1.0 0.25 1.25	052	150 g
X-0412	RDX FSL 7210	79.00 21.00	008	3500 g
X-0413	PETN FSL 7210	79.00 21.00	008	3500 g
X-0414	HMX R45M IPDI Diocetyl Adipate	84.00 12.48 0.52 3.00	053	500 kg
X-0415	HMX EAK	60.0 40.0	048 Φ3 Add 3	100 kg
X-0416	HMX EAK	40.0 60.0	048 Φ 3 Add 3	100 kg
X-0417	HMX EAK	20.0 80.0	048 Φ 3 Add 3	100 kg
X-0418	HMX Kraton G 1650 Synton PAO 100	97.50 1.12 1.38	035 Φ 3	50 lbs.
X-0419	HMX Vistalon 404	97.50 2.50	052	150 g
X-0420	DINGU Exon 461 KR138S	94.00 5.00 1.00	055	100 kg
X-0421	TATB EAK	20.00 80.00	048	100 kg
X-0422	HMX Ep Syn 3007	97.50 2.50	052	150 g

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0423	HMX Ep Syn 4006	97.5 2.5	052	150 g
X-0424	RDX NuSil CF1-3500	79.0 21.0	008	3500 g
X-0425	PETN NuSil CF1-3500	79.0 21.0	008	3500 g
X-0426	PYX Kel-F 800	95.0 5.0	054	454 kg
X-0427	PETN NuSil CF1-3500	77.0 23.0	008	3500 g
X-0428	PETN NuSil CF1-3500	75.0 25.0	008	3500 g
X-0429	DINGU Exon 461	95.0 5.0	055	100 kg
X-0430	HMX Kraton G-1650 Tufflo 6026 Oil	88.0 6.0 6.0	035	91 kg
X-0431	PETN Nu-Sil CF2-3500	75.0 25.0	008	3500 g
X-0432	DINGU TNT	60.0 40.0	055 Add 1	100 kg
X-0433	TATB (Micronized) HMX (Ball Milled) Kel-F 800 Dye	79.8 15.0 5.0 0.2	021	100 kg
X-0434	TATB PETN Kel-F 800 Dye	64.8 30.0 5.0 0.2	021 Add 15	3 kg
X-0435	TATB HMX (specially ground to Class E) Estane	70.0 25.0 5.0	021 Φ 3 Add 13	100 kg
X-0436	HMX CAB NP KR 138S	90.0 7.4 2.5 0.1	056 Φ 2	3 kg
X-0437	HMX CAB NP KR 138S	85.0 11.2 3.7 0.1	056 Φ 2	3 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0439	PETN Nu-Sil CF3-3500	75.0 25.0	008	3500 g
X-0440	PETN Nu-Sil CF3-3500	70.0 30.0	008	3500 g
X-0441	RDX Viton Calcium Tartrate	58.0 34.0 8.0	057	15 kg
X-0442	RDX Kraton Tufflo 6026 Oil Calcium Tartrate	70.0 10.0 10.0 10.0	057	15 kg
X-0443	TATB Viton	85.0 15.0	057	15 kg
X-0444	HMX Estane BDNPA/BDNPF	88.0 6.0 6.0	013 Add 8	100 kg
X-0445	PETN Nu-Sil CF3-3500	80.0 20.0	008 Φ 3 Add 5	3500 g
X-0446	RDX Viton Calcium Tartrate	50.0 35.0 15.0	057 Φ 3 Add 1	15 kg
X-0447	RDX Kraton Tufflo 6026 oil Calcium Tartrate	58.0 10.0 10.0 22.0	057 Φ 3 Add 1	15 kg
X-0448	TATB Viton	80.0 20.0	057 Φ 3 Add 1	15 kg
X-0449	RDX Estane Calcium Tartrate	60.0 25.0 15.0	057 Φ 3 Add 1	15 kg
X-0450	TATB HMX Estane	60.9 35.0 4.1	021 Φ 3 Add 13	100 kg
X-0451	PETN Nu-Sil CF3-3500	78.0 22.0	008 Φ 3 Add 5	3500 g

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0452	PETN Nu-Sil CF4-3500	78.0 22.0	008 Φ 3 Add 5	3500 g
X-0453	PETN Nu-Sil CF5-3500	78.0 22.0	008 Φ 3 Add 5	3500 g
X-0454	RDX Estane CEF Calcium Tartrate	58.0 15.0 10.0 17.0	057 Φ 3 Add 1	15 kg
X-0455	PETN Nu-Sil CF5-3500	75.0 25.0	008 Φ 3 Add 5	3500 g
X-0456	PETN Nu-Sil CF5-3500	70.0 30.0	008 Φ 3 Add 5	3500 g
X-0457	PETN NuSil CF6-3500	78.0 22.0	008 Add 5	3500 g
X-0458	TATB (wet aminated) Kel-F 800 Diocyl Sebacate (Octoil-S)	95.0 4.8 0.2	021 Φ 3 Add 12	100 kg
X-0459	TATB EYPEL-F 2,2-dichlorobenzoyl peroxide in silicone base (catalyst)	95.6 4.38 0.02	021 Φ 3 Add 18	3000 g
X-0460	HMX Kraton TCP CT	59.0 11.5 11.5 18.0	057 Φ 3 Add 1	15 kg
X-0461	PETN NuSil CF7-3500	78.0 20.0	008 Φ 3 Add 5	3500 g
X-0462	TATB Kraton G 1650 Hypalon 20	97.8 2.0 0.2	021 Φ 3 Add 12	250 kg
X-0463	HMX Kraton G 1650 Tufflo 6026 oil Irganox	97.47 1.25 1.25 0.03	035 Φ 3	250 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0464	TNT Calcium Carbonate	≤60 ≥40	030 Φ 1 Add 1	3 kg
X-0465	TNT Oxamide	≤70 ≥30	030 Φ 2 Add 1	3 kg
X-0468	TATB Vistanex MML-100 Tufflo 6026 032-4500 Microballoons	86.0 6.0 6.0 2.0	021 Φ 3 Add 12	10 kg
X-0469	CLASSIFIED COMPOSITION		057 Φ 3 Add 1	10 kg
X-0470	CLASSIFIED COMPOSITION		057 Φ 3	15 kg
X-0471	HMX Emulsion	75.0 25.0	058 Φ 3	25 kg
X-0472	HMX Emulsion	50.0 50.0	058 Φ 3	25 kg
X-0473	HMX Emulsion	25.0 75.0	058 Φ 3	25 kg
X-0474	Emulsion	100	058 Φ 3	25 kg
X-0475	CLASSIFIED COMPOSITION		057 Φ 3	15 kg
X-0476	CLASSIFIED COMPOSITION		057 Φ 3	15 kg
X-0477	HMX Emulsion	70.0 30.0	058 Φ 3	25 kg
X-0478	HMX Emulsion	40.0 60.0	058 Φ 3	25 kg
X-0479	HMX Emulsion	30.0 70.0	058 Φ 3	25 kg
X-0480	HMX Emulsion	20.0 80.0	058 Φ 3	25 kg
X-0481	HMX Emulsion	10.0 90.0	058 Φ 3	25 kg
X-0482	PETN NuSil CF2-3550	78.0 22.0	008 Φ 3 Add 5	3.5 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0483	NTO Exon 461	95.0 5.0	059 Φ 2	3.0 kg
X-0484	NTO Viton A	95.0 5.0	059 Φ 2	3.0 kg
X-0485	NTO Kel-F 800	95.0 5.0	059 Φ 2	3.0 kg
X-0486	NTO Kraton 1650	95.0 5.0	059 Φ 2	3.0 kg
X-0487	NTO Estane 5703	95.0 5.0	059 Φ 2	3.0 kg
X-0488	NTO TNT	40.0 60.0	060 Φ 2	3.0 kg
X-0489	NTO TNT	50.0 50.0	060 Φ 2	3.0 kg
X-0490	NTO TNT	60.0 40.0	060 Φ 2	3.0 kg
X-0491	NTO RDX Viton A	45.0 50.0 5.0	059 Φ 2 Add 1	3.0 kg
X-0492	NTO RDX Estane	45.0 50.0 5.0	059 Φ 2 Add 1	3.0 kg
X-0493	NTO RDX FPC 461	45.0 50.0 5.0	059 Φ 2	3.0 kg
X-0494	NTO RDX Kel-F 800	45.0 50.0 5.0	059 Φ 2 Add 1	3.0 kg
X-0495	NTO RDX Kraton 1650	45.0 50.0 5.0	059 Φ 2 Add 1	3.0 kg
X-0496	HMX Emulsion	60.0 40.0	058 Φ 3	25 kg
X-0497	TATB Polysar 306	95.0 5.0	052 Φ 1	150 g
X-0498	TATB Vistalon 404	95.0 5.0	052 Φ 1	150 g
X-0499	TATB Polyvinylidene Fluoride	95.0 5.0	021 Φ 3	100 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0500	TATB Poly(vinylidene fluoride /hexafluoropropylene)	95.0 5.0	021 Φ 3	100 kg
X-0501	RDX CF6-3500	78.0 22.0	008 Φ 3 Add 5	3500 g
X-0502	Dinitrotolune D-2wax Dye	50.0 49.7 0.3	061 Φ 2	3 kg
X-0503	NTO RDX Estane	85.0 10.0 5.0	059 Φ2 Add 1	3 kg
X-0504	NTO RDX FPC 461	85.0 10.0 5.0	059 Φ 2 Add 1	3 kg
X-0505	NTO RDX Kel-F 800	85.0 10.0 5.0	059 Φ 2 Add 1	3 kg
X-0506	NTO RDX Kraton 1650	85.0 10.0 5.0	059 Φ 2 Add 1	3 kg
X-0507	HMX Estane	82.0 18.0	013 Φ 3 Add 9	100 kg
X-0508	HMX Estane BDNPA/F	81.0 15.0 4.0	013 Φ 3 Add 9	100 kg
X-0509	HMX Kraton G 1650 Tufflo oil	88.0 5.40 6.60	035 Φ 3 Add 4	250 kg
X-0510	NTO RDX Viton A	85.0 10.0 5.0	059 Φ 2 Add 1	3 kg
X-0511	HMX Vistalon 404	95.0 5.0	035 Φ 3 Add 4	250 kg
X-0512	HMX Vistalon 404	88.0 12.0	035 Φ 3 Add 4	250 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0513	TNT Calcium Carbonate Estane	40.0 50.0 10.0	030 Φ 3 Add 3	500 kg
X-0514	TNT Calcium Carbonate Estane	45.0 50.0 5.0	030 Φ 3 Add 3	500 kg
X-0515	TNT Cyanuric Acid Estane	40.0 50.0 10.0	030 Φ 3 Add 3	500 kg
X-0516	TNT Zinc oxide Estane	40.0 50.0 10.0	030 Φ 3 Add 3	500 kg
X-0517	TNT Oxamide Estane	40.0 50.0 10.0	030 Φ 3 Add 3	500 kg
X-0518	PETN Pentaerythritol Sylgard 182	50.0 30.0 20.0	008 Φ 3 Add 6	10 kg
X-0519	PETN Pentaerythritol Sylgard 182	60.0 20.0 20.0	008 Φ 3 Add 6	10 kg
X-0520	PETN Pentaerythritol Sylgard 182	70.0 10.0 20.0	008 Φ 3 Add 6	10 kg
X-0521	TNT Calcium Carbonate Estane	50.0 40.0 10.0	030 Φ 3 Add 3	500 kg
X-0522	RDX CF6-3500	80.0 20.0	008 Φ 3 Add 5	3.5 kg
X-0523	RDX Estane 5703 CEF Cyanuric Acid	51.0 12.5 12.5 24.0	057 Φ 3	15 kg
X-0524	TATB Kel-F 800 Hypalon	95.0 4.8 0.2	021 Φ 3 Add 5	2000 kg
X-0525	TNT Calcium Carbonate/Cab-o-Sil	≤70 ≥30	030 Φ 2	2 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0526	TNT Calcium Carbonate /Talc	≤70 ≥30	030 Φ 2	2 kg
X-0527	TATB Macrolon (Polycarbonate)	97.0 3.0	21 Φ 3 Add 12	100 kg
X-0528	HMX R45HT DOA IPDI	84.0 7.6 7.6 0.8	053 Φ 3	25 kg
X-0529	HMX Vistalon 503	≤97.5 ≥2.5	035 Φ 3 Add 4	250 kg
X-0530	Kinepak Mixture AN + sensitizers NM	≈80 ≈20	062 Φ 2	3 kg
X-0531	TATB Polysar 306	98.0 2.0	021 Φ 3 Add 5	250 kg
X-0532	TATB Vistalon 404	98.0 2.0	021 Φ 3 Add 5	250 kg
X-0533	TNT Calcium Carbonate Talc Microballoons	40 55-60 0-2 1-2	030 Φ 3 Add 4	500 kg
X-0534	TNT Calcium Carbonate Talc Microballoons	50 16-24 25-33 1-2	030 Φ3 Add 4	500 kg
X-0535	TZX OXY-461	95.0 5.0	064 Φ 2	3 kg
X-0536	RDX ZnO R45HT/IPDI Binder	20-30 50-65 14-20	063 Φ 2	3 kg
X-0537	HMX R45T/IPDI Type Binder	≤90 ≥10	053 Φ 3 Rev 1	25 kg
X-0538	TATB NTO Kel-F 800	20-80 20-80 0-10	059 Φ 2 Add 3	3 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0539	RDX (micronized) Estane 5703 CEF Cyanuric Acid	44.0 12.5 12.5 31.0	057 Φ 3 Add 2	15 kg
X-0540	RDX (micronized) Estane 5703 CEF Cyanuric Acid	39.0 12.5 12.5 31.0	057 Φ 3 Add 2	15 kg
X-0541	TATB PETN Kel-F 800 Blue Dye (Freon Process)	69.8 25.0 5.0 0.2	021 Φ 3 Add 16	100 kg
X-0542	TATB L-9267, Fluoroplastic terpolymer (3M)	95.0 5.0	021 Φ 3 Add 5	250 kg
X-0543	TATB Kel-F 3700	95.0 5.0	021 Φ 3 Add 5	250 kg
X-0544	TATB Ammonium Nitrate	26.0 74.0	066 Φ 2	3 kg
X-0545	RDX Cellulose Acetate Butyrate (CAB) Acetyl Triethyl-citrate (ATEC) Nitrocellulose Ethylcentralite	76.0 12.0 7.6 4.0 0.4	056 Φ 2 Add 2	3 kg

Reviewed on May 18, 1998 - Minor Changes

Reviewed by:

*Larry Hatler*  
Larry Hatler

DATE:

*6/2/98*

ESA-WMM HE Processing Team Leader

1.0 High-Energy Exploding Bridgewire (EBW) Detonators

The following EBW, slapper and high energy detonators have been approved for assembly into test devices:

#1E23		#ER-396A	SE1
#1E26	#ER-325	#ER-396B	SE1/31
#1E26B	#ER-312B	#ER-402	RP1
#1E29	#ER-344	#ER-403	RP1/31
#1E30	#ER-349	#ER-403B	RP2
#1E33	#ER-350	#ER-403	RP80
#1E34	#ER-351		RP84
#1E36	#ER-352		RP87
#1E38 T.F.	#ER-353		
#1E38	#ER-370		
	#ER-371	#MK20	
	#ER-377	#MK22A	
	#ER-380	#MK13C	
	#ER-400		

2.0 The following low energy detonators have been approved for assembly into test devices: 3E1, 3E1A, 3E1D.

3.0 The following low-energy actuators and igniter have been approved for assembly into test devices:

2S/2052	Actuator	3S/PT06	Actuator
2S/STP/150	Actuator	4S/152	Actuator
3X/2052	Igniter	5S/152	Actuator
6S/PT06	Actuator	7S/152	Actuator
8S/2052	Actuator		

Note: To provide safe handling, the actuators and igniter listed above will be assembled into a valve body or an assembly that will provide confinement before they are furnished to ESA-WMM for subsequent assembly. Shorting plugs will be installed until connected to next assembly.

# Approved by Nuclear Explosive Safety Study for use, at NTS, in nuclear explosive assembly.

Approved by: Larry Hatler Date 7/7/98  
Larry Hatler, ESA-WMM HE Processing Team Leader

CHANGES IN SHADING 6/23/98

**9. HE-Contaminated Solid Wastes, WPF#: 29686**

**ESA Standard Operating Procedure 1.1, Table 1**

*Replaces*

**DX-DO:SOP 01, Standard Operating Procedure for Waste Management and  
Generator Waste Certification in DX-Division**

NAME OR CODE	COMPOSITION
AI/ANFO <sup>a</sup>	Ammonium nitrate/fuel oil/aluminum powder
AN	Ammonium nitrate
ANFO	Ammonium nitrate/fuel oil
Baratol	75 wt% Barium nitrate/25 wt% TNT
BDNPA	Bis(dinitropropyl) acetal
BDNPF	Bis(dinitropropyl) formal
Black powder	74 wt% Potassium nitrate/15.6 wt% charcoal/10.4 wt% sulfur
Boracitol	60 wt% Boric acid/40 wt% TNT
BTX <sup>b</sup>	5,7-Dinitro-1-picrylbenzotriazole
Composition A-3	91 wt% RDX/9 wt% beeswax
Composition A-4	97 wt% RDX/3 wt% beeswax
Composition A-5	98.5 wt% RDX/1.5 wt% beeswax
Composition B and B-3	60 wt% RDX/40 wt% TNT
Composition C-3	88 wt% RDX/12 wt% wax
Composition C-4	91 wt% RDX/2.1 wt% polyisobutylene/1.6 wt% motor oil/ 5.3 wt% di(2-ethylhexyl) sebacate
Cyclotol, 75/25	75 wt% RDX/25 wt% TNT
Cyclotol, 70/30	70 wt% RDX/30 wt% TNT
DATB	Diaminotrinitrobenzene
DBA-1 (a)	AN/NaNO <sub>3</sub> /TNT/H <sub>2</sub> O/thickener
Detasheet C	63 wt% PETN/8 wt% NC/29 wt% elastomeric binder
Detasheet D	75 wt% PETN/25 wt% elastomeric binder <b>NOTE: Although this material may be red in color, it is an explosive and not an inert material</b>
DINGU	Dinitroglycoluril
DNPA	2,2-Dinitropropyl acrylate polymer
DNT	Dinitrotoluene
EDC-8 <sup>c</sup>	76 wt% PETN/24 wt% Silicone rubber, MS 2420
EDC-28 <sup>d</sup>	94 wt% RDX/6 wt% FPC 461
EDC-32 <sup>e</sup>	85 wt% HMX/15 wt % Viton A
EDC-37 <sup>f</sup>	91 wt% HMX/1 wt% nitrocellulose/8 wt% K-10 liquid
EDC-38 <sup>g</sup>	94.5 wt% HMX/3.5 wt% K-10 Liquid/2 wt% Polyurethane
HBX-1	40 wt% RDX/38 wt% TNT/17 wt% Al/5 wt% Wax/ 0.5 wt% CaCl <sub>2</sub>
High Energy Propellants <sup>h</sup>	Solid propellants generally used in missile systems
HMX	Cyclotetramethylenetetranitramine
HNS	Hexanitrostilbene

<sup>a</sup> For transportation only to and from DX and ESA Division Groups and storage by Group ESA-WMM.

<sup>b</sup> For transportation only - SEE HED-037

<sup>c</sup> EDC-8 is the United Kingdom's version of XTX-8003

<sup>d</sup> EDC-28 is the United Kingdom's version of PBX 9407

<sup>e</sup> EDC-32 is the United Kingdom's version of LX-04

<sup>f</sup> For shipping, storage and experimental evaluation of quantities less than 5 g and for assembly of finished charges into test devices only.

<sup>g</sup> For shipping, storage, and analytical evaluation of molding powder and assembly of finished pieces into test devices.

<sup>h</sup> After approval by the Explosives Development Committee

NAME OR CODE	COMPOSITION
K-10 <sup>1</sup>	65.3 wt% dinitroethylbenzene/34.7 wt% trinitroethylbenzene
LX-04	85 wt% HMX/15 wt% Viton A
LX-07	90 wt% HMX/10 wt% Viton A
LX-14	95.5 wt% HMX/4.5 wt % Estane 5702 F-1
Methane/oxyben (i)	Explosive mixtures of methane and oxygen gases
NC	Nitrocellulose, cellulose nitrate
Nitromethane	Nitromethane
NQ	Nitroguanidine
NTO	1,2,4-nitro-triazole-5-one
Octol	75 wt% HMX/25 wt% TNT
PBX-9001	90 wt% RDX/8.5 wt% polystyrene/1.5 wt% dioctylphthalate
PBX-9007	90 wt% RDX/9.1 wt% polystyrene/0.5 wt% dioctylphthalate/ 0.4 wt % resin
PBX-9010	90 wt% RDX/10 wt% Kel-F 3700 elastomer
PBX-9011	90 wt% HMX/10 wt% Estane 5703 F-1
PBX-9205	92 wt% RDX/6 wt% polystyrene/2 wt% dioctylphthalate
PBX-9206	92 wt% HMX/8 wt% Kel-F 3700 elastomer
PBX-9401	94.2 wt% RDX/3.6 wt% polystyrene/2.2 wt% trioctyl phosphate
PBX-9404	94 wt% HMX/3 wt% nitrocellulose/3 wt% chloroethyl phosphate
PBX-9405	94 wt% RDX/3 wt% nitrocellulose/3 wt% chloroethyl phosphate
PBX-9407	94 wt% RDX/6 wt% Exon 461
PBX-9501	95 wt% HMX/2.5 wt% Estane/2.5 wt% BDNPA/F
PBX-9502	95 wt% TATB/5 wt% Kel-F 800
PBX-9503	80 wt% TATB (Class 2)/15 wt% HMX (Class 2)/5 wt% Kel-F 800
PBXW-113	88 wt% HMX/12 wt% rubber/plasticizer binder
Pentolite	50 wt% PETN/50 wt% TNT
PETN	Pentaerythritol tetranitrate
Picric Acid	DuPont 85 wt% pure
PYX	2,6-Bis(picrylamino)-3,5-dinitropyridine
RDX	Cylonite, cyclotrimethylenetrinitramine
Smokeless Powder (Single Base)	Standard Military grades. Single or multi-perforated grains of colloided nitrocellulose. Stabilizers, plasticizers, inorganic nitrates, and other modifying agents may also be present.
Smokeless Powder (Double Base)	Standard Military grades. Single or multi-perforated grains of colloided nitrocellulose containing nitroglycerin or nitroglycol. Stabilizers, plasticizers, inorganic nitrates, and other modifying agents may also be present.
STRATABLAST C (a)	Slurry blasting explosive
TAGN (i)	Triaminoguanidine nitrate
TAL-1005E (a)	Slurry blasting explosive
TATB	Triaminotrinitrobenzene
Tetryl	2,4,6-Trinitrophenylmethylnitramine
TNS	Trinitrostilbene

<sup>1</sup> For shipping, storage and experimental evaluations on less than 5 g quantities.

( ) With letter inserted is cross-reference to footnote.

NAME OR CODE	COMPOSITION
TNT	Trinitrotoluene
TNT/NC	80 wt% TNT/20 wt% NC
TPM	Tripicrylmelamine
Tritonal	80 wt% TNT/20 wt% aluminum powder
XTX-8003	80 wt% Recrystallized PETN/20 wt% Sylgard 182
XTX-8004	80 wt% RDX/20 wt% Sylgard 182

**Reviewed on April 2, 1998 - NO CHANGES**

Reviewed by: \_\_\_\_\_ DATE: \_\_\_\_\_

Larry Hatler  
ESA-WMM HE Processing Team Leader

**9. HE-Contaminated Solid Wastes, WPF#: 29686**

*Insert*

**MSDS Form: PBX 9501**

**MSDS Form: PBX 9502**

# MSDS: PBX 9501

---

## SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MDL INFORMATION SYSTEMS, INC.  
1281 Murfreesboro Road, Suite 300  
Nashville, TN 37217-2423  
1-615-366-2000

EMERGENCY TELEPHONE NUMBER:  
1-800-424-9300 (NORTH AMERICA)  
1-703-527-3887 (INTERNATIONAL)

SUBSTANCE: PBX 9501

TRADE NAMES/SYNONYMS:  
INV# 12564; OHSLQ167

CREATION DATE: Apr 22 1992  
REVISION DATE: Mar 12 1998

---

## SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: CYCLOTETRAMETHYLENETETRANITRAMINE  
CAS NUMBER: 2691-41-0  
EC NUMBER (EINECS): 220-260-0  
PERCENTAGE: 95.0

COMPONENT: ESTANE  
CAS NUMBER: 61789-63-7  
EC NUMBER: Not assigned.  
PERCENTAGE: 2.5

COMPONENT: BIS(2,2-DINITROPROPYL) ACETAL  
CAS NUMBER: 5108-69-0  
EC NUMBER: Not assigned.  
PERCENTAGE: 1.25

COMPONENT: BIS(2,2-DINITROPROPYL) FORMAL  
CAS NUMBER: 5917-61-3  
EC NUMBER: Not assigned.  
PERCENTAGE: 1.25

---

## SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=4 REACTIVITY=4

EC CLASSIFICATION (CALCULATED): No classification assigned.

EMERGENCY OVERVIEW:  
COLOR: white  
PHYSICAL FORM: solid  
MAJOR HEALTH HAZARDS: harmful on contact with the skin



PHYSICAL HAZARDS: May explode if exposed to shock, friction or heating.  
Flammable solid. Dust/air mixtures may ignite or explode.

POTENTIAL HEALTH EFFECTS:

INHALATION:

SHORT TERM EXPOSURE: no information on significant adverse effects

LONG TERM EXPOSURE: no information on significant adverse effects

SKIN CONTACT:

SHORT TERM EXPOSURE: no information on significant adverse effects

LONG TERM EXPOSURE: no information on significant adverse effects

EYE CONTACT:

SHORT TERM EXPOSURE: irritation

LONG TERM EXPOSURE: no information on significant adverse effects

INGESTION:

SHORT TERM EXPOSURE: symptoms of drunkenness

LONG TERM EXPOSURE: no information on significant adverse effects

CARCINOGEN STATUS:

OSHA: N

NTP: N

IARC: N

---

## SECTION 4 FIRST AID MEASURES

INHALATION: Remove from exposure immediately. Use a bag valve mask or similar device to perform artificial respiration (rescue breathing) if needed. Get medical attention.

SKIN CONTACT: Remove contaminated clothing, jewelry, and shoes immediately. Wash with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes). Get medical attention, if needed.

EYE CONTACT: Wash eyes immediately with large amounts of water or normal saline, occasionally lifting upper and lower lids, until no evidence of chemical remains. Get medical attention immediately.

INGESTION: If vomiting occurs, keep head lower than hips to help prevent aspiration. Get medical attention, if needed.

---

## SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Severe fire hazard. Severe explosion hazard.  
Dust/air mixtures may ignite or explode.

EXTINGUISHING MEDIA: Flood with water. If no water is available, use dry chemical, halogenated extinguishing agents or earth.

FIRE FIGHTING: Do not move containers which have been damaged or exposed to heat. Do not try to fight fire in cargo or storage areas. Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. For tank, rail car or tank truck, evacuation radius: 1600 meters (1 mile). Explosive. Do not try to fight fire in cargo or storage areas. Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Avoid inhalation of material or combustion by-products. Evacuation radius: 1600 meters (1 mile).

---

## **SECTION 6 ACCIDENTAL RELEASE MEASURES**

### **OCCUPATIONAL RELEASE:**

Avoid heat, flames, sparks and other sources of ignition. Do not touch spilled material. Remove sources of ignition. Evacuation radius: 800 meters (1/2 mile). Keep unnecessary people away, isolate hazard area and deny entry.

---

## **SECTION 7 HANDLING AND STORAGE**

Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. Department of Treasury 27 CFR Subpart K. U.S. OSHA 29 CFR 1910.109 NFPA 495 Standard for Storage, Use and Handling of Explosives. Keep separated from incompatible substances.

---

## **SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION**

### **EXPOSURE LIMITS:**

#### **PBX 9501:**

No occupational exposure limits established.

**VENTILATION:** Provide local exhaust or process enclosure ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

**EYE PROTECTION:** Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

**CLOTHING:** Wear appropriate chemical resistant clothing.

**GLOVES:** Wear appropriate chemical resistant gloves.

**RESPIRATOR:** Under conditions of frequent use or heavy exposure, respiratory protection may be needed. Respiratory protection is ranked in order from minimum to maximum. Consider warning properties before use.

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode.

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

For Unknown Concentrations or Immediately Dangerous to Life or Health -

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.

Any self-contained breathing apparatus with a full facepiece.

---

## **SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES**

PHYSICAL STATE: solid  
COLOR: white  
ODOR: Not available  
BOILING POINT: Not applicable  
MELTING POINT: Not available  
DECOMPOSITION POINT: 536 F (280 C)  
VAPOR PRESSURE: Not applicable  
VAPOR DENSITY: Not applicable  
SPECIFIC GRAVITY (water=1): 1.9  
WATER SOLUBILITY: insoluble  
PH: Not applicable  
VOLATILITY: Not applicable  
ODOR THRESHOLD: Not available  
EVAPORATION RATE: Not applicable  
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available

---

## SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: May explode if exposed to shock, friction or heating.

INCOMPATIBILITIES: metal salts, oxidizing materials

### CYCLOTETRAMETHYLENETETRANITRAMINE:

MERCURY FULMINATE: May easily initiate an explosion.

METAL AZIDES: May initiate detonation.

OXIDIZERS (STRONG): Fire and explosion hazard.

BIS(2,2-DINITROPROPYL) ACETAL:

OXIDIZERS (STRONG): Fire and explosion hazard.

BIS(2,2-DINITROPROPYL) FORMAL:

OXIDIZERS (STRONG): Fire and explosion hazard.

ESTANE:

OXIDIZERS (STRONG): Fire and explosion hazard.

### HAZARDOUS DECOMPOSITION:

Thermal decomposition products: oxides of carbon, nitrogen

POLYMERIZATION: Will not polymerize.

---

## SECTION 11 TOXICOLOGICAL INFORMATION

### CYCLOTETRAMETHYLENETETRANITRAMINE:

#### IRRITATION DATA:

500 mg skin-rabbit mild

#### TOXICITY DATA:

6490 mg/kg oral-rat LD50; 25 mg/kg intravenous-rat LD50; 7300 mg/kg unreported-rat LD50; 1500 mg/kg oral-mouse LD50; 2700 mg/kg unreported-mouse LD50; 40 mg/kg intravenous-dog LDLo; 50 mg/kg oral-rabbit LD50; 630 mg/kg skin-rabbit LD50; 10 mg/kg intravenous-rabbit LD50; 300 mg/kg oral-guinea pig LD50; 28 mg/kg intravenous-guinea pig LD50; 153 mg/kg/22 week(s) intermittent oral-rat TDLo

ACUTE TOXICITY LEVEL:

Toxic: dermal absorption  
Slightly Toxic: ingestion

HEALTH EFFECTS:

INHALATION:

ACUTE EXPOSURE:

CYCLOTETRAMETHYLENETETRANITRAMINE: No data available.

ESTANE: At elevated processing temperatures, fumes and vapors may cause irritation of the respiratory tract of sensitive persons.

BIS(2,2-DINITROPROPYL) ACETAL: May cause irritation.

BIS(2,2-DINITROPROPYL) FORMAL: May cause irritation.

CHRONIC EXPOSURE:

CYCLOTETRAMETHYLENETETRANITRAMINE: No data available.

ESTANE: No data available.

BIS(2,2-DINITROPROPYL) ACETAL: No data available.

BIS(2,2-DINITROPROPYL) FORMAL: No data available.

SKIN CONTACT:

ACUTE EXPOSURE:

CYCLOTETRAMETHYLENETETRANITRAMINE: The lethal dose reported in rabbits was 630 mg/kg. The symptoms were not reported.

ESTANE: At elevated processing temperatures, fumes and vapors may cause irritation. Sensitization dermatitis has been reported to occur from contact with uncured polyurethane resins and adhesives.

BIS(2,2-DINITROPROPYL) ACETAL: May cause irritation.

BIS(2,2-DINITROPROPYL) FORMAL: May cause irritation.

CHRONIC EXPOSURE:

CYCLOTETRAMETHYLENETETRANITRAMINE: Dermatitis and circulatory collapse with central nervous system disturbances have been reported in animals.

ESTANE: No data available.

BIS(2,2-DINITROPROPYL) ACETAL: No data available.

BIS(2,2-DINITROPROPYL) FORMAL: No data available.

EYE CONTACT:

ACUTE EXPOSURE:

CYCLOTETRAMETHYLENETETRANITRAMINE: May cause irritation.

ESTANE: At elevated processing temperatures, fumes and vapors may cause irritation.

BIS(2,2-DINITROPROPYL) ACETAL: May cause irritation.

BIS(2,2-DINITROPROPYL) FORMAL: May cause irritation.

CHRONIC EXPOSURE:

CYCLOTETRAMETHYLENETETRANITRAMINE: No data available.

ESTANE: No data available.

BIS(2,2-DINITROPROPYL) ACETAL: No data available.

BIS(2,2-DINITROPROPYL) FORMAL: No data available.

**INGESTION:**

**ACUTE EXPOSURE:**

CYCLOTETRAMETHYLENETETRANITRAMINE: May cause narcosis.

ESTANE: No specific data available. Polymers are generally poorly absorbed, and ingestion of sufficient quantities may result in the formation of bezoars.

BIS(2,2-DINITROPROPYL) ACETAL: No data available.

BIS(2,2-DINITROPROPYL) FORMAL: No data available.

**CHRONIC EXPOSURE:**

CYCLOTETRAMETHYLENETETRANITRAMINE: No data available.

ESTANE: No data available.

BIS(2,2-DINITROPROPYL) ACETAL: No data available.

BIS(2,2-DINITROPROPYL) FORMAL: No data available.

---

**SECTION 12 ECOLOGICAL INFORMATION**

Not available

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**SECTION 13 DISPOSAL CONSIDERATIONS**

Dispose in accordance with all applicable regulations.

---

**SECTION 14 TRANSPORT INFORMATION**

U.S. DOT 49 CFR 172.101 SHIPPING NAME-UN NUMBER:  
Substances, explosive n.o.s. (cyclotetramethylenetetranitramine)-UN0473

U.S. DOT 49 CFR 172.101 HAZARD CLASS OR DIVISION:  
1.1A

U.S. DOT 49 CFR 172.101 PACKING GROUP:  
II

U.S. DOT 49 CFR 172.101 AND SUBPART E LABELING REQUIREMENTS:  
EXPLOSIVE 1.1A

U.S. DOT 49 CFR 172.101 PACKAGING AUTHORIZATIONS:  
EXCEPTIONS: None  
NON-BULK PACKAGING: 49 CFR 173.62  
BULK PACKAGING: None

U.S. DOT 49 CFR 172.101 QUANTITY LIMITATIONS:  
PASSENGER AIRCRAFT OR RAILCAR: Forbidden  
CARGO AIRCRAFT ONLY: Forbidden

LAND TRANSPORT ADR/RID:

SUBSTANCE NAME: Substances, explosive, n.o.s.: Not to be accepted for carriage  
UN NUMBER: UN0473  
ADR/RID CLASS: 1.1A  
ITEM NUMBER: See marg. 100 (8)

AIR TRANSPORT IATA/ICAO:

CORRECT TECHNICAL NAME: Substances, explosive, n.o.s.  
UN/ID NUMBER: UN0473  
IATA/ICAO CLASS: 1.1A

MARITIME TRANSPORT IMDG:

CORRECT TECHNICAL NAME: Substances, explosive, n.o.s.  
UN/ID NUMBER: UN0473  
IMDG CLASS: 1.1 A  
MARINE POLLUTANT: N

---

**SECTION 15 REGULATORY INFORMATION**

U.S. REGULATIONS:

TSCA INVENTORY STATUS: N

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CERCLA SECTION 103 (40CFR302.4): N

SARA SECTION 302 (40CFR355.30): N

SARA SECTION 304 (40CFR355.40): N

SARA SECTION 313 (40CFR372.65): N

SARA HAZARD CATEGORIES, SARA SECTIONS 311/312 (40CFR370.21):

ACUTE: Y

CHRONIC: N

FIRE: Y

REACTIVE: Y

SUDDEN RELEASE: Y

OSHA PROCESS SAFETY (29CFR1910.119): N

STATE REGULATIONS:

California Proposition 65: N

EUROPEAN REGULATIONS:

EC NUMBER: Not assigned.

---

**SECTION 16 OTHER INFORMATION**

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# MSDS: PBX 9502

---

## SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MDL INFORMATION SYSTEMS, INC.  
1281 Murfreesboro Road, Suite 300  
Nashville, TN 37217-2423  
1-615-366-2000

EMERGENCY TELEPHONE NUMBER:  
1-800-424-9300 (NORTH AMERICA)  
1-703-527-3887 (INTERNATIONAL)

SUBSTANCE: PBX 9502

TRADE NAMES/SYNONYMS:  
INV# 12563; OHSLQ059

CREATION DATE: Jun 06 1991  
REVISION DATE: Mar 12 1998

---

## SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: TRIAMINOTRINITROBENZENE  
CAS NUMBER: 3058-38-6  
EC NUMBER (EINECS): 221-297-5  
PERCENTAGE: 95.0

COMPONENT: CHLOROTRIFLUOROETHYLENE/VINYLDENE FLUORIDE COPOLYMER  
CAS NUMBER: 9010-75-7  
EC NUMBER: Not assigned.  
PERCENTAGE: 5.0

---

## SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=1 REACTIVITY=3

EC CLASSIFICATION (CALCULATED): No classification assigned.

### EMERGENCY OVERVIEW:

COLOR: yellow

PHYSICAL FORM: solid

MAJOR HEALTH HAZARDS: No significant target effects reported.

PHYSICAL HAZARDS: May explode if exposed to shock, friction or heating.

Dust/air mixtures may ignite or explode. May ignite if exposed to shock, friction or heating.

### POTENTIAL HEALTH EFFECTS:

#### INHALATION:

SHORT TERM EXPOSURE: irritation, bluish skin color, lung congestion

LONG TERM EXPOSURE: symptoms of drunkenness, lung damage, liver damage

#### SKIN CONTACT:

SHORT TERM EXPOSURE: no information on significant adverse effects



LONG TERM EXPOSURE: same as effects reported in long term inhalation  
EYE CONTACT:  
SHORT TERM EXPOSURE: visual disturbances  
LONG TERM EXPOSURE: no information on significant adverse effects  
INGESTION:  
SHORT TERM EXPOSURE: same as effects reported in short term inhalation  
LONG TERM EXPOSURE: no information on significant adverse effects

CARCINOGEN STATUS:  
OSHA: N  
NTP: N  
IARC: N

---

## **SECTION 4 FIRST AID MEASURES**

INHALATION: Remove from exposure immediately. Use a bag valve mask or similar device to perform artificial respiration (rescue breathing) if needed. Get medical attention.

SKIN CONTACT: Remove contaminated clothing, jewelry, and shoes immediately. Wash with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes). Get medical attention, if needed.

EYE CONTACT: Wash eyes immediately with large amounts of water or normal saline, occasionally lifting upper and lower lids, until no evidence of chemical remains. Get medical attention immediately.

INGESTION: If vomiting occurs, keep head lower than hips to help prevent aspiration. Get medical attention, if needed.

---

## **SECTION 5 FIRE FIGHTING MEASURES**

FIRE AND EXPLOSION HAZARDS: Slight fire hazard. Dust/air mixtures may ignite or explode. May ignite if exposed to shock, friction or heating. Avoid friction and static electricity. Severe explosion hazard.

EXTINGUISHING MEDIA: Flood with water. If no water is available, use dry chemical, halogenated extinguishing agents or earth.

FIRE FIGHTING: Do not move containers which have been damaged or exposed to heat. Do not try to fight fire in cargo or storage areas. Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. For tank, rail car or tank truck, evacuation radius: 1600 meters (1 mile). Explosive. Do not try to fight fire in cargo or storage areas. Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Avoid inhalation of material or combustion by-products. Evacuation radius: 1600 meters (1 mile).

---

## **SECTION 6 ACCIDENTAL RELEASE MEASURES**

OCCUPATIONAL RELEASE:

Avoid heat, flames, sparks and other sources of ignition. Do not touch spilled material. Remove sources of ignition. Evacuation radius: 800 meters (1/2 mile). Keep unnecessary people away, isolate hazard area and deny entry.

---

## **SECTION 7 HANDLING AND STORAGE**

Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

---

## **SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION**

### EXPOSURE LIMITS:

PBX 9502:

No occupational exposure limits established.

VENTILATION: Provide local exhaust ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: Under conditions of frequent use or heavy exposure, respiratory protection may be needed. Respiratory protection is ranked in order from minimum to maximum. Consider warning properties before use.

Any dust, mist, and fume respirator.

Any air-purifying respirator with a high-efficiency particulate filter.

Any powered, air-purifying respirator with a dust, mist, and fume filter.

Any powered, air-purifying respirator with a high-efficiency particulate filter.

For Unknown Concentrations or Immediately Dangerous to Life or Health -

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.

Any self-contained breathing apparatus with a full facepiece.

---

## **SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES**

PHYSICAL STATE: solid

COLOR: yellow

TEXTURE: granular

ODOR: Not available

BOILING POINT: Not applicable

MELTING POINT: Not available

DECOMPOSITION POINT: 617 F (325 C)

VAPOR PRESSURE: Not applicable

VAPOR DENSITY: Not applicable  
SPECIFIC GRAVITY (water=1): 1.9  
WATER SOLUBILITY: almost insoluble  
PH: Not applicable  
VOLATILITY: negligible  
ODOR THRESHOLD: Not available  
EVAPORATION RATE: Not applicable  
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available

---

## SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure. May explode if exposed to shock, friction or heating. Stable at normal temperatures and pressure.

INCOMPATIBILITIES: metals, oxidizing materials, bases, halogens, combustible materials

TRIAMINOTRINITROBENZENE:

HEAVY METALS: Incompatible.

HYDROXYLAMINIUM PERCHLORATE (SATURATED AQUEOUS SOLUTION): Forms explosive mixture.

OXIDIZERS (STRONG): Fire and explosion hazard.

AMINES:

ACROLEIN: Exothermic polymerization.

CALCIUM HYPOCHLORITE: Formation of explosive chloroamine.

MALEIC ANHYDRIDE: Explosive decomposition.

NITROSYL PERCHLORATE: Explosive reaction.

SODIUM HYPOCHLORITE: Formation of explosive chloroamine.

TRI-ISO-BUTYL ALUMINUM: Violent reaction.

CHLOROTRIFLUOROETHYLENE/VINYLIDENE FLUORIDE COPOLYMER:

OXIDIZERS (STRONG): Fire and explosion hazard.

NITROAROMATICS:

ALKALIES: Possible violent decomposition or explosion when heated.

CHLORINE TRIFLUORIDE: Solutions are extremely shock sensitive.

HAZARDOUS DECOMPOSITION:

Thermal decomposition products: oxides of nitrogen

POLYMERIZATION: Will not polymerize.

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## SECTION 11 TOXICOLOGICAL INFORMATION

TRIAMINOTRINITROBENZENE:

TOXICITY DATA:

>5 gm/kg oral-rat LD50 (Mason & Hanger-Silas Mason); >5 gm/kg oral-mouse LD50 (Mason & Hanger-Silas Mason)

ACUTE TOXICITY LEVEL: Insufficient Data.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: respiratory disorders

CHLOROTRIFLUOROETHYLENE/VINYLDENE FLUORIDE COPOLYMER:

ADDITIONAL DATA: Smoking may enhance the toxic effects.

HEALTH EFFECTS:

INHALATION:

ACUTE EXPOSURE:

TRIAMINOTRINITROBENZENE: May cause irritation of the respiratory tract. Intratracheal instillation of up to 30 mg to rats produced lung congestion but no mortality or systemic effects. A one hour exposure of 5 mg/m<sup>3</sup> to animals produced a mild increase in the incidence of focal pneumonia. Aromatic amines may cause necrosis and nephritis of the kidneys, necrosis of the liver and methemoglobinemia. Some are strong sensitizers, causing severe allergic responses.

CHLOROTRIFLUOROETHYLENE/VINYLDENE FLUORIDE COPOLYMER: No specific data available. Vapors from some heated fluorocarbon polymers have been reported to cause polymer fume fever.

CHRONIC EXPOSURE:

TRIAMINOTRINITROBENZENE: Animals exposed to levels up to 5000 mg/m<sup>3</sup> for 90 days showed no adverse effects; however necropsy showed lung effects due to the deposition of the test material. No significant adverse effects were noted in rats exposed to 10.4 mg/m<sup>3</sup> for 90 days and a subsequent 21 month period following exposure. Poisoning by nitro aromatic compounds may result in reduction of the oxygen carrying power of the blood, central nervous system depression, liver damage and kidney effects. Some aromatic amines may cause urinary tract cancer, particularly of the bladder.

CHLOROTRIFLUOROETHYLENE/VINYLDENE FLUORIDE COPOLYMER: No data available.

SKIN CONTACT:

ACUTE EXPOSURE:

TRIAMINOTRINITROBENZENE: Animal studies have reported no irritation or sensitization.

CHLOROTRIFLUOROETHYLENE/VINYLDENE FLUORIDE COPOLYMER: No specific data available. Copolymers of this type have been reported to be non-irritating and non-sensitizing.

CHRONIC EXPOSURE:

TRIAMINOTRINITROBENZENE: No specific data available. Effects of nitro aromatic compounds as detailed in chronic inhalation may occur.

CHLOROTRIFLUOROETHYLENE/VINYLDENE FLUORIDE COPOLYMER: No data available.

EYE CONTACT:

ACUTE EXPOSURE:

TRIAMINOTRINITROBENZENE: Rabbit eye irritation studies report mild transient irritation. Amine vapors may cause edema of the epithelium of the cornea and visual disturbances.

CHLOROTRIFLUOROETHYLENE/VINYLDENE FLUORIDE COPOLYMER: No specific data available. Copolymers of this type have been reported to be non-irritating.

CHRONIC EXPOSURE:

TRIAMINOTRINITROBENZENE: No data available.

CHLOROTRIFLUOROETHYLENE/VINYLDENE FLUORIDE COPOLYMER: No data available.

INGESTION:

ACUTE EXPOSURE:

TRIAMINOTRINITROBENZENE: No specific data available. Aromatic amines are strong irritants and may be absorbed through the digestive tract causing

effects as detailed in acute inhalation.

CHLOROTRIFLUOROETHYLENE/VINYLDENE FLUORIDE COPOLYMER: No specific data available. Polymers are generally poorly absorbed, and ingestion of sufficient quantities may result in the formation of bezoars.

**CHRONIC EXPOSURE:**

TRIAMINOTRINITROBENZENE: No specific data available. Some aromatic amines may cause urinary tract cancer, particularly of the bladder.

CHLOROTRIFLUOROETHYLENE/VINYLDENE FLUORIDE COPOLYMER: No data available.

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## **SECTION 12 ECOLOGICAL INFORMATION**

Not available

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## **SECTION 13 DISPOSAL CONSIDERATIONS**

Dispose in accordance with all applicable regulations.

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## **SECTION 14 TRANSPORT INFORMATION**

U.S. DOT 49 CFR 172.101 SHIPPING NAME-UN NUMBER:  
Explosive, blasting, type A-UN0081

U.S. DOT 49 CFR 172.101 HAZARD CLASS OR DIVISION:  
1.1D

U.S. DOT 49 CFR 172.101 PACKING GROUP:  
II

U.S. DOT 49 CFR 172.101 AND SUBPART E LABELING REQUIREMENTS:  
EXPLOSIVE 1.1D

U.S. DOT 49 CFR 172.101 PACKAGING AUTHORIZATIONS:  
EXCEPTIONS: None  
NON-BULK PACKAGING: 49 CFR 173.62  
BULK PACKAGING: None

U.S. DOT 49 CFR 172.101 QUANTITY LIMITATIONS:  
PASSENGER AIRCRAFT OR RAILCAR: Forbidden  
CARGO AIRCRAFT ONLY: Forbidden

LAND TRANSPORT ADR/RID:  
SUBSTANCE NAME: Explosive, blasting, type A  
UN NUMBER: UN0081  
ADR/RID CLASS: 1.1D  
ITEM NUMBER: 4  
WARNING SIGN/LABEL: 1; 13

AIR TRANSPORT IATA/ICAO:  
CORRECT TECHNICAL NAME: Explosive, blasting, type A  
UN/ID NUMBER: UN0081  
IATA/ICAO CLASS: 1.1D

MARITIME TRANSPORT IMDG:  
CORRECT TECHNICAL NAME: Explosive, blasting, type A  
UN/ID NUMBER: UN0081  
IMDG CLASS: 1.1 D  
EmS No.: 1-02  
MARINE POLLUTANT: N

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## SECTION 15 REGULATORY INFORMATION

### U.S. REGULATIONS:

TSCA INVENTORY STATUS: Y

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CERCLA SECTION 103 (40CFR302.4): N

SARA SECTION 302 (40CFR355.30): N

SARA SECTION 304 (40CFR355.40): N

SARA SECTION 313 (40CFR372.65): N

SARA HAZARD CATEGORIES, SARA SECTIONS 311/312 (40CFR370.21):

ACUTE: N

CHRONIC: N

FIRE: N

REACTIVE: Y

SUDDEN RELEASE: Y

OSHA PROCESS SAFETY (29CFR1910.119): N

### STATE REGULATIONS:

California Proposition 65: N

### EUROPEAN REGULATIONS:

EC NUMBER: Not assigned.

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## SECTION 16 OTHER INFORMATION

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**11. HE-Contaminated Rags, Wipes, and other Combustibles, WPF#: 27828**

**ESA Standard Operating Procedure 1.1**

*Replaces*

**DX-DO:SOP 01, Standard Operating Procedure for Waste Management and  
Generator Waste Certification in DX-Division**

## WEAPON MATERIALS & MANUFACTURING

### SAFE OPERATING PROCEDURE

FOR

HIGH EXPLOSIVES

Approved by: Larry E. Hatler Date: 6/2/98  
Larry Hatler, ESA-WMM HE Processing Team Leader

Approved by: Ricardo V. Ortiz Date: 6/3/98  
Ricardo V. Ortiz, ESA-WMM Group Leader

Approved by: Daniel G. McDonald Date: 6/26/98  
ESA-FM/ESH Safety Officer

**LOS ALAMOS**

National Laboratory  
ESA-WMM

CONTROLLED DOCUMENT

**Users have the ultimate responsibility to ensure that they are working with the latest revision of the controlled document. Uncontrolled if cover sheet is not printed in red.**

## 1.0 SCOPE

This SOP governs the high explosives (HE) that may be processed, assembled, transported, and stored at S-Site by Group ESA-WMM. Restrictions on the use of some of these explosives in processing operations may be imposed in the pertinent individual SOPs and High Explosive Development (HED) procedures and authorization.

## 2.0 Nature and Uses of Explosives

### 2.1 Types

Explosives are compounds that will burn or explode if they are heated, exposed to some type of impact, pinched between moving surfaces, or subjected to an electric discharge or a strong shock pressure. Not all explosives behave in the same way and, because they are not all the same, they have been divided into four classes: (1) Primary or initiating, (2) Boostering, (3) Secondary high explosives (main charge or bursting charge), and (4) Insensitive high explosives.

#### 2.1.1 Primary or Initiating

Primary or initiating explosives are those explosives that can be detonated with very little energy. They are very sensitive to friction, heat, and impact, and some of them to a static electrical discharge. When involved in a fire, primary explosives can be expected to detonate without burning. These explosives are used to "trigger" other explosives that are less sensitive and require a little more energy to get started. Explosives such as lead azide and lead styphnate fall into this category.

Primary explosives are not processed at S-Site, but are often used indirectly. Small quantities are used in squibs that are stored and used for special applications. In addition, some items that contain primary explosives, such as fuses, low-energy detonators, and explosive bolts and fasteners, are assembled into test devices. These initiation devices are received and handled as individual preassembled components. They are generally classified as 1.4 explosive devices, per the United Nation Organization (UNO) Classification. Class 1.4 is defined as moderate fire, no blast.

### 2.1.2 Boostering

Booster explosives are used in initiation trains to ensure a detonation wave (reaction) is transferred between the detonator, "trigger", and the main charge HE. Booster explosives are generally secondary and are less sensitive than primary HEs. High explosives such as PETN, RDX, HMX, HNS and tetryl typically fall into this class of materials. These materials can be used in small quantities (few grams) as pure materials or mixed with plastic binders which make them less sensitive than the pure explosives. These materials, in their pure form, can be used in detonator applications. PETN is the most sensitive HE used at Los Alamos for weapon system applications.

The pure HEs, PETN, RDX, HMX and HNS are processed in the first steps of making plastic bonded explosives (PBXs) and extrudable explosives such as extex (XTX) for initiation train and booster explosives applications. Booster charge applications generally require relatively small amounts of HE for their applications, usually less than one pound.

These secondary HEs, in their pure form or in their PBX formulations, are categorized as Class 1.1 mass detonating HEs per UNO. Additional restrictions require the pure HEs, PETN, RDX, HMX and HNS to be stored and transported wet with a mixture of water and alcohol.

### 2.1.3 Secondary High Explosives (Main Charge or Bursting Charges)

Secondary HEs are used as main charges for weapon applications in assemblies built at S-Site. The term bursting charge is generally used by the DoD for conventional ordnance applications. These charges are used as the principal source of energy to drive metals, generate fragments or create blast overpressures depending on their specific design requirements. Main charge applications generally require large quantities of HE ranging from a few pounds to, in some cases, several hundred pounds. Processing and operational limits are further restricted by quantity distance requirements and the type of HE formulation and their safety properties. All secondary HEs require more energy for initiation than primary HEs. Within the HE formulations used for main charge applications, some are more sensitive than others. In a few cases these same materials are used for booster applications. The quantity of these materials are restricted depending on sensitivity

and design applications, in operation specific SOPs. All HEs in this class will detonate if they receive strong enough shock pressures from an impact or from a booster HE. When exposed to a fire, they will burn without detonating unless confined. The normal method of disposal is by open air burning. HEs such as TNT, Baratol, Cyclotols and most PBXs are used for main charge applications. Most high energy PBXs use the pure HEs (RDX and HMX) as the explosive material. These PBXs are referred to as Conventional HEs (CHEs). These materials are Class 1.1, mass detonating, per UNO requirements.

#### 2.1.4 Insensitive High Explosives (IHE)

Two secondary HEs, TATB and NQ and their PBX formulations, have been shown to be extremely insensitive and require very high levels of shock energy for these materials to react or detonate. The sensitivity or safety properties of these HEs provide a greatly increased safety margin, compared to other secondary main charge HEs, for all processing operations; however, these materials are still high explosives and are treated and handled as HEs. These types of HEs may, in some cases provide a "second chance" if severely abused by mishandling or misapplication of unintended energy, while other HE formulations may not afford a second chance. These IHEs are also used for main charge applications similar to the other secondary main charge explosives. The IHEs are typically initiated with a booster train, including a detonator and booster pellet, providing a strong shock input pressure. When exposed to a fire, these materials also burn without detonating in unconfined geometry's and are typically disposed of by open air burning. The TATB, NQ and PBX formulations are also Class 1.1 materials per the UNO requirements.

## 2.2 Health Hazards

Most of the explosives processed at S-Site present a possible health hazard. For this reason, one must avoid taking them into the body through either the mouth, lungs, or skin. ESH Division and ESA-FM Industrial Hygiene and safety personnel are aware of these hazards and keep site personnel informed of the allowable exposures for the various operating conditions, as well as, recommending the proper protective equipment such as respirators, gloves, etc. as required for a specific operation.

## 2.3 Compatibility with Other Materials

2.3.1 There are times when HEs are mixed with other materials or come in contact with non-HE materials that cause the HE to become less stable and increase its sensitivity, creating an unsafe condition. The non-HE material is said to be incompatible with the HE. As an example many commercial adhesives contain amine compounds which can react with HEs during the curing process and cause the HE to become less stable. Therefore, all adhesives to be used with HEs must be checked for compatibility before use. Other materials such as mold releases and potting compounds that come in direct contact with HEs must be approved before use, to avoid incompatibilities.

2.3.2 To help assess material incompatibilities with HEs, compatibility safety checks are run. The results of these tests are used as a guide in using these materials and often cause the limitations to be placed on how and where these materials may be used. A list of acceptable materials that may be used in specific applications is available to operating supervisors. Copies of the HE Safety Compatibility Check List (Compatibility Approval Index) can be found in the ESA-WMM Group Office or from the ESA-WMM Materials Team Leader. WMM SOP 11.5.0, Table 3, lists compatible adhesives that may be used with HEs. When the material in question does not appear on the list or its use is limited and there is a requirement for its use, additional safety compatibility checks should be requested. The Group DX-2 Analytical Laboratory Request for HE Safety Compatibility Check form shall be submitted along with a sample to the DX-2 Analytical Laboratory Team Leader. Upon completion of evaluation and testing (if required), DX-2 will submit their recommendations and restrictions to the ESA-WMM requester and ESA-WMM management, for approval for use of the material at S-Site.

## 2.4 HE Lot/Batch Approval

Before any explosive material can be used or processed at S-Site, each lot or batch must be identified analytically by the DX-2, Analytical Laboratory. Signed copies of the approved Material Release Memo must be furnished to the operating personnel of Groups DX-2 and ESA-WMM before the identified material is used or processed.

### **3.0 Explosives Operations**

#### **3.1 Explosives Area**

All activities at S-Site that involve explosives are conducted in the High Explosives Exclusion Area (HEEA), except laundry, transportation to and from other sites and Class 1.4 HE operations conducted at TA-16-207. Explosives must not be removed from the HEEA, except for those transported to other locations per ESA-WMM delivery orders or Laboratory shipping requests. Minimal HE contamination in the form of fine dust particles on issued apparel and HE transportation vehicles are permitted to be removed from the HEEA as a part of normal day-to-day operations. Transportation of explosives to and from the S-Site HEEA must be through the K-Site road gate near Building TA-16-220.

#### **3.2 Administrative Area (see WMM SOP 1.0.0 for definition)**

Explosives are not allowed in the Administrative Area except for minimal contamination in the form of fine dust particles on issued apparel or HE transportation vehicles. The issued apparel is cleaned in the ESA-WMM laundry in Building TA-16-193. Although the quantity of explosives involved is very small, these operations are also governed by SOPs. HE transportation vehicles must not contain visible amounts of explosives when driven or parked in the Administrative Area. Delivery of only Class 1.4 HE materials to building TA-16-207 is permitted.

#### **3.3 All equipment and nonexplosive materials removed from the Explosives Area and brought into the Administrative Area, or taken off-site through Security Posted Guard Stations or K-Site road gate near TA-16-220, must be certified clean of explosives by a Certifying Agent; exceptions are noted in Section 3.1, above. HE transportation vehicles must be certified clean before they are sent off-site for maintenance or repairs or are released to another organization (reference WMM SOP 1.8.2).**

### **4.0 ALLOWABLE EXPLOSIVES AT S-SITE**

Explosives that may be processed at S-Site are called allowable explosives and fall into the categories of established explosives, developmental explosives and detonators. In some cases, nonexplosive additives are incorporated into these explosives. These additives are usually included in the allowable explosives in the individual SOP for a given operation.

#### 4.1 Established Explosives

Some of these explosives are identified by popular names or groups of letters that are widely known in the explosives and propellants industries. The other explosives, PBX and XTX, are identified by material code numbers. These material codes are four-digit numbers that are usually written with PBX or XTX preceding them. The established explosives are listed in Table 1, of this SOP along with their nominal compositions.

#### 4.2 Developmental Explosives

These are explosives that have been approved for development according to the procedures in the document "Los Alamos High Explosives Development (HED) Procedures and Authorization". These explosives are identified by an experimental code number of four digits preceded by X. The developmental explosives are listed in Table 2, of this SOP along with their nominal compositions, pertinent references, and weight limit restrictions.

#### 4.3 Detonators

##### 4.3.1 Types of Detonators

##### 4.3.1.1 High Energy

Detonators used in the test assembly devices for initiation of the main charge HEs require high energy electrical power for firing. These high energy detonators are generally divided into two types: (1) Exploding Bridge Wire (EBWs) and (2) Slappers.

4.3.1.1.1 The EBW detonators have a small amount of a pure explosive, such as PETN, placed in direct contact with an electrically conductive wire. The bridge wire explodes when high energy current is applied, which in turn initiates the explosive pellet.

4.3.1.1.2 The slapper detonator assembly contains an electrical conductive foil with a narrow bridge positioned over a cup containing a pure explosive pellet, generally PETN. The space or "air gap" between the bridge and the pellet is referred to as the "barrel". When a high

energy current is applied, the bridge explodes forming a flier plate from the insulating material around the bridge. This flier plate then travels down the barrel and "slaps" the explosive pellet resulting in initiation.

These types of detonators are insensitive to normally encountered static electrical charges and electromagnetic radiation and offer increased safety properties in handling and assembly operations. These detonators are received and handled as individual preassembly components. These detonators are not appreciably more sensitive than the other HEs used at S-Site. The EBWs and Slappers are classed as 1.4 explosive devices, per the UNO Classification. Table 3 lists the detonators approved for use at S-Site.

**4.3.1.2 Low Energy**

In certain applications, detonators that can be initiated by relatively low levels of energy are used. These detonators contain primary explosives. To preclude the possibility of accidental initiation from static charges or the accidental application of test voltages, all low-energy detonators received at S-Site will be equipped with shorting clips. These shorting clips must remain in place at all times while the detonators are under the jurisdiction of ESA-WMM personnel.

**4.3.1.3** Precautions to be taken in the assembly of devices with low-energy detonators are delineated in SOP 11.1.2. Low-energy detonators approved for use at S-Site are listed in Table 3.

**4.3.1.4 Approval for Use**

Before a new type of detonator may be ordered for use at S-Site, its design must be checked by the ESA-WMM HE Processing Team Leader or the Assembly Team Leader. Upon his recommendation, the new type detonator will be listed as an approved detonator in Table 3.

#### 4.3.1.5 Transportation and Storage

Detonators must be transported and stored in containers that are designed to prevent propagation from detonator to detonator and container to container. When detonators are installed into devices, they will be transported and stored with the devices.

#### 4.4 Squibs

Electrically fired squibs used by the ESA-WMM Disposal Operations Team are covered under SOPs in Chapter 12. The squibs are transported and stored in the DOT-approved containers in which they are received or in the ESA-WMM approved container (13Y-100279, SOP 13.1.0). The squibs approved for these operations are DuPont S-94, ESA-WMM Code Number 225-03, or other similar DuPont S-series squibs.

#### 4.5 Munitions

Pending approval by the Explosives Review Committee (ERC), munitions with or without their fuse and arming systems can be received and stored at S-Site. The ESA-WMM HE Transportation and Handling Supervisor or the PMA Supervisor must receive documentation recording ERC approval prior to long-term storage of any munitions. In the instance that munitions are received without proper documentation, the munitions will be held in short-term storage for a period of thirty days. If written approval has not been given after thirty days, the munitions will either be returned or disposed of.

NAME OR CODE	COMPOSITION
AI/ANFO <sup>a</sup>	Ammonium nitrate/fuel oil//aluminum powder
AN	Ammonium nitrate
ANFO	Ammonium nitrate/fuel oil
Baratol	75 wt% Barium nitrate/25 wt% TNT
BDNPA	Bis(dinitropropyl) acetal
BDNPF	Bis(dinitropropyl) formal
Black powder	74 wt% Potassium nitrate/15.6 wt% charcoal/10.4 wt% sulfur
Boracitol	60 wt% Boric acid/40 wt% TNT
BTX <sup>b</sup>	5,7-Dinitro-1-picrylbenzotriazole
Composition A-3	91 wt% RDX/9 wt% beeswax
Composition A-4	97 wt% RDX/3 wt% beeswax
Composition A-5	98.5 wt% RDX/1.5 wt% beeswax
Composition B and B-3	60 wt% RDX/40 wt% TNT
Composition C-3	88 wt% RDX/12 wt% wax
Composition C-4	91 wt% RDX/2.1 wt% polyisobutylene/1.6 wt% motor oil/ 5.3 wt% di(2-ethylhexyl) sebacate
Cyclotol, 75/25	75 wt% RDX/25 wt% TNT
Cyclotol, 70/30	70 wt% RDX/30 wt% TNT
DATB	Diaminotrinitrobenzene
DBA-1 (a)	AN/NaNO <sub>3</sub> /TNT/H <sub>2</sub> O/thickener
Detasheet C	63 wt% PETN/8 wt% NC/29 wt% elastomeric binder
Detasheet D	75 wt% PETN/25 wt% elastomeric binder <b>NOTE: Although this material may be red in color, it is an explosive and not an inert material</b>
DINGU	Dinitroglycoluril
DNPA	2,2-Dinitropropyl acrylate polymer
DNT	Dinitrotoluene
EDC-8 <sup>c</sup>	76 wt% PETN/24 wt% Silicone rubber, MS 2420
EDC-28 <sup>d</sup>	94 wt% RDX/6 wt% FPC 461
EDC-32 <sup>e</sup>	85 wt% HMX/15 wt % Viton A
EDC-37 <sup>f</sup>	91 wt% HMX/1 wt% nitrocellulose/8 wt% K-10 liquid
EDC-38 <sup>g</sup>	94.5 wt% HMX/3.5 wt% K-10 Liquid/2 wt% Polyurethane
HBX-1	40 wt% RDX/38 wt% TNT/17 wt% Al/5 wt% Wax/ 0.5 wt% CaCl <sub>2</sub>
High Energy Propellants <sup>h</sup>	Solid propellants generally used in missile systems
HMX	Cyclotetramethylenetetranitramine
HNS	Hexanitrostilbene

<sup>a</sup> For transportation only to and from DX and ESA Division Groups and storage by Group ESA-WMM.

<sup>b</sup> For transportation only - SEE HED-037

<sup>c</sup> EDC-8 is the United Kingdom's version of XTX-8003

<sup>d</sup> EDC-28 is the United Kingdom's version of PBX 9407

<sup>e</sup> EDC-32 is the United Kingdom's version of LX-04

<sup>f</sup> For shipping, storage and experimental evaluation of quantities less than 5 g and for assembly of finished charges into test devices only.

<sup>g</sup> For shipping, storage, and analytical evaluation of molding powder and assembly of finished pieces into test devices.

<sup>h</sup> After approval by the Explosives Development Committee

NAME OR CODE	COMPOSITION
K-10 <sup>1</sup>	65.3 wt% dinitroethylbenzene/34.7 wt% trinitroethylbenzene
LX-04	85 wt% HMX/15 wt% Viton A
LX-07	90 wt% HMX/10 wt% Viton A
LX-14	95.5 wt% HMX/4.5 wt % Estane 5702 F-1
Methane/oxyben (i)	Explosive mixtures of methane and oxygen gases
NC	Nitrocellulose, cellulose nitrate
Nitromethane	Nitromethane
NQ	Nitroguanidine
NTO	1,2,4-nitro-triazole-5-one
Octol	75 wt% HMX/25 wt% TNT
PBX-9001	90 wt% RDX/8.5 wt% polystyrene/1.5 wt% dioctylphthalate
PBX-9007	90 wt% RDX/9.1 wt% polystyrene/0.5 wt% dioctylphthalate/ 0.4 wt % resin
PBX-9010	90 wt% RDX/10 wt% Kel-F 3700 elastomer
PBX-9011	90 wt% HMX/10 wt% Estane 5703 F-1
PBX-9205	92 wt% RDX/6 wt% polystyrene/2 wt% dioctylphthalate
PBX-9206	92 wt% HMX/8 wt% Kel-F 3700 elastomer
PBX-9401	94.2 wt% RDX/3.6 wt% polystyrene/2.2 wt% trioctyl phosphate
PBX-9404	94 wt% HMX/3 wt% nitrocellulose/3 wt% chloroethyl phosphate
PBX-9405	94 wt% RDX/3 wt% nitrocellulose/3 wt% chloroethyl phosphate
PBX-9407	94 wt% RDX/6 wt% Exon 461
PBX-9501	95 wt% HMX/2.5 wt% Estane/2.5 wt% BDNPA/F
PBX-9502	95 wt% TATB/5 wt% Kel-F 800
PBX-9503	80 wt% TATB (Class 2)/15 wt% HMX (Class 2)/5 wt% Kel-F 800
PBXW-113	88 wt% HMX/12 wt% rubber/plasticizer binder
Pentolite	50 wt% PETN/50 wt% TNT
PETN	Pentaerythritol tetranitrate
Picric Acid	DuPont 85 wt% pure
PYX	2,6-Bis(picrylamino)-3,5-dinitropyridine
RDX	Cylonite, cyclotrimethylenetrinitramine
Smokeless Powder (Single Base)	Standard Military grades. Single or multi-perforated grains of colloided nitrocellulose. Stabilizers, plasticizers, inorganic nitrates, and other modifying agents may also be present.
Smokeless Powder (Double Base)	Standard Military grades. Single or multi-perforated grains of colloided nitrocellulose containing nitroglycerin or nitroglycol. Stabilizers, plasticizers, inorganic nitrates, and other modifying agents may also be present.
STRATABLAST C (a)	Slurry blasting explosive
TAGN (i)	Triaminoguanidine nitrate
TAL-1005E (a)	Slurry blasting explosive
TATB	Triaminotrinitrobenzene
Tetryl	2,4,6-Trinitrophenylmethyl nitramine
TNS	Trinitrostilbene

<sup>1</sup> For shipping, storage and experimental evaluations on less than 5 g quantities.

( ) With letter inserted is cross-reference to footnote.

NAME OR CODE	COMPOSITION
TNT	Trinitrotoluene
TNT/NC	80 wt% TNT/20 wt% NC
TPM	Tripicrylmelamine
Tritonal	80 wt% TNT/20 wt% aluminum powder
XTX-8003	80 wt% Recrystallized PETN/20 wt% Sylgard 182
XTX-8004	80 wt% RDX/20 wt% Sylgard 182

Reviewed on April 2, 1998 - NO CHANGES

Reviewed by: Larry E Hatler DATE: 4/2/98  
Larry Hatler  
ESA-WMM HE Processing Team Leader

## TABLE 2 DEVELOPMENTAL EXPLOSIVES

The explosives listed in this table have been approved for development according to the procedures in "Group - High Explosives Development Procedures and Authorization". Any limitations or special instructions relative to these explosives, other than those contained in the Safe Operating Procedures (SOPs) will be found in the referenced High Explosives Development Proposal (HED). Any such limitations or instructions must be observed, in addition to, and in the same manner as those in the appropriate SOPs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0001	HMX Indowax 170/175	86.1 13.9	001	5 lbs.
X-0002	HMX Indowax 170/175	89.2 10.8	001	5 lbs.
X-0003	HMX Indowax 170/175	92.1 7.9	001	5 lbs.
X-0004	HMX Indowax 170/175	94.9 5.1	001	5 lbs.
X-0005	HMX Indowax 170/175	97.5 2.5	001	5 lbs.
X-0006	HMX Estane 5740X-2	82.6 17.4	001	5 lbs.
X-0007	HMX Estane 5740X-2	86.4 13.6	001	1500 lbs.
X-0009	HMX Estane 5740X-2	93.4 6.6	001	1500 lbs.
X-0010	HMX Estane 5740X-2	96.8 3.2	001	5 lbs.
X-0011	HMX CPR 1-46A	82.6 17.4	001	5 lbs.
X-0012	HMX CPR 1-46A	86.4 13.6	001	5 lbs.
X-0013	HMX CPR 1-46A	90.0 10.0	001	5 lbs.
X-0014	HMX CPR 1-46A	93.4 6.6	001	5 lbs.
X-0015	HMX CPR 1-46A	96.8 3.2	001	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0016	HMX CPR 1-46C	82.6 17.4	001	5 lbs.
X-0017	HMX CPR 1-46C	86.4 13.6	001	5 lbs.
X-0018	HMX CPR 1-46C	90.0 10.0	001	5 lbs.
X-0019	HMX CPR 1-46C	93.4 6.6	001	5 lbs.
X-0020	HMX CPR 1-46C	96.8 3.2	001	5 lbs.
X-0021	HMX Halowax 1001	78.3 21.7	001	5 lbs.
X-0022	HMX Halowax 1001	82.8 17.2	001	5 lbs.
X-0023	HMX Halowax 1001	87.2 12.8	001	5 lbs.
X-0024	HMX Halowax 1001	91.5 8.5	001	5 lbs.
X-0025	HMX Halowax 1001	95.8 4.2	001	5 lbs.
X-0026	HMX Halowax 1013	77.3 22.7	001	5 lbs.
X-0027	HMX Halowax 1013	82.0 18.0	001	5 lbs.
X-0028	HMX Halowax 1013	86.6 13.4	001	5 lbs.
X-0029	HMX Halowax 1013	91.1 8.9	001	5 lbs.
X-0030	HMX Halowax 1013	95.6 4.4	001	5 lbs.
X-0031	HMX Halowax 1014	76.2 23.8	001	5 lbs.
X-0032	HMX Halowax 1014	81.0 19.0	001	5 lbs.
X-0033	HMX Halowax 1014	85.8 14.2	001	5 lbs.
X-0034	HMX Halowax 1014	90.6 9.4	001	5 lbs.
X-0035	HMX Halowax 1014	95.3 4.7	001	5 lbs.

<b>CODE NUMBER</b>	<b>NOMINAL COMPOSITION</b>	<b>WEIGHT %</b>	<b>HED</b>	<b>WEIGHT LIMIT</b>
X-0036	HMX Halowax 1051	74.0 26.0	001	5 lbs.
X-0037	HMX Halowax 1051	79.2 20.8	001	5 lbs.
X-0038	HMX Halowax 1051	84.3 15.7	001	5 lbs.
X-0039	HMX Halowax 1051	89.5 10.5	001	5 lbs.
X-0040	HMX Halowax 1051	94.8 5.2	001	5 lbs.
X-0041	HMX Epolene LV	86.0 14.0	001	5 lbs.
X-0042	HMX Epolene LV	89.1 10.9	001	5 lbs.
X-0043	HMX Epolene LV	92.1 7.9	001	5 lbs.
X-0044	HMX Epolene LV	94.9 5.1	001	5 lbs.
X-0045	HMX Epolene LV	97.5 2.5	001	5 lbs.
X-0046	HMX Epolene HD	85.9 14.1	001	5 lbs.
X-0047	HMX Epolene HD	89.0 11.0	001	5 lbs.
X-0048	HMX Epolene HD	92.0 8.0	001	5 lbs.
X-0049	HMX Epolene HD	94.8 5.2	001	5 lbs.
X-0050	HMX Epolene HD	97.5 2.5	001	5 lbs.
X-0051	HMX Chlorowax 70	77.6 22.4	001	5 lbs.
X-0052	HMX Chlorowax 70	82.2 17.8	001	5 lbs.
X-0053	HMX Chlorowax 70	86.7 13.3	001	5 lbs.
X-0054	HMX Chlorowax 70	91.2 8.8	001	5 lbs.
X-0055	HMX Chlorowax 70	95.6 4.4	001	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0056	HMX Kel-F Wax 200	73.0 27.0	001	5 lbs.
X-0057	HMX Kel-F Wax 200	78.3 21.7	001	5 lbs.
X-0058	HMX Kel-F Wax 200	83.6 16.4	001	5 lbs.
X-0059	HMX Kel-F Wax 200	89.0 11.0	001	5 lbs.
X-0060	HMX Kel-F Wax 200	94.5 5.5	001	5 lbs.
X-0061	HMX Kel-F Elastomer L1107	75.5 24.5	001	5 lbs.
X-0062	HMX Kel-F Elastomer L1107	80.4 19.6	001	5 lbs.
X-0063	HMX Kel-F Elastomer L1107	85.3 14.7	001	5 lbs.
X-0064	HMX Kel-F Elastomer L1107	90.2 9.8	001	5 lbs.
X-0065	HMX Kel-F Elastomer L1107	95.1 4.9	001	5 lbs.
X-0066	HMX Kel-F Elastomer 3700	75.5 24.5	001	5 lbs.
X-0067	HMX Kel-F Elastomer 3700	80.4 19.6	001	5 lbs.
X-0068	HMX Kel-F Elastomer 3700	85.3 14.7	001	5 lbs.
X-0069	HMX Kel-F Elastomer 3700	90.2 9.8	001	5 lbs.
X-0070	HMX Kel-F Elastomer 3700	95.1 4.9	001	5 lbs.
X-0071	HMX Exon 461	77.0 23.0	001	5 lbs.
X-0072	HMX Exon 461	81.7 18.3	001	5 lbs.
X-0073	HMX Exon 461	86.4 13.6	001	5 lbs.
X-0074	HMX Exon 461	91.0 9.0	001	5 lbs.

<b>CODE NUMBER</b>	<b>NOMINAL COMPOSITION</b>	<b>WEIGHT %</b>	<b>HED</b>	<b>WEIGHT LIMIT</b>
X-0075	HMX Exon 461	95.5 4.5	001	5 lbs.
X-0076	RDX Indowax 170/175	85.6 14.4	001	5 lbs.
X-0077	RDX Indowax 170/175	88.7 11.3	001	5 lbs.
X-0078	RDX Indowax 170/175	91.7 8.3	001	5 lbs.
X-0079	RDX Indowax 170/175	94.6 5.4	001	5 lbs.
X-0080	RDX Indowax 170/175	97.4 2.6	001	5 lbs.
X-0081	RDX Estane 5740X-2	81.9 18.1	001	5 lbs.
X-0082	RDX Estane 5740X-2	85.7 14.3	001	5 lbs.
X-0083	RDX Estane 5740X-2	89.5 10.5	001	5 lbs.
X-0084	RDX Estane 5740X-2	93.1 6.9	001	5 lbs.
X-0085	RDX Estane 5740X-2	96.6 3.4	001	5 lbs.
X-0086	RDX CPR 1-46A	81.9 18.1	001	5 lbs.
X-0087	RDX CPR 1-46A	85.7 14.3	001	5 lbs.
X-0088	RDX CPR 1-46A	89.5 10.5	001	5 lbs.
X-0089	RDX CPR 1-46A	93.1 6.9	001	5 lbs.
X-0090	RDX CPR 1-46A	96.6 3.4	001	5 lbs.
X-0091	RDX Halowax 1013	76.4 23.6	001	5 lbs.
X-0092	RDX Halowax 1013	81.2 18.8	001	5 lbs.
X-0093	RDX Halowax 1013	86.0 14.0	001	5 lbs.
X-0094	RDX Halowax 1013	90.7 9.3	001	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0095	RDX Halowax 1013	95.4 4.6	001	5 lbs.
X-0096	RDX Epolene LV	85.4 14.6	001	5 lbs.
X-0097	RDX Epolene LV	88.6 11.4	001	5 lbs.
X-0098	RDX Epolene LV	91.7 8.3	001	5 lbs.
X-0099	RDX Epolene LV	94.6 5.4	001	5 lbs.
X-0100	RDX Epolene LV	97.4 2.6	001	5 lbs.
X-0101	RDX Kel-F 3700	74.5 25.5	002	5 lbs.
X-0102	RDX Kel-F 3700	79.6 20.4	001	5 lbs.
X-0103	RDX Kel-F 3700	84.7 15.3	001	5 lbs.
X-0104	RDX Kel-F 3700	89.8 10.2	001	5 lbs.
X-0105	RDX Kel-F 3700	94.9 5.1	001	5 lbs.
X-0106	RDX Exon 461	76.1 23.9	001	5 lbs.
X-0107	RDX Exon 461	80.9 19.1	001	5 lbs.
X-0108	RDX Exon 461	85.7 14.3	001	5 lbs.
X-0109	RDX Exon 461	90.5 9.5	001	5 lbs.
X-0110	RDX Exon 461	95.3 4.7	001	5 lbs.
X-0111	HMX NQ Estane 5740X-2	94.8 0.0 5.2	002	5 lbs.
X-0112	HMX NQ Estane 5740X-2	85.9 9.9 5.2	002	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0113	HMX NQ Estane 5740X-2	76.7 18.0 5.3	002	400 lbs.
X-0114	HMX NQ Estane 5740X-2	67.6 27.1 5.3	002	5 lbs.
X-0115	HMX NQ Estane 5740X-2	58.3 36.4 5.3	002	5 lbs.
X-0116	HMX NQ Estane 5740X-2	48.9 45.8 5.3	002	5 lbs.
X-0117	HMX NQ Estane 5740X-2	39.3 55.3 5.4	002	5 lbs.
X-0118	HMX NQ Estane 5740X-2	29.7 64.9 5.4	002	400 lbs.
X-0119	HMX NQ Estane 5740X-2	19.9 74.6 5.5	002	5 lbs.
X-0120	HMX NQ Estane 5740X-2	10.0 84.5 5.5	002	5 lbs.
X-0121	HMX NQ Halowax 1013	92.9 0.0 7.1	002	5 lbs.
X-0122	HMX NQ Halowax 1013	84.1 8.8 7.1	002	5 lbs.
X-0123	HMX NQ Halowax 1013	75.2 17.6 7.2	002	5 lbs.
X-0124	HMX NQ Halowax 1013.	66.2 26.6 7.2	002	5 lbs.
X-0125	HMX NQ Halowax 1013	57.1 35.6 7.3	002	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0126	HMX NQ Halowax 1013	47.9 44.8 7.3	002	5 lbs.
X-0127	HMX NQ Halowax 1013	38.5 54.1 7.4	002	5 lbs.
X-0128	HMX NQ Halowax 1013	29.1 63.5 7.4	002	5 lbs.
X-0129	HMX NQ Halowax 1013	19.5 73.1 7.4	002	5 lbs.
X-0130	HMX NQ Halowax 1013	9.8 82.7 7.5	002	5 lbs.
X-0131	HMX NQ Exon 461	92.8 0.0 7.2	002	5 lbs.
X-0132	HMX NQ Exon 461	84.0 8.7 7.3	002	5 lbs.
X-0133	HMX NQ Exon 461	75.1 17.6 7.3	002	5 lbs.
X-0134	HMX NQ Exon 461	66.1 26.5 7.4	002	5 lbs.
X-0135	HMX NQ Exon 461	57.0 35.6 7.4	002	5 lbs.
X-0136	HMX NQ Exon 461	47.8 44.8 7.4	002	5 lbs.
X-0137	HMX NQ Exon 461	38.5 54.0 7.5	002	5 lbs.
X-0138	HMX NQ Exon 461	29.0 63.5 7.5	002	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0139	HMX NQ Exon 461	19.5 72.9 7.6	002	5 lbs.
X-0140	HMX NQ Exon 461	9.8 82.6 7.6	002	5 lbs.
X-0142	HMX DATB Estane 5740X-2	90.2 4.6 5.2	004	5 lbs.
X-0143	HMX DATB Estane 5740X-2	85.6 9.2 5.2	004	400 lbs.
X-0144	HMX DATB Estane 5740X-2	76.3 18.5 5.2	004	400 lbs.
X-0145	HMX DATB Estane 5740X-2	67.0 27.8 5.2	004	400 lbs.
X-0146	HMX DATB Estane 5740X-2	57.7 37.1 5.2	004	400 lbs.
X-0147	HMX DATB Estane 5740X-2	48.2 46.5 5.3	004	400 lbs.
X-0148	HMX DATB Estane 5740X-2	38.6 56.1 5.3	004	5 lbs.
X-0149	HMX DATB Estane 5740X-2	29.1 65.6 5.3	004	5 lbs.
X-0150	HMX DATB Estane 5740X-2	19.5 75.2 5.3	004	5 lbs.
X-0151	HMX DATB Estane 5740X-2	9.7 84.9 5.4	004	5 lbs.
X-0152	HMX DATB Estane 5740X-2	4.9 89.7 5.4	004	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0154	HMX DATB Halowax 101	88.4 4.5 37.1	004	5 lbs.
X-0155	HMX DATB Halowax 1013	83.9 9.0 7.1	004	5 lbs.
X-0156	HMX DATB Halowax 1013	74.8 18.1 7.1	004	5 lbs.
X-0157	HMX DATB Halowax 1013	65.6 27.2 7.2	004	5 lbs.
X-0158	HMX DATB Halowax 1013	56.4 36.4 7.2	004	5 lbs.
X-0159	HMX DATB Halowax 1013	47.2 45.6 7.2	004	5 lbs.
X-0160	HMX DATB Halowax 1013	37.9 54.9 7.2	004	5 lbs.
X-0161	HMX DATB Halowax 1013	38.5 64.2 7.3	004	5 lbs.
X-0162	HMX DATB Halowax 1013	19.0 73.7 7.3	004	5 lbs.
X-0163	HMX DATB Halowax 1013	9.6 83.1 7.3	004	5 lbs.
X-0164	HMX DATB Halowax 1013	4.8 87.9 7.3	004	5 lbs.
X-0165	HMX DATB KFE 3700	92.2 0.0 7.8	004	5 lbs.
X-0166	HMX DATB KFE 3700	87.7 4.5 7.8	004	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0167	HMX DATB KFE 3700	83.3 8.9 7.8	004	5 lbs.
X-0168	HMX DATB KFE 3700	74.2 17.9 7.9	004	5 lbs.
X-0169	HMX DATB KFE 3700	65.1 27.0 7.9	004	400 lbs.
X-0170	HMX DATB KFE 3700	56.0 36.1 7.9	004	5 lbs.
X-0171	HMX DATB KFE 3700	46.8 45.3 7.9	004	5 lbs.
X-0172	HMX DATB KFE 3700	37.6 54.5 7.9	004	5 lbs.
X-0173	HMX DATB KFE 3700	28.3 63.7 8.0	004	400 lbs.
X-0174	HMX DATB KFE 3700	18.9 73.1 8.0	004	5 lbs.
X-0175	HMX DATB KFE 3700	9.5 82.5 8.0	004	5 lbs.
X-0176	HMX DATB KFE 3700	4.8 87.2 8.0	004	5 lbs.
X-0177	75/25 Cyclotol $\alpha$ -nitronaphthalene	99.7 0.3	003	40 lbs.
X-0178	75/25 Cyclotol $\alpha$ -nitronaphthalene	99.6 0.4	003	40 lbs.
X-0179	75/25 Cyclotol $\alpha$ -nitronaphthalene	99.5 0.5	003	40 lbs.
X-0180	HMX NQ KFE 3700	92.2 0.0 7.8	002	5 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0181	HMX NQ KFE 3700	83.5 8.7 7.8	002	5 lbs.
X-0182	HMX NQ KFE 3700	74.6 17.5 7.9	002	5 lbs.
X-0183	HMX NQ KFE 3700	65.7 26.4 7.9	002	400 lbs.
X-0184	HMX NQ KFE 3700	56.6 35.4 8.0	002	5 lbs.
X-0185	HMX NQ KFE 3700	47.5 44.5 8.0	002	5 lbs.
X-0186	HMX NQ KFE 3700	38.2 53.7 8.1	002	5 lbs.
X-0187	HMX NQ KFE 3700	28.8 63.1 8.1	002	5 lbs.
X-0188	HMX NQ KFE 3700	19.3 72.5 8.2	002	5 lbs.
X-0189	HMX NQ KFE 3700	9.7 82.1 8.2	002	5 lbs.
X-0190	RDX KFE 3700 Beeswax w/Alox	89.11 9.90 0.99	006	300 lbs.
X-0191	HMX NC CEF Beeswax w/Alox	93.14 2.97 2.90 0.99	006	500 lbs.
X-0192 (LX-04)	HMX Viton	85.0 15.0	007	1000 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0193	Experimental detonating fuse Explosives. Compositions range from HMX Sylgard 182 HMX Sylgard 182	73.1 26.9 98.9 1.1	008	Footnote <sup>1</sup>
X-0194	Experimental detonating fuse Explosives. Compositions range from PETN Sylgard 182 PETN Sylgard 182	70.0 30.0 80.0 20.0	008 $\Phi 3$ <sup>2</sup> Add 2 <sup>3</sup>	20 lbs.
X-0195	HMX DATB Estane	55.9 36.1 8.0	004	400 lbs.
X-0196	HMX DATB Estane	56.8 36.6 6.6	004	400 lbs.
X-0197	HMX Teflon	88.7 11.3	001	5 lbs.
X-0198	HMX Teflon	67.1 32.9	001	5 lbs.
X-0199	HMX Teflon w /wax and Alox	89.7 10.3	001	5 lbs.
X-0200	HMX Teflon w/wax and Alox	67.4 32.6	001	5 lbs.
X-0201	TNT RDX	60.0 40.0	009	200 lbs.
X-0202	Barium Nitrate TNT	40.0 60.0	005	800 lbs.
X-0204	HMX Teflon	83.2 16.8	001 Add 8	1000 lbs.
X-0205	HMX Teflon w/wax and Alox	84.2 15.8	001 Add 8	1000 lbs.

<sup>1</sup> Weight limit for any given composition is 500 grams. Within this limit, material may be replaced as cross-linked batches and are sent for disposal.

<sup>2</sup> Phase =  $\Phi$

<sup>3</sup> Addendum - Add

<b>CODE NUMBER</b>	<b>NOMINAL COMPOSITION</b>	<b>WEIGHT %</b>	<b>HED</b>	<b>WEIGHT LIMIT</b>
X-0206	HMX Nitroso elastomer	84.2 15.8	011	150 lbs.
X-0207	HMX Sylgard 182	80.0 20.0	008	20 lbs.
X-0208	RDX Sylgard 182	80.0 20.0	008	20 lbs.
X-0209	HMX Elvax 460 Be-Square 170/175 wax	95.50 2.25 2.25	012	1000 lbs.
X-0210	HMX Estane BDNPF	94.10 2.95 2.95	013	1000 lbs.
X-0211 LX-07	HMX Viton A	90.0 10.0	014 Add 1	500 lbs.
X-0212	HMX CPR X9B-78B	90.0 10.0	015	1000 lbs.
X-0213	HMX Estane BDNPF Be-Square 170/175 wax	94.6 2.0 2.0 1.4	016	1000 lbs.
X-0214	HMX Viton A	90.0 10.0	017	1000 lbs.
X-0215	HMX Viton A Beeswax	90.0 8.5 1.5	017	1000 lbs.
X-0217	HMX DNPA BDNPF BDNPA Wax Surface Active Agents	25-94 0-50 0-50 0-50 0-5 0-0.25	019	1000 lbs.
X-0218	HMX Hallowax 1014 Hydrocarbon Waxes Alox Estane Surface Active Agents	90-95 0-10 0-5 0-2 0-2 0-1	020	1000 lbs.
X-0219	TATB HMX Kel-F 800	0-92 0-92 9-15	021	5000 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0220	DATB Urea-formaldehyde Microballoons Epoxy resin/chlorendic anhydride	40-60 20-40 10-30	022	200 lbs.
X-0221	RDX Urea-formaldehyde Microballoons Epoxy resin/chlorendic anhydride	40-60 20-40 10-30	022	See HED-022, V. D.
X-0222	DATB Phenol-formaldehyde Microballoons Epoxy resin/chlorendic anhydride	30-60 20-50 10-30	022	See HED-022, V. D.
X-0223	RDX Phenol-formaldehyde Microballoons Epoxy resin/chlorendic anhydride	30-60 20-50 10-30	022	See HED-022, V. D.
X-0224	RDX Aluminum Be-Square 170/175 wax Elvax 460 Coating compounds	74.0 20.0 5.4 0.1 0-0.5	023	4000 lbs. Uncoated  2000 lbs. Coated
X-0225	HMX DNPA FEFO	94.0 3.5 2.5	024	1000 lbs.
X-0226	RDX Estane	80-90 20-10	001	See HED-001 Add 9, VI. C.
EDC-8	PETN RTV Silicone	76.0 24.0	025	See HED-025 IV. E.
X-0227	Nitroguanidine Kel-F elastomer	70-100 0-30	026	1000 lbs.
X-0228	Nitroguanidine Estane 5703	70-100 0-30	026	1000 lbs.
X-0229	Nitroguanidine DNPA polymer BDNPF/A nitroplasticizer	70-100 0-18 0-12	026	1000 lbs.
X-0230	RDX Be-square 170/175 wax-Elvax 460	94.0 6.0	023	See HED-023 Add 1, V.C.
X-0231	HMX Tungsten Exon 461 Plasticizer	5-40 40-95 0-10 0-5	027	See HED-027 VI. D.
X-0232	HMX Tungsten Kel-F Plasticizer	5-40 40-95 0-10 0-5	027	See HED-027 VI. D.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0233	HMX Tungsten Polystyrene Plasticizer	5-40 40-95 0-10 0-5	027	See HED-027 VI. D.
X-0234	HMX DNPA CEF Surface-active agents	90-95 0-10 0-5 0-0.5	019	See HED-019 VI. D.
X-0235	HMX DNPA BDNPF/BDNPA Estane Surface active agents	90-95 0-10 0-10 0-5 0-0.5	019	See HED 019 VI. D.
X-0236	TATB Polystyrene-DOP Surface active agents	≤95 ≥5 ≤1	028	See HED-028 V. D.
X-0237	TATB Wax-Elvax Surface active agents	≤95 ≥5 ≤1	028	See HED-028 V. D.
X-0238	TATB Estane Surface active agents	≤95 ≥5 1	028	See HED 028 V. D.
X-0239	HMX Tungsten Estane Plasticizer	5-40 40-95 0-10 0-5	027	See HED-027 VI.D.
X-0240 LX-10	HMX Viton	95.0 5.0	029	See HED-029 IV
X-0241	Nitroguanidine Wax-Elvax	90-100 0-10	026 Add 1	1000 lbs.
X-0242	HMX BDNPF/A Estane Calcium Stearate	90-95 0-5 0-5 0-0.5	013 Add 2	5000 lbs.
X-0243	DATB Polystyrene DOP	≤95 ≥5	028 Add 1	500 lbs.
X-0244	DATB Polystyrene TOF	≤95 ≥5	028 Add 1	500 lbs.

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0245	DATB Wax Elvax	≤95 ≥5	028 Add 1	500 lbs.
X-0246	DATB Estane	≤95 ≥5	028 Add 1	500 lbs.
X-0247	DATB Kel-F	≤95 ≥5	028 Add 1	500 lbs.
X-0248	DATB DNPA/BDNPA-F	≤95 ≥5	028 Add 1	500 lbs.
X-0249	RDX Sylgard 182 Barium carbonate	≤42.9 0-40 0-70	008 Add 1	5 lbs.
X-0250	RDX Sylgard 182 Cyanuric acid	≤57.5 0-40 0-70	008 Add 1	5 lbs.
X-0251	DATB Sylgard 182 Barium carbonate	≤42.6 0-40 0-70	008 Add 1	5 lbs.
X-0252	DATB Sylgard 182 Cyanuric acid	≤57.1 0-40 0-70	008 Add 1	5 lbs.
X-0253	TATB Dapon M	≤95 ≥5	028 Add 2	500 lbs.
X-0254	RDX Estane Barium Carbonate	≤47.3 ≥6.3 ≥46.4	030	5 lbs.
X-0255	RDX Estane Oxamide	≤66.5 ≥8.9 ≥24.6	030	5 lbs.
X-0256	RDX Viton Barium Carbonate	≤45.7 ≥9.4 ≥44.9	030	5 lbs.
X-0257	RDX Viton Oxamide	≤63.5 ≥13.0 ≥23.5	030	5 lbs.
X-0258	RDX Polystyrene DOP Barium Carbonate	≤47.7 ≥4.1 ≥1.4 ≥46.8	030	5 lbs.

<b>CODE NUMBER</b>	<b>NOMINAL COMPOSITION</b>	<b>WEIGHT %</b>	<b>HED</b>	<b>WEIGHT LIMIT</b>
X-0259	RDX Polystyrene DOP Oxamide	≤67.4 ≥5.8 ≥1.9 ≥24.9	030	5 lbs.
X-0260	RDX Wax Elvax Barium Carbonate	≤47.9 ≥2.9 ≥2.9 ≥47.1	030	5 lbs.
X-0261	RDX Wax Elvax Oxamide	≤67.9 ≥3.6 ≥3.5 ≥25.0	030	5 lbs.
X-0262	DATB Estane Barium Carbonate	≤47.0 ≥6.3 ≥46.7	030	5 lbs.
X-0263	DATB Estane Oxamide	≤66.3 ≥8.9 ≥24.8	030	5 lbs.
X-0264	DATB Viton Barium Carbonate	≤45.4 ≥9.4 ≥24.8	030	5 lbs.
X-0265	DATB Viton Oxamide	≤63.2 ≥13.1 ≥23.7	030	5 lbs.
X-0266	DATB Polystyrene DOP Barium Carbonate	≤47.4 ≥4.1 ≥1.4 ≥47.1	030	5 lbs.
X-0267	DATB Polystyrene DOP Oxamide	≤67.1 ≥5.8 ≥2.0 ≥25.1	030	5 lbs.
X-0268	DATB Wax Elvax Barium Carbonate	≤47.6 ≥2.5 ≥2.5 ≥27.4	030	5 lbs.

<b>CODE NUMBER</b>	<b>NOMINAL COMPOSITION</b>	<b>WEIGHT %</b>	<b>HED</b>	<b>WEIGHT LIMIT</b>
X-0269	DATB Wax Elvax Oxamide	≤67.6 ≥3.6 ≥3.5 ≥25.3	030	5 lbs.
X-0270	RDX Exon	50-85 15-50	022 Add 3	200 lbs.
X-0271	Barium Nitrate TNT Decylgallophenone or Nitrocellulose	~76.0 ~24.0 ~0.5	031	2000 lbs.
X-0272	HMX TATB Estane Calcium Stearate	≤95 0-10 0-5 0-0.5	013 Add 3	500 lbs.
X-0273	HMX DATB Kel-F	≤92.0 ≤92.0 8-15	021 Add 1	500 lbs.
X-0274	RDX TNT AN (Ammonium Nitrate) Compatible surface active agent	0-60 35-100 0-70 0-2	032 Add 1	1000 lbs.
X-0275	TATB TNT Aluminum	40 40 20	033	50 kg
X-0276	RDX Copper Be-square wax Elvax	59.5 35.9 4.1 0.5	023 Add 3	50 kg
X-0277	RDX Iron Be-square wax Elvax 460	62.2 33.0 4.3 0.5	023 Add 3	50 kg
X-0278	RDX Barium Nitrate Be-square wax Elvax	42.2 52.9 4.4 0.5	023 Add 3	50 kg
X-0279	RDX Cesium Nitrate Be-square wax Elvax	54.1 40.8 4.6 0.5	023 Add 3	50 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0280	RDX Estane	95.0 5.0	013 Add 5	250 kg
X-0281	RDX Estane BDNPA/F	95.0 2.5 2.5	013 Add 5	150 kg
X-0282	HMX Estane	95.5 5.5	034 Φ 3	500 kg
X-0283	HMX Viton Kel-F elastomer various plasticizers	≤95.0 2.5-10.0 2.5-10.0 2.5-5.0	029 Φ 3 Add 1	500 kg
X-0284	RDX TNT AN/Potassium Nitrate Compatible surface active agents	0-60 35-100 0-70 0-2	032 Φ 3 Add 2	500 kg
X-0285	HMX Vibrathane	95.5 4.5	034 Φ 3 Add 1	500 kg
X-0286	HMX Kraton High-vacuum oil plasticizer	97±0.5 1.35 1.65	035 Φ 3	250 kg
X-0287	HMX Kraton B3 wax	97.4±0.5 1.43 1.17	035 Φ 3 Add 1	250 kg
X-0288	HMX Fluorolube MO-10 Cab-O-Sil	≤75.0 ≥22.0 ≤3.0	008 Φ 2 Add 2	5 kg
X-0289	HMX Fluorolube LG-260 Cab-O-Sil	≤75.0 ≥22.0 ≤3.0	008 Φ 2 Add 2	5 kg
X-0290	TATB Kel-F 800	95.0 5.0	021 Φ 3 Add 7	2000 kg
X-0291	TATB Kel-F 800	92.5 7.5	021 Φ 3 Add 5	500 kg
X-0292	TATB Vibrathanes	92-98 2-8	021 Φ 3 Add 5	500 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0293	RDX AN	40±2 60±2	036 Φ 3	45.4 kg
X-0294	RDX AN MAN	40±2 45±2 15±2	036 Φ 3	45.4 kg
X-0295	RDX AN MAN	40±2 30±2 30±2	036 Φ 3	45.4 kg
X-0296	TATB Kraton	90-99 10-1	021 Φ 3 Add 5	500 kg
X-0297	TATB Kel-F 800	97.5 2.5	021 Φ 3 Add 5	500 kg
X-0298	HMX Kraton Hyvac Oil 930503	97.50 1.12 1.38	035 Φ 3 Add 2	250 kg
X-0299	DATB Viton A 5±2	95±2 5±2	004 Φ3 Add 5	25 kg
X-0300	DATB Estane	95±2 5±2	004 Φ3 Add 5	25 kg
X-0301	RDX Viton A	95.0 5.0	029 Φ 3 Add 2	100 kg
X-0302	FKM Propellants	100	040 Φ 2	5 kg
X-0303	RDX Estane Polyester fibers	95.0 4.5 0.5	013 Φ 3 Add 7 Rev 1	2000 kg
X-0304	RDX Estane Polyester fibers	95.0 3.5 1.5	013 Φ 3 Add 7 Rev 1	2000 kg
X-0305	TATB Kel-F 800 Fluorolube plasticizer	95.0 2.5 2.5	021 Φ 3 Add 5	2000 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0306	Nitroguanidine Viton A	95.0 5.0	026 Φ3 Add 3	500 kg
X-0307	Nitroguanidine Viton A Fluorolube plasticizer	95.0 4.0 1.0	026 Φ 3 Add 3	500 kg
X-0308	RDX Estane Polyethylene fibers	95.0 4.5 0.5	013 Φ3 Add 7, R1	2000 kg
X-0309 (Destex)	TNT Aluminum 18.7 D-2 Acetylene black (carbon)	74.2 18.7 4.8 1.9	041 Φ 3	500 kg
X-0310	NQ Viton LM	95.0 5.0	026 Φ3 Add 4	100 kg
X-0311	NQ Viton 10	95.0 5.0	026 Φ 3 Add 4	100 kg
X-0312	RDX Estane Polyethylene fibers	95.0 3.5 1.5	013 Φ3 Add 7 Rev 1	100 kg
X-0313	NQ Viton A-HV	95.0 5.0	026 Φ 3 Add 4	100 kg
X-0314	NQ Viton C-10	95.0 5.0	026 Φ3 Add 4	100 kg
X-0315	NQ Viton L-31	95.0 5.0	026 Φ3 Add 4	100 kg
X-0316	NQ RDX Viton A	91.0 4.0 5.0	026 Φ 3 Add 5	1 kg
X-0317	NQ RDX Viton A	87.0 8.0 5.0	026 Φ 3 Add 5	1 kg
X-0318	HNS Sylgard 182	80.0 20.0	018 Φ 2	0.1 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0319	TATB HMX Kel-F 800	50.0 45.0 5.0	021 Φ3 Add 10	100 kg
X-0320	TATB HMX Kel-F 800	60.0 35.0 5.0	021 Φ3 Add 10	100 kg
X-0321	TATB HMX Kel-F 800	75.0 20.0 5.0	021 Φ 3 Add 10	100 kg
X-0322	Fairy Dust 2/1	100	042 Φ2	1 kg
X-0323	NQ Kraton G/Hyvac oil	95.0 5.0	026 Φ 3 Add 6	100 kg
X-0324	NQ HMX Viton A	50.0 45.0 5.0	026 Φ 3 Add 6	100 kg
X-0325	NQ HMX Viton A	60.0 35.0 5.0	026 Φ3 Add 6	100 kg
X-0326	NQ HMX Viton A	75.0 20.0 5.0	026 Φ 3 Add 6	100 kg
X-0327	NQ HMX Kraton G/Hyvac oil	50.0 45.0 5.0	026 Φ 3 Add 6	100 kg
X-0328	NQ HMX Kraton G/Hyvac oil	60.0 36.0 5.0	026 Φ3 Add 6	100 kg
X-0329	TATB Phenoxy	96.9 3.1	021 Φ 3 Add 5	227 kg
X-0330	TATB Polystyrene/polyphenylene-oxide	97.2 2.8	021 Φ 3 Add 5	227 kg
X-0331	TATB Kel-F 800	99.5 0.5	021 Φ3 Add 5	227 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0332	TATB Kel-F 800	99.0 1.0	021 Φ 3 Add 5	227 kg
X-0333	TATB Kel-F 800	98.0 2.0	021 Φ 3 Add 5	227 kg
X-0334	NQ HMX Kraton G/Hyvac oil	75.0 20.0 5.0	026 Φ 3 Add 6	100 kg
X-0335	NQ HMX Kraton G/Hyvac oil	45.0 45.0 10.0	026 Φ3 Add 6	100 kg
X-0336	NQ Polyvinyl alcohol	95.0 5.0	026 Φ 3 Add 6	100 kg
X-0337	NQ Kel-F 800	95.0 5.0	026 Φ3 Add 6	100 kg
X-0338	NQ Viton A	99.5 0.5	026 Φ3 Add 6	100 kg
X-0339	TATB Kel-F 800 Polyethylene fibers	95.0 4.5 0.5	021 Φ 3 Add 5	90.8 kg
X-0340	NQ Nylon	95.0 5.0	026 Φ 3 Add 4	3 kg
X-0341	TATB HMX Kel-F 800	90.25 4.75 5.00	021 Φ 3 Add 10	100 kg
X-0342	TATB HMX Kel-F 800	85.5 9.5 5.0	021 Φ 3 Add 10	100 kg
X-0343	TATB HMX Kel-F 800	80.75 14.25 5.00	021 Φ 3 Add 10	100 kg
X-0344	TATB HMX Kel-F 800	71.25 23.75 5.00	021 Φ 3 Add 10	90.8 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0345	TATB Kraton G Hyvac oil	97.6 1.68 0.72	021 Φ 3 Add 5	90.8 kg
X-0346	Nitromethane	100.0	043 Φ 2	5.0 lbs.
X-0347	Nitromethane Aluminum powder	80.0 20.0	043 Φ2	5.0 lbs.
X-0348	Nitromethane Aluminum powder Polymethyl methacrylate	75.0 20.0 5.0	043 Φ 2	5.0 lbs.
X-0349	TATB, Superfine HMX Kel-F 800	90.0 5.0 5.0	021 Φ3 Add 10	90.8 kg
X-0350	TATB, Superfine HMX Kel-F 800	85.0 10.0 5.0	021 Φ 3 Add 10	90.8 kg
X-0351	TATB, Superfine HMX Kel-F 800	80.0 15.0 5.0	021 Φ3 Add 10	90.8 kg
X-0352	TATB, Superfine HMX Kel-F 800	75.0 20.0 5.0	021 Φ3 Add 10	90.8 kg
X-0353	TATB, Superfine HMX Kel-F 800	92.5 5.0 2.5	021 Φ 3 Add 11	100 kg
X-0354	TATB, Superfine HMX Kel-F 800	87.5 10.0 2.5	021 Φ 3 Add 11	100 kg
X-0355	TATB, Superfine HMX Kel-F 800	82.5 15.0 2.5	021 Φ3 Add 11	100 kg
X-0356	TATB, Superfine HMX Kel-F 800	77.5 20.0 2.5	021 Φ3 Add 11	100 kg
X-0357	TATB, Superfine HMX Kel-F 800	82.5 12.5 5.0	021 Φ 3 Add 10	90.8 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0358	TATB, Superfine HMX Kel-F 800	85.0 12.5 2.5	021 Φ3 Add 11	100 kg
X-0359	TNT NQ	25-75 25-75	044 Φ 3	100 kg
X-0360	RDX Polyurethane binder	82.0 18.0	046 Φ2	3 kg
X-0361	RDX Aluminum Polyurethane binder	67.0 18.0 15.0	046 Φ2	3 kg
X-0362	ANFO Aluminum	90.0 10.0	047 Φ3	50 g
X-0363	ANFO Aluminum	80.0 20.0	047 Φ 3	50 g
X-0364	AN ADNT KN	40.4 52.4 7.2	042 Φ 2 Add 2	1 kg
X-0365	AN ADNT EDD KN	42.0 11.0 39.0 5.0	042 Φ 2 Add 2	1 kg
X-0366	AN EDD	50.0 50.0	042 Φ 2 Add 2	1 kg
X-0367	AN EDD KN	44.1 48.1 7.8	042 Φ 2 Add 2	1 kg
X-0368	EDD AN KN	50.0 42.5 7.5	048 Φ 3	25 kg
X-0369	RDX EDD AN Aluminum	14.2 40.3 40.3 5.2	048 Φ 3	25 kg
X-0370	RDX EDD AN Aluminum	12.8 36.2 36.2 14.8	048 Φ3	25 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0371	TATB HMX Estane	51.00 46.00 3.00	021 Φ 3 Add 13	100 kg
X-0372	TATB HMX Kraton/Oil	51.40 46.30 2.30	021 Φ 3 Add 13	100 kg
X-0373	TATB HMX Estane	43.00 55.00 2.00	021 Φ 3 Add 13	200 kg
X-0374	TATB HMX Kraton/Oil	43.00 55.00 2.00	021 Φ 3 Add 13	100 kg
X-0375	RDX TNT Al D-2 Wax	45.00 30.00 20.00 5.00	049 Φ3	100 kg
X-0376	TATB Oil	27.51 72.49	021 Φ 3 Add 12	3 kg
X-0377	TATB Oil	46.06 53.94	021 Φ 3 Add 12	3 kg
X-0378	TATB Oil	77.35 22.65	021 Φ 3 Add 12	3 kg
X-0379	TATB Oil	80.00 20.00	021 Φ 3 Add 12	3 kg
X-0380	TATB Oil	85.00 15.00	021 Φ 3 Add 12	3 kg
X-0381	BTX (5,7-dinitro-1-picryl-benzotriazole) Sylgard	80.00 20.00	038 Φ 2	3 kg
X-0382	NQ EDD AN RN	50.00 25.00 21.25 3.75	048 Φ 3 Add 1	500 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0383	BTF Sylgard	80.00 20.00	038 Φ 2 Add 1	500 g
X-0384	DATB Sylgard	80.00 20.00	038 Φ 2 Add 1	500 g
X-0385	PYX Sylgard	80.00 20.00	038 Φ 2 Add 1	500 g
X-0386	EDD AN RN AI	42.50 36.10 6.40 15.00	048 Φ 3 Add 2	227 kg
X-0387	EDD AN RN RDX	49.00 41.60 7.40 2.00	048 Φ 3 Add 2	227 kg
X-0388	EDD AN RN NQ AI	32.50 27.60 4.90 25.00 10.00	048 Φ 3 Add 2	227 kg
X-0389	TATB Tungsten Polystyrene DOP	13.46 85.24 0.80 0.50	027 Φ 3 Add 3	100 kg
X-0390	TATB HMX Tungsten Polystyrene DOP	6.74 6.60 85.36 0.80 0.50	027 Φ 3 Add 3	100 kg
X-0391	TNT LIF	80.00 20.00	050 Φ 3	91 kg
X-0392	TPM RTV-619	80.00 vol % 20.00 vol %	045 Φ 2	3 kg
X-0393	TPM Epoxy	80.00 vol % 20.00 vol %	045 Φ 2	3 kg
X-0394	TATB HMX Estane	47.50 48.70 3.80	021 Φ 3 Add 13	100 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0395	PETN FPC 461	96.5 3.5	051 Φ 3	10 kg
X-0396	TATB HMX Estane	70.0 25.0 5.0	021 Φ 3 Add 13	100 kg
X-0397	TATB HMX Kraton G	70.0 25.0 5.0	021 Φ 3 Add 13	100 kg
X-0398	TATB HMX Kraton G HyVac Oil	70.0 25.0 2.24 2.76	021 Φ 3 Add 13	100 kg
X-0399	TATB Viton A	95.0 5.0	021 Φ 3 Add 13	100 kg
X-0400	PETN FPC-461 Exon	99.5 0.5	051 Φ 3 Add 1	5 kg
X-0401	PETN Kel-F 800	99.5 0.5	051 Φ 3 Add 1	5 kg
X-0402	PETN Kel-F 800	96.5 3.5	051 Φ 3 Add 1	5 kg
X-0403	HMX Kraton G Hyvac Oil	96.50 1.57 1.93	035 Φ 3	90 kg
X-0404	HMX Kraton G Hyvac Oil	98.50 0.67 0.83	035 Φ 3	90 kg
X-0405	HMX Kraton. Hyvac	98.00 0.89 1.11	035 Φ 3	90 kg
X-0406	HMX Kraton G Hyvac Oil	97.20 1.27 1.53	035 Φ3	200 lbs.
X-0407	TATB PETN Kel-F 800 Dye	69.8 25.0 5.0 0.2	021 Φ 2	3 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0408	HMX Vistalon 503	97.5 2.5	052	150 g
X-0409	HMX Royalene 100	97.5 2.5	052	150 g
X-0410	HMX Polysar 306 Tufflo 6026	97.5 1.25 1.25	052	150 g
X-0411	HMX Kraton G 1650 Vistalon 457 Tufflo 6026	97.5 1.0 0.25 1.25	052	150 g
X-0412	RDX FSL 7210	79.00 21.00	008	3500 g
X-0413	PETN FSL 7210	79.00 21.00	008	3500 g
X-0414	HMX R45M IPDI Diocetyl Adipate	84.00 12.48 0.52 3.00	053	500 kg
X-0415	HMX EAK	60.0 40.0	048 Φ3 Add 3	100 kg
X-0416	HMX EAK	40.0 60.0	048 Φ 3 Add 3	100 kg
X-0417	HMX EAK	20.0 80.0	048 Φ 3 Add 3	100 kg
X-0418	HMX Kraton G 1650 Synton PAO 100	97.50 1.12 1.38	035 Φ 3	50 lbs.
X-0419	HMX Vistalon 404	97.50 2.50	052	150 g
X-0420	DINGU Exon 461 KR138S	94.00 5.00 1.00	055	100 kg
X-0421	TATB EAK	20.00 80.00	048	100 kg
X-0422	HMX Ep Syn 3007	97.50 2.50	052	150 g

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0423	HMX Ep Syn 4006	97.5 2.5	052	150 g
X-0424	RDX NuSil CF1-3500	79.0 21.0	008	3500 g
X-0425	PETN NuSil CF1-3500	79.0 21.0	008	3500 g
X-0426	PYX Kel-F 800	95.0 5.0	054	454 kg
X-0427	PETN NuSil CF1-3500	77.0 23.0	008	3500 g
X-0428	PETN NuSil CF1-3500	75.0 25.0	008	3500 g
X-0429	DINGU Exon 461	95.0 5.0	055	100 kg
X-0430	HMX Kraton G-1650 Tufflo 6026 Oil	88.0 6.0 6.0	035	91 kg
X-0431	PETN Nu-Sil CF2-3500	75.0 25.0	008	3500 g
X-0432	DINGU TNT	60.0 40.0	055 Add 1	100 kg
X-0433	TATB (Micronized) HMX (Ball Milled) Kel-F 800 Dye	79.8 15.0 5.0 0.2	021	100 kg
X-0434	TATB PETN Kel-F 800 Dye	64.8 30.0 5.0 0.2	021 Add 15	3 kg
X-0435	TATB HMX (specially ground to Class E) Estane	70.0 25.0 5.0	021 Φ 3 Add 13	100 kg
X-0436	HMX CAB NP KR 138S	90.0 7.4 2.5 0.1	056 Φ 2	3 kg
X-0437	HMX CAB NP KR 138S	85.0 11.2 3.7 0.1	056 Φ 2	3 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0439	PETN Nu-Sil CF3-3500	75.0 25.0	008	3500 g
X-0440	PETN Nu-Sil CF3-3500	70.0 30.0	008	3500 g
X-0441	RDX Viton Calcium Tartrate	58.0 34.0 8.0	057	15 kg
X-0442	RDX Kraton Tufflo 6026 Oil Calcium Tartrate	70.0 10.0 10.0 10.0	057	15 kg
X-0443	TATB Viton	85.0 15.0	057	15 kg
X-0444	HMX Estane BDNPA/BDNPF	88.0 6.0 6.0	013 Add 8	100 kg
X-0445	PETN Nu-Sil CF3-3500	80.0 20.0	008 Φ 3 Add 5	3500 g
X-0446	RDX Viton Calcium Tartrate	50.0 35.0 15.0	057 Φ 3 Add 1	15 kg
X-0447	RDX Kraton Tufflo 6026 oil Calcium Tartrate	58.0 10.0 10.0 22.0	057 Φ 3 Add 1	15 kg
X-0448	TATB Viton	80.0 20.0	057 Φ 3 Add 1	15 kg
X-0449	RDX Estane Calcium Tartrate	60.0 25.0 15.0	057 Φ 3 Add 1	15 kg
X-0450	TATB HMX Estane	60.9 35.0 4.1	021 Φ 3 Add 13	100 kg
X-0451	PETN Nu-Sil CF3-3500	78.0 22.0	008 Φ 3 Add 5	3500 g

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0452	PETN Nu-Sil CF4-3500	78.0 22.0	008 Φ 3 Add 5	3500 g
X-0453	PETN Nu-Sil CF5-3500	78.0 22.0	008 Φ 3 Add 5	3500 g
X-0454	RDX Estane CEF Calcium Tartrate	58.0 15.0 10.0 17.0	057 Φ 3 Add 1	15 kg
X-0455	PETN Nu-Sil CF5-3500	75.0 25.0	008 Φ 3 Add 5	3500 g
X-0456	PETN Nu-Sil CF5-3500	70.0 30.0	008 Φ 3 Add 5	3500 g
X-0457	PETN NuSil CF6-3500	78.0 22.0	008 Add 5	3500 g
X-0458	TATB (wet aminated) Kel-F 800 Diocetyl Sebacate (Octoil-S)	95.0 4.8 0.2	021 Φ 3 Add 12	100 kg
X-0459	TATB EYPEL-F 2,2-dichlorobenzoyl peroxide in silicone base (catalyst)	95.6 4.38 0.02	021 Φ 3 Add 18	3000 g
X-0460	HMX Kraton TCP CT	59.0 11.5 11.5 18.0	057 Φ 3 Add 1	15 kg
X-0461	PETN NuSil CF7-3500	78.0 20.0	008 Φ 3 Add 5	3500 g
X-0462	TATB Kraton G 1650 Hypalon 20	97.8 2.0 0.2	021 Φ 3 Add 12	250 kg
X-0463	HMX Kraton G 1650 Tufflo 6026 oil Irganox	97.47 1.25 1.25 0.03	035 Φ 3	250 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0464	TNT Calcium Carbonate	≤60 ≥40	030 Φ 1 Add 1	3 kg
X-0465	TNT Oxamide	≤70 ≥30	030 Φ 2 Add 1	3 kg
X-0468	TATB Vistanex MML-100 Tufflo 6026 032-4500 Microballoons	86.0 6.0 6.0 2.0	021 Φ 3 Add 12	10 kg
X-0469	CLASSIFIED COMPOSITION		057 Φ 3 Add 1	10 kg
X-0470	CLASSIFIED COMPOSITION		057 Φ 3	15 kg
X-0471	HMX Emulsion	75.0 25.0	058 Φ 3	25 kg
X-0472	HMX Emulsion	50.0 50.0	058 Φ 3	25 kg
X-0473	HMX Emulsion	25.0 75.0	058 Φ 3	25 kg
X-0474	Emulsion	100	058 Φ 3	25 kg
X-0475	CLASSIFIED COMPOSITION		057 Φ 3	15 kg
X-0476	CLASSIFIED COMPOSITION		057 Φ 3	15 kg
X-0477	HMX Emulsion	70.0 30.0	058 Φ 3	25 kg
X-0478	HMX Emulsion	40.0 60.0	058 Φ 3	25 kg
X-0479	HMX Emulsion	30.0 70.0	058 Φ 3	25 kg
X-0480	HMX Emulsion	20.0 80.0	058 Φ 3	25 kg
X-0481	HMX Emulsion	10.0 90.0	058 Φ 3	25 kg
X-0482	PETN NuSil CF2-3550	78.0 22.0	008 Φ 3 Add 5	3.5 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0483	NTO Exon 461	95.0 5.0	059 Φ 2	3.0 kg
X-0484	NTO Viton A	95.0 5.0	059 Φ 2	3.0 kg
X-0485	NTO Kel-F 800	95.0 5.0	059 Φ 2	3.0 kg
X-0486	NTO Kraton 1650	95.0 5.0	059 Φ 2	3.0 kg
X-0487	NTO Estane 5703	95.0 5.0	059 Φ 2	3.0 kg
X-0488	NTO TNT	40.0 60.0	060 Φ 2	3.0 kg
X-0489	NTO TNT	50.0 50.0	060 Φ 2	3.0 kg
X-0490	NTO TNT	60.0 40.0	060 Φ 2	3.0 kg
X-0491	NTO RDX Viton A	45.0 50.0 5.0	059 Φ 2 Add 1	3.0 kg
X-0492	NTO RDX Estane	45.0 50.0 5.0	059 Φ 2 Add 1	3.0 kg
X-0493	NTO RDX FPC 461	45.0 50.0 5.0	059 Φ 2	3.0 kg
X-0494	NTO RDX Kel-F 800	45.0 50.0 5.0	059 Φ 2 Add 1	3.0 kg
X-0495	NTO RDX Kraton 1650	45.0 50.0 5.0	059 Φ 2 Add 1	3.0 kg
X-0496	HMX Emulsion	60.0 40.0	058 Φ 3	25 kg
X-0497	TATB Polysar 306	95.0 5.0	052 Φ 1	150 g
X-0498	TATB Vistalon 404	95.0 5.0	052 Φ 1	150 g
X-0499	TATB Polyvinylidene Fluoride	95.0 5.0	021 Φ 3	100 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0500	TATB Poly(vinylidene fluoride /hexafluoropropylene)	95.0 5.0	021 Φ 3	100 kg
X-0501	RDX CF6-3500	78.0 22.0	008 Φ 3 Add 5	3500 g
X-0502	Dinitrotolune D-2wax Dye	50.0 49.7 0.3	061 Φ 2	3 kg
X-0503	NTO RDX Estane	85.0 10.0 5.0	059 Φ2 Add 1	3 kg
X-0504	NTO RDX FPC 461	85.0 10.0 5.0	059 Φ 2 Add 1	3 kg
X-0505	NTO RDX Kel-F 800	85.0 10.0 5.0	059 Φ 2 Add 1	3 kg
X-0506	NTO RDX Kraton 1650	85.0 10.0 5.0	059 Φ 2 Add 1	3 kg
X-0507	HMX Estane	82.0 18.0	013 Φ 3 Add 9	100 kg
X-0508	HMX Estane BDNPA/F	81.0 15.0 4.0	013 Φ 3 Add 9	100 kg
X-0509	HMX Kraton G 1650 Tufflo oil	88.0 5.40 6.60	035 Φ 3 Add 4	250 kg
X-0510	NTO RDX Viton A	85.0 10.0 5.0	059 Φ 2 Add 1	3 kg
X-0511	HMX Vistalon 404	95.0 5.0	035 Φ 3 Add 4	250 kg
X-0512	HMX Vistalon 404	88.0 12.0	035 Φ 3 Add 4	250 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0513	TNT Calcium Carbonate Estane	40.0 50.0 10.0	030 Φ 3 Add 3	500 kg
X-0514	TNT Calcium Carbonate Estane	45.0 50.0 5.0	030 Φ 3 Add 3	500 kg
X-0515	TNT Cyanuric Acid Estane	40.0 50.0 10.0	030 Φ 3 Add 3	500 kg
X-0516	TNT Zinc oxide Estane	40.0 50.0 10.0	030 Φ 3 Add 3	500 kg
X-0517	TNT Oxamide Estane	40.0 50.0 10.0	030 Φ 3 Add 3	500 kg
X-0518	PETN Pentaerythritol Sylgard 182	50.0 30.0 20.0	008 Φ 3 Add 6	10 kg
X-0519	PETN Pentaerythritol Sylgard 182	60.0 20.0 20.0	008 Φ 3 Add 6	10 kg
X-0520	PETN Pentaerythritol Sylgard 182	70.0 10.0 20.0	008 Φ 3 Add 6	10 kg
X-0521	TNT Calcium Carbonate Estane	50.0 40.0 10.0	030 Φ 3 Add 3	500 kg
X-0522	RDX CF6-3500	80.0 20.0	008 Φ 3 Add 5	3.5 kg
X-0523	RDX Estane 5703 CEF Cyanuric Acid	51.0 12.5 12.5 24.0	057 Φ 3	15 kg
X-0524	TATB Kel-F 800 Hypalon	95.0 4.8 0.2	021 Φ 3 Add 5	2000 kg
X-0525	TNT Calcium Carbonate/Cab-o-Sil	≤70 ≥30	030 Φ 2	2 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0526	TNT Calcium Carbonate /Talc	≤70 ≥30	030 Φ 2	2 kg
X-0527	TATB Macrolon (Polycarbonate)	97.0 3.0	21 Φ 3 Add 12	100 kg
X-0528	HMX R45HT DOA IPDI	84.0 7.6 7.6 0.8	053 Φ 3	25 kg
X-0529	HMX Vistalon 503	≤97.5 ≥2.5	035 Φ 3 Add 4	250 kg
X-0530	Kinepak Mixture AN + sensitizers NM	≈80 ≈20	062 Φ 2	3 kg
X-0531	TATB Polysar 306	98.0 2.0	021 Φ 3 Add 5	250 kg
X-0532	TATB Vistalon 404	98.0 2.0	021 Φ 3 Add 5	250 kg
X-0533	TNT Calcium Carbonate Talc Microballoons	40 55-60 0-2 1-2	030 Φ 3 Add 4	500 kg
X-0534	TNT Calcium Carbonate Talc Microballoons	50 16-24 25-33 1-2	030 Φ3 Add 4	500 kg
X-0535	TZX OXY-461	95.0 5.0	064 Φ 2	3 kg
X-0536	RDX ZnO R45HT/IPDI Binder	20-30 50-65 14-20	063 Φ 2	3 kg
X-0537	HMX R45T/IPDI Type Binder	≤90 ≥10	053 Φ 3 Rev 1	25 kg
X-0538	TATB NTO Kel-F 800	20-80 20-80 0-10	059 Φ 2 Add 3	3 kg

CODE NUMBER	NOMINAL COMPOSITION	WEIGHT %	HED	WEIGHT LIMIT
X-0539	RDX (micronized) Estane 5703 CEF Cyanuric Acid	44.0 12.5 12.5 31.0	057 Φ 3 Add 2	15 kg
X-0540	RDX (micronized) Estane 5703 CEF Cyanuric Acid	39.0 12.5 12.5 31.0	057 Φ 3 Add 2	15 kg
X-0541	TATB PETN Kel-F 800 Blue Dye (Freon Process)	69.8 25.0 5.0 0.2	021 Φ 3 Add 16	100 kg
X-0542	TATB L-9267, Fluoroplastic terpolymer (3M)	95.0 5.0	021 Φ 3 Add 5	250 kg
X-0543	TATB Kel-F 3700	95.0 5.0	021 Φ 3 Add 5	250 kg
X-0544	TATB Ammonium Nitrate	26.0 74.0	066 Φ 2	3 kg
X-0545	RDX Cellulose Acetate Butyrate (CAB) Acetyl Triethyl-citrate (ATEC) Nitrocellulose Ethylcentralite	76.0 12.0 7.6 4.0 0.4	056 Φ 2 Add 2	3 kg

Reviewed on May 18, 1998 - Minor Changes

Reviewed by:

*Larry Hatler*

DATE:

*6/2/98*

Larry Hatler

ESA-WMM HE Processing Team Leader

1.0 High-Energy Exploding Bridgewire (EBW) Detonators

The following EBW, slapper and high energy detonators have been approved for assembly into test devices:

#1E23		#ER-396A	SE1
#1E26	#ER-325	#ER-396B	SE1/31
#1E26B	#ER-312B	#ER-402	RP1
#1E29	#ER-344	#ER-403	RP1/31
#1E30	#ER-349	#ER-403B	RP2
#1E33	#ER-350	#ER-403	RP80
#1E34	#ER-351		RP84
#1E36	#ER-352		RP87
#1E38 T.F.	#ER-353		
#1E38	#ER-370		
	#ER-371	#MK20	
	#ER-377	#MK22A	
	#ER-380	#MK13C	
	#ER-400		

2.0 The following low energy detonators have been approved for assembly into test devices: 3E1, 3E1A, 3E1D.

3.0 The following low-energy actuators and igniter have been approved for assembly into test devices:

2S/2052	Actuator	3S/PT06	Actuator
2S/STP/150	Actuator	4S/152	Actuator
3X/2052	Igniter	5S/152	Actuator
6S/PT06	Actuator	7S/152	Actuator
8S/2052	Actuator		

Note: To provide safe handling, the actuators and igniter listed above will be assembled into a valve body or an assembly that will provide confinement before they are furnished to ESA-WMM for subsequent assembly. Shorting plugs will be installed until connected to next assembly.

# Approved by Nuclear Explosive Safety Study for use, at NTS, in nuclear explosive assembly.

Approved by: Larry Hatler Date 7/7/98  
Larry Hatler, ESA-WMM HE Processing Team Leader

CHANGES IN SHADING 6/23/98

LANL General Part B Permit Application  
Request for Supplemental Information Response  
August, 2000 (corrected, Rev. 1)

Certification

**CERTIFICATION**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

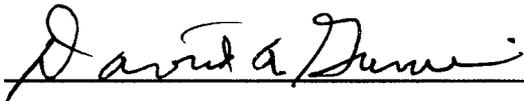


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Dennis J. Erickson  
Division Director for Environment, Safety, and  
Health Division  
Los Alamos National Laboratory  
Operator

9/12/00

Date Signed



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David A. Gurulé, P.E.  
Area Manager, Los Alamos Area Office  
U.S. Department of Energy  
Albuquerque Operations  
Owner/Operator

9/19/00

Date Signed