

APPENDIX E
CHARACTERISTICS OF DETECTED ANALYTES

E.0 CHARACTERISTICS OF DETECTED ANALYTES

This appendix presents a summary of chemical characteristics for compounds detected at TEAD-S during the RFI-Phase I and investigations conducted before the RFI-Phase I. Summaries for Priority Pollutants and target metals are compiled from information presented in the Hazardous Substance Data Base (HSDB) of the National Library of Medicine's online MEDLARS System, the Chemical Stockpile Disposal Program Final Programmatic Environmental Impact Statement Appendices (Department of the Army, 1988), Howard (1989), and Merck (1983). The information summarized for each compound includes physical characteristics, priority pollutant status, documented natural occurrences, artificial sources and uses, and documented information pertaining to compound emissions to the environment. This information is important in determining conditions associated with contamination or releases for investigated SWMUs. Organic compounds are characterized in Sections E.1 through E.4. Metals are described in Section E.5.

E.1 VOLATILE ORGANIC ANALYTES

Table E-1 lists organic compounds detected during the RFI-Phase I and investigations previous to the RFI-Phase I.

1,1-DICHLOROETHANE (Ethylidene Chloride)

Molecular Formula:	C ₂ H ₄ Cl ₂
Molecular Weight:	98.97
Melting Point:	-97°C
Boiling Point:	57.3°C
Water Solubility:	5,060 mg/l at 25°C
Vapor Pressure:	227 mm Hg at 25°C
Log Octanol/ Water Partition Coefficient:	1.79

Priority Pollutant: Yes

Natural Occurrences: None

Artificial Sources/Uses: Largest industrial use is in the production of 1,1,1-trichloroethane; solvent in paint and grease removers; combustion product of distilled mustard.

Table E-1 • Occurrences of Organic Analytes at TEAD-S
(excluding Known Releases SWMUs)

Compounds	R11- Soil	R11- Groundwater	Historical Soil	Historical Groundwater
Volatiles				
1,1-Dichloroethane				
1,2-Dichloroethylene				
1,2-Dimethylbenzene		•		
1,3-Dimethylbenzene		•		
2-Nitropropane		•		
Acetone		•		
Benzene	•			
Chloroform	•			
Chloromethane		•		
Methylene Chloride		•		•
Toluene		•		
Trichloroethylene		•		
Semivolatiles				
1-Methylnaphthalene				
1,4-Dichlorobenzene		•		
2-Ethylhexanoic Acid	•			
Benzyl Alcohol	•			
Bis (2-ethylhexyl) Phthalate				
Butyl Benzl Phthalate		•		
Cyclohexanone	•			•
DDD		•		•
DDE		•		•
DDT	•			•
Diethyl Phthalate	•			
Dimethylnaphthalene	•			
O-cresol	•			
Explosives				
1,3-Dinitrobenzene				
1,3,5-Trinitrobenzene				
2,4-Dinitrotoluene				•
2,6-Dinitrotoluene				•
2,4,6-Trinitrotoluene				•
Cyclotrimethylenetrinitramine				•
N-methyl-N,2,4,6-tetranitroaniline				•
Agent Breakdown Products				
Isopropylmethyl Phosphonic Acid	•			
	•			

Releases to Environment: Released as fugitive emissions during its production and use as a chemical intermediate.

Detected In: Groundwater (RFI)

1,2-DICHLOROETHYLENE (Acetylene Dichloride)

Molecular Formula: $C_2H_2Cl_2$

Molecular Weight: 96.95

Melting Point:

cis-1,2-dichloroethylenetrans-1,2-dichloroethylene
-80.5°C-50°C

Boiling Point:

60.3°C48.0-48.5°C

Water Solubility:

3.5 g/l at 25°C6.3 g/l at 25°C

Vapor Pressure:

200 mm Hg at 35°C340 mm Hg at 25°C

Log Octanol/

Water Partition Coefficient:

1.862.06

Priority Pollutant: No

Natural Occurrences: None

Artificial Sources/Uses: Used as a solvent and extractant in organic synthesis, and in the manufacture of perfumes, lacquers, and thermoplastics. Found as a breakdown product of trichloroethylene due to reductive dehalogenation at landfill sites. Occurs as a breakdown product from the combustion of Lewisite.

Releases to Environment: May be released in emissions and wastewater during its production and use as mentioned above.

Detected In: Groundwater (RFI)

1,2-DIMETHYLBENZENE (o-xylene)

Molecular Formula:

C_8H_{10}

Molecular Weight:

106.16

Melting Point:

o-xylene
-25°C

Boiling Point:

144°

Water Solubility: 175 mg/l at 25°C
Vapor Pressure: 6.6 mm Hg at 25°C
Log Octanol/
Water Partition Coefficient: 3.12

Priority Pollutant: Yes

Natural Occurrences: Coal tar, petroleum, forest fires, plant volatile.

Artificial Sources/Uses: Used as a chemical intermediate, solvent, tobacco smoke.

Releases to Environment: Emissions from petroleum refining, coal tar and coal gas distillation; emissions from its use as a chemical intermediate and solvent, evaporative losses during transport and storage of gasoline, auto emissions, tobacco smoke, gasoline spills, agricultural spraying.

Detected In: Groundwater (RFI)

1,3-DIMETHYLBENZENE (m-xylene)

Molecular Formula: C_8H_{10}
Molecular Weight: 106.16
Melting Point: -47.4°C
Boiling Point: 139.3°C
Water Solubility: 146 mg/l at 25°C
Vapor Pressure: 8.3 mm Hg at 25°C
Log Octanol/
Water Partition Coefficient: 3.20

Priority Pollutant: No

Natural Occurrences: Petroleum.

Artificial Sources/Uses: Found in gasoline and diesel fuels. Used as a solvent for alkyl resins, lacquers, enamels, rubber cement, pesticidal sprays, and in organic synthesis.

Releases to Environment: Emissions from petroleum refining, gasoline, and diesel engines. Leaks and evaporation losses during transportation and storage of gasoline. Emissions from its use as mentioned above.

Detected In: Groundwater (RFI)

2-NITROPROPANE (Dimethyl Naphthalene)

Molecular Formula:	C ₃ H ₇ NO ₂
Molecular Weight:	89.09
Meeting Point:	-93°C
Boiling Point:	120.3°C at 760 mg Hg
Water Solubility:	170,000 mg/l at 25°C
Vapor Pressure:	18 mg Hg at 25°C
Log Octanol/ Water Partition Coefficient:	0.554

Priority Pollutant: No

Natural Occurrences: None

Artificial Sources/Uses: Chemical intermediate, solvent in coatings, inks, and cellulose esters, stripping solvents for shellac and lacquer, explosives, rocket propellants, additives to fuel for racing cars and diesel fuels.

Releases to Environment: Emissions connected with its manufacture and use as a solvent. All emissions from its use as stated above in "Uses."

Detected In: Soil (RFI)

ACETONE

Molecular Formula:	C ₃ H ₆ O
Molecular Weight:	58.09
Melting Point:	-95.35°C
Boiling Point:	56.2°C at 760 mm Hg
Water Solubility:	Miscible
Vapor Pressure:	231 mm Hg at 25°C
Log Octanol/ Water Partition Coefficient:	-0.24

Priority Pollutant: Yes

Natural Occurrences: Oxidation of humic substances, produced by the fermentation of west coast kelp, identified in vegetation and insects as a naturally occurring volatile metabolite, emissions from volcanos and forest fires.

Artificial Sources/Uses: Found in the manufacture of methacrylates. Found as a by-product in the manufacture of acetaldehyde and acetic acid, and wood pulping. Acetone is a product of the photooxidation of some alkane and alkenes that are found in urban air. Used as a solvent (as a chem. intermediate in the manuf. of methyl isobutyl ketone).

Releases to Environment: In gasoline exhaust, emissions from wood-burning fireplaces, released as stack emissions, fugitive emissions, and in wastewater in its production and use in the manufacture of methacrylates and as a solvent.

Detected In: Groundwater and soil (RFI)

BENZENE

Molecular Formula:	C ₆ H ₆
Molecular Weight:	78.11
Melting Point:	5.5°C
Boiling Point:	80.1°C
Water Solubility:	1,791 mg/l
Vapor Pressure:	95.19 mm Hg at 25°C
Log Octanol/ Water Partition Coefficient:	21.3

Priority Pollutant: Yes

Natural Occurrences: Volcanoes, natural constituent of crude oil, forest fires, and plant volatile.

Artificial Sources/Uses: Used as an intermediate in the production of other chemicals and as a solvent, found in nonferrous metal manufacture, ore mining, wood processing, coal mining, textile manufacture, and cigarette smoke.

Releases to Environment: Released from production, storage, transport, venting, and combustion of gasoline; from production, storage, and transport of benzene itself, from its indirect production in coke ovens, cigarette smoke, other sources result from its uses and mentioned above.

Detected In: Groundwater (RFI and historical)

BIS (2-ETHYLHEXYL) PHTHALATE (B2EHP)

Molecular Formula:	C ₂₄ H ₃₈ O ₄
Molecular Weight:	390.62
Melting Point:	-50°C

Boiling Point: 230°C at 5 mm Hg
Water Solubility: 0.3 mg/l at 25°C
Vapor Pressure: 6.45 x 10⁻⁶ mm Hg at 25°C
Log Octanol/
Water Partition Coefficient: log K_{ow} = 5.11

Priority Pollutant: Yes

Natural Occurrences: DEHP has been reported to be a possible natural product in animals and plants.

Artificial Sources/Uses: DEHP is used in large quantities, primarily as a plasticizer for polyvinyl chloride and other polymeric materials. Disposal of these products (incineration, landfill, etc.) will result in the release of DEHP into the environment. DEHP has been detected in the effluent of numerous industrial plants.

Detected In: Groundwater (historical)

CHLOROFORM (Trichloromethane)

Molecular Formula: CHCl₃
Molecular Weight: 119.39
Melting Point: -63.5°C
Boiling Point: 61.7°C at 760 mm Hg
Water Solubility: 7,950 mg/l
Vapor Pressure: 246 mm Hg at 25°C
Log Octanol/
Water Partition Coefficient: 1.97

Priority Pollutant: Yes

Natural Occurrences: Plant volatile.

Artificial Sources/Uses: Used in the chlorination of drinking water; municipal sewage, cooling water in electric power plants, chemical intermediate, dry cleaning agent, or fumigant ingredient; in fluorocarbon 22 production; and in synthetic rubber production. Decontamination product of GB stabilizer (DIBC), VX, VX stabilizer (DIPC), distilled mustard (HD); combustion product of distilled mustard (HD) (Department of the Army, 198_). Occurs as a decontamination breakdown product of GB stabilizer (DIPC), VX, VX stabilizer (DIPC), and distilled mustard. Also occurs as a combustion breakdown product of distilled mustard (HD).

Releases to Environment: Emissions from its production and indirect production (in manufacture of ethylene dichloride) as auto exhaust, and spills.

Detected In: Groundwater (RFI)

CHLOROMETHANE (Methyl Chloride)

Molecular Formula:	CH ₃ Cl
Molecular Weight:	50.49
Melting Point:	-97°C
Boiling Point:	-23°C
Water Solubility:	0.648% wt at 30°C
Vapor Pressure:	4,309.7 mm Hg at 30°C
Log Octanol/ Water Partition Coefficient:	0.91

Priority Pollutant: Yes

Natural Occurrences: Volcanoes, plant volatiles from cedar and cypress, and forest fires. Produced in seawater by the reaction of methyl iodide with chloride ions. Naturally occurring due to interaction of chlorinated water with organisms in aquifers, microbial activity; results from burning organic material, plastics, and cigarettes (ATSDR TP).

Artificial Sources/Uses: Manufacture of silicones, agrichemicals, methyl cellulose, quaternary amines, butyl rubber, and tetraethyl lead. Occurs as a combustion breakdown product of Lewisite.

Releases to Environment: Volatilization from the ocean reservoir, emitted as fugitive emissions. Released in tobacco smoke and turbine exhaust.

Detected In: Groundwater (RFI)

METHYLENE CHLORIDE (Dichloromethane)

Molecular Formula:	CH ₂ Cl ₂
Molecular Weight:	84.94
Melting Point:	-95.1°C
Boiling Point:	39.75°C at 760 mm Hg
Water Solubility:	13,000 mg/l at 25°C
Vapor Pressure:	434.9 mm Hg at 25°C
Log Octanol/	

Water Partition Coefficient: 1.30

Priority Pollutant: Yes

Natural Occurrences: None

Artificial Sources/Uses: Used as an aerosol propellant, paint remover, metal degreaser, a urethane foam blowing agent, and a solvent in food processing. Occurs as a combustion breakdown product of distilled mustard (HD).

Releases to Environment: Released in wastewater primarily from the following industries; paint and ink, aluminum forming, coal mining, photographic equipment and supplies, pharmaceutical, organic chemical/plastics, rubber processing, foundries and laundries.

Detected In: Groundwater (RFI)

TOLUENE (Methylbenzene)

Molecular Formula:	C ₇ H ₈
Molecular Weight:	92.13
Melting Point:	-95°C
Boiling Point:	110.6°C at 760 mm Hg
Water Solubility:	534.8 mg/l at 25°C
Vapor Pressure:	28.4 mm Hg at 25°C
Log Octanol/ Water Partition Coefficient:	2.73

Priority Pollutant: Yes

Natural Occurrences: Volcanos, forest fires, crude oil.

Artificial Sources/Uses: Motor vehicle exhaust. Emissions from gasoline storage tanks, filling stations, carburetors, etc. Petroleum spills and discharges on land and in waterways. Emissions and wastewater from its use as a solvent and thinner for paints, lacquers, etc. Emissions from its production from petroleum, coal, and as a by-product from styrene production. Emissions from its use as a chemical intermediate.

Detected In: Groundwater (RFI and historical)

TRICHLOROETHYLENE

Molecular Formula:	C ₂ HCl ₃
Molecular Weight:	131.40
Melting Point:	-73°C
Boiling Point:	87°C
Water Solubility:	1,100 mg/l at 25°C
Vapor Pressure:	69.0 mm Hg at 25°C
Log Octanol/ Water Partition Coefficient:	2.42

Priority Pollutant: Yes

Natural Occurrences: None

Artificial Sources/Uses: Metal finishing, paint and ink formulation, electrical/electronic components, rubber processing, degreasing dry cleaning.

Releases to Environment: Air emissions from metal degreasing plants. Wastewater from metal finishing, paint and ink formulation, electrical/electronic components, rubber processing industries.

Detected In: Groundwater (RFI)

E.2 SEMIVOLATILE ORGANIC ANALYTES

1-METHYLNAPHTHALENE

Molecular Formula:	C ₁₁ H ₁₀
Molecular Weight:	142.21
Melting Point:	-22°C
Boiling Point:	244.64°C at 760 mm Hg
Water Solubility:	insoluble in water
Vapor Pressure:	-
Log Octanol/ Water Partition Coefficient:	-

Priority Pollutant: No

Natural Occurrences: -

Artificial Sources/Uses: -

Releases to Environment: Found in wastewater from coking operations.

Detected In: Groundwater (RFI)

1,4-DICHLOROBENZENE

Molecular Formula:	C ₆ H ₄ Cl ₂
Molecular Weight:	147.01
Melting Point:	53.1°C
Boiling Point:	175°C at 760 mm Hg
Water Solubility:	87 mg/l at 25°C
Vapor Pressure:	1.76 mm Hg at 25°C
Log Octanol/ Water Partition Coefficient:	3.52

Priority Pollutant: Yes

Natural Occurrences: None

Artificial Sources/Uses: Toilet bowl and garbage deodorants, moth control fumigant, polyphenylene sulfide resin production.

Releases to Environment: Released to the atmosphere by volatilization from toilet bowl deodorants, garbage deodorants, moth flakes.

Detected In: Soil (RFI)

2-ETHYLHEXANOIC ACID (Butylethylacetic acid)

Molecular Formula:	C ₈ H ₁₆ O ₂
Molecular Weight:	144.24
Melting Point:	-
Boiling Point:	226.9°C
Water Solubility:	Slightly soluble in water
Vapor Pressure:	0.03 mm Hg at 20°C
Log Octanol/ Water Partition Coefficient:	-

Priority Pollutant: No

Natural Occurrences: -

Artificial Sources/Uses: Cosolvent in pesticides and lotions, also used as gelling agent for hydrocarbons and plasticizers.

Releases to Environment: -

Detected In: Soil (RFI)

BENZYL ALCOHOL

Molecular Formula:	C ₇ H ₈ O
Molecular Weight:	108.13
Melting Point:	-15.19°C
Boiling Point:	204.7°C at 760 mm Hg
Water Solubility:	40,000 mg/l at 17°C; 35,000 mg/l at 20°C
Vapor Pressure:	0.15 mm Hg at 25°C
Log Octanol/ Water Partition Coefficient:	-

Priority Pollutant: Yes

Natural Occurrences: Jasmine, hyacinth, ylang-ylang oils, Peru and Tolu balsams, storax.

Artificial Sources/Uses: Solvent, shellac, perfumery, flavoring, plasticizer, developer for color movie film, dyeing nylon filaments (carpet), textiles and sheet plastic, ball point pen ink used in insect ointment and repellents, cosmetics, and soaps. Benzyl alcohol can be produced by a replacement with toluene when chlorotoluene is present (Morrison and Boyd).

Releases to Environment: May be released to environment by disposal of the above products, in wastewater effluent from sewage treatment plants, effluent from waste incinerators, and has been detected in automobile exhaust.

Detected In: Groundwater (RFI and historical)

BUTYL BENZYL PHTHALATE (BBZP)

Molecular Formula:	C ₁₉ H ₂₀ O ₄
Molecular Weight:	312.39
Melting Point:	-35°C
Boiling Point:	370°C
Water Solubility:	2.69 mg/l at 25°C
Vapor Pressure:	8.6 x 10 ⁻⁶ mm Hg at 20°C
Log Octanol/ Water Partition Coefficient:	4.91

Priority Pollutant: Yes

Natural Occurrences: None

Artificial Sources/Uses: BBP is used as a plasticizer for polyvinyl and cellulosic resins, primarily in polyvinyl chloride. Possible sources of BBP release to the environment are from its manufacture, distribution, and PVC blending operations, however, release from consumer products is expected to be minimal. Most BBP releases will be to soil and water and not to the air. BBP released to soil is expected to adsorb and not to leach extensively although it has been detected in groundwater.

Detected In: Groundwater (RFI and historical), soil (RFI)

CYCLOHEXANONE

Molecular Formula:	C ₆ H ₁₀ O
Molecular Weight:	98.14
Melting Point:	-32.1°C
Boiling Point:	155.6°C at 760 mm Hg
Water Solubility:	23,000 mg/l at 25°C
Vapor Pressure:	4.8 mm Hg at 25°C
Log Octanol/ Water Partition Coefficient:	0.81

Priority Pollutant: No

Natural Occurrences: None

Artificial Sources/Uses: Metal degreaser, solvent for lacquers, resins, and pesticides (DDT); also solvent for vinyl resins, crude rubber, and shellac; PVC polymers and copolymers; chemical intermediate of Nylon 6.

Releases to Environment: Released to environment due to leaching from landfills (industrial-chemical manufacturing and municipal).

Detected In: Groundwater (RFI)

DDD (1,1-bis(4-chlorophenyl)-2,2-dichloroethane)

Molecular Formula:	C ₁₄ H ₁₀ Cl ₄
Molecular Weight:	320.05
Melting Point:	109-110°C
Boiling Point:	-

Water Solubility: 20 µg/l
Vapor Pressure: 1.0×10^{-6} mm Hg at 30°C
Log Octanol/
Water Partition Coefficient: 5.99

Priority Pollutant: 4,4'-DDD - yes

Natural Occurrences: None

Artificial Sources/Uses: Insecticide, degradation product of DDT.

Releases to Environment:

Detected In: Soils (RFI)

DDE (Dichlorodiphenylethane)

Molecular Formula: $C_{14}H_8Cl_4$
Molecular Weight: 318.0
Melting Point: 88.4°C
Boiling Point: -
Water Solubility: 0.12 mg/l at 25°C
Vapor Pressure: 6.5×10^{-6} mm Hg at 20°C
Log Octanol/
Water Partition Coefficient: 5.69

Priority Pollutant: 4,4'-DDE - yes

Natural Occurrences: None

Artificial Sources/Uses: Occurs as an impurity in commercial DDT formulations and as a biodegradation product of DDT.

Releases to Environment: Same as DDT. The general use of DDT has been banned in the U.S. since 1972.

Detected In: Soils (RFI)

DDT (Dichlorodiphenyltrichloroethane)

Molecular Formula:	C ₁₄ H ₉ Cl ₅
Molecular Weight:	354.50
Melting Point:	108.5-109°C
Boiling Point:	260°C
Water Solubility:	0.0031-0.0034 mg/l at 25°C
Vapor Pressure:	1.5 x 10 ⁻⁷ mm Hg at 20°C
Log Octanol/ Water Partition Coefficient:	3.98

Priority Pollutant: 4,4'-DDT - yes

Natural Occurrences: None

Artificial Sources/Uses: Pesticide/Insecticide, dicofol contains very low levels of pip - DDT.

Releases to Environment: Released through its manufacture and use as a pesticide/insecticide. Its general use has been banned in the U.S. since 1972.

Detected In: Soils (RFI)

DIETHYL PHTHALATE

Molecular Formula:	C ₁₂ H ₁₄ O ₄
Molecular Weight:	222.26
Melting Point:	-40.5°C
Boiling Point:	295°C
Water Solubility:	1,080 mg/l at 25°C
Vapor Pressure:	1.65 x 10 ⁻³ mm Hg at 25°C
Log Octanol/ Water Partition Coefficient:	log <i>k</i> _{ow} = 2.47

Priority Pollutant: Yes

Natural Occurrences: Detected in some food products, but probably as a solvent residue.

Artificial Sources/Uses: Plastics, insecticidal sprays, insect repellents, perfumes.

Releases to Environment: Air emissions, aqueous effluent, and solid waste products from manufacturing and plastics processing. Approximately 0.5 percent lost during manufacture.

Emitted in vapor and particulate form during incineration of some plastics. May volatilize from plastics. Use of insecticidal sprays, insect repellents, and perfumes.

Detected In: Soil (historical)

DIMETHYLNAPHTHALENE

Molecular Formula:	C ₁₂ H ₁₂
Molecular Weight:	156.23
Melting Point:	-
Boiling Point:	268°C at 760 mm Hg
Water Solubility:	-
Vapor Pressure:	-
Log Octanol/ Water Partition Coefficient:	-

Priority Pollutant: No

Natural Occurrences: None

Artificial Sources/Uses: Synthetic organic compound, insecticide adjuvant; documented as constituent of petroleum, tobacco smoke, and automobile exhaust.

Releases to Environment:

Detected In: Soils (RFI)

O-CRESOL (2-methylphenol)

Molecular Formula:	C ₇ H ₈ O
Molecular Weight:	108.15
Melting Point:	30.9°C
Boiling Point:	190.95°C at 760 mm Hg
Water Solubility:	30.8 g/l at 40°C
Vapor Pressure:	0.31 mm Hg at 25°C
Log Octanol/ Water Partition Coefficient:	1.95

Priority Pollutant: No

Natural Occurrences: Plant volatile; coal, petroleum, constituent in wood, constituent in natural runoff.

Artificial Sources/Uses: Automobile exhaust, roadway runoff ... petroleum distillates, fuels, perfumes, oils, lubricants, metal cleaning, and scouring compounds.

Releases to Environment: Emissions and effluents during its production and use as a disinfectant and solvent; emissions of wastewater during coal tar and petroleum refining, organic chemicals, plastics, and resins manufacturing, and in its use as an ore flotation and textile scouring agent, found in sewage; found in emissions from wood pulping, tobacco smoke, and auto and diesel exhaust, it is a product of photooxidation of toluene.

Detected In: Groundwater (historical)

E.3 EXPLOSIVES

1,3-DINITROBENZENE

Molecular Formula:	C ₆ H ₄ N ₂ O ₄
Molecular Weight:	168.11
Melting Point:	89.90°C
Boiling Point:	300-303°C
Water Solubility:	1 g dissolves in 2,000 ml cold water, 320 ml boiling water
Vapor Pressure:	<1 mm Hg at 20°C
Log Octanol/ Water Partition Coefficient:	-

Priority Pollutant: Yes

Natural Occurrences: None

Artificial Sources/Uses: Used in the manufacture of dyes, explosives, industrial solvents, and pesticides.

Releases to Environment: Released to the environment as a result of the previously mentioned uses. Also, due to its presence in TNT, it may be released from munitions blending and loading operations.

Detected In: Groundwater (historical)

1,3,5-TRINITROBENZENE

Molecular Formula:	C ₆ H ₃ N ₃ O ₆
Molecular Weight:	213.11
Melting Point:	122.5°C
Boiling Point:	315°C at 760 mm Hg
Water Solubility:	0.035 g/100 g water
Vapor Pressure:	-
Log Octanol/ Water Partition Coefficient:	-

Priority Pollutant: No

Natural Occurrences: None

Artificial Sources/Uses: Explosive, rubber vulcanization.

Releases to Environment:

Detected In: Groundwater (historical)

2,4-DINITROTOLUENE

Molecular Formula:	C ₇ H ₆ N ₂ O ₄
Molecular Weight:	182.14
Melting Point:	71°C
Boiling Point:	300°C with slight decomposition
Water Solubility:	300 mg/l at 22°C
Vapor Pressure:	1.1 x 10 ⁻⁴ mm Hg at 20°C
Log Octanol/ Water Partition Coefficient:	1.98

Priority Pollutant: No

Natural Occurrences: None

Artificial Sources/Uses: 2,4-DNT is used for manufacture of 2,4-diaminotoluene for isocyanate production, organic synthesis, dyes, explosives, and as a propellant additive.

Releases to Environment: Direct release to the environment through the previously mentioned uses.

Detected In: Groundwater (historical)

2,6-DINITROTOLUENE (2,6-DNT)

Molecular Formula:	C ₇ H ₆ N ₂ O ₄
Molecular Weight:	182.15
Melting Point:	66°C
Boiling Point:	285°C
Water Solubility:	-
Vapor Pressure:	3.5 x 10 ⁻⁴ mm Hg at 20°C
Log Octanol/ Water Partition Coefficient:	1.72

Priority Pollutant: Yes

Natural Occurrences: None

Artificial Sources/Uses: No specific use information found for 2,6-DNT; however, dinitrotoluenes are used in organic synthesis, dyes, and explosives and probably some is consumed in isocyanate production along with 2,4-DNT. Recent information indicated that two companies produced 2,6-DNT as a mixture with 2,4-DNT.

Releases to Environment: Releases from the commercial mixture production as well as from a variety of the above uses is possible.

Detected In: Groundwater (historical)

2,4,6-TRINITROTOLUENE

Molecular Formula:	C ₇ H ₃ N ₃ O ₆
Molecular Weight:	227.13
Melting Point:	80.1°C
Boiling Point:	240°C
Water Solubility:	0.01% at 25°C
Vapor Pressure:	1.99 x 10 ⁻⁴ mm Hg at 20°C
Log Octanol/ Water Partition Coefficient:	-

Priority Pollutant: No

Natural Occurrences: None

Artificial Sources/Uses: May be released to the environment in wastewater and air effluents from its production and use as a military explosive and propellant. Generally alpha-TNT is not expected to hydrolyze, volatilize from water, or bioconcentrate under normal environmental conditions expected to maintain low soil mobility and to a certain extent partition to sediments and particulate matter in the water column. Alpha-TNT photolysis is directly related to increases in pH and organic matter content.

Detected In: Groundwater (historical)

CYCLONITE (cyclotrimethylene trinitramine) (RDX)

Molecular Formula:	C ₃ H ₆ N ₆ O ₆
Molecular Weight:	222.26
Melting Point:	205-206°C
Boiling Point:	-
Water Solubility:	Insoluble in water
Vapor Pressure:	-
Log Octanol/ Water Partition Coefficient:	-

Priority Pollutant: No

Natural Occurrences: None

Artificial Sources/Uses: Found in munitions and solid-propellant manufacture.

Releases to Environment: Released through direct manufacture and when used as mentioned above.

Detected In: Groundwater (RFI)

N-METHYL-N,2,4,6-TETRANITROANILINE (TETRYL)

Molecular Formula:	C ₇ H ₅ N ₅ O ₈
Molecular Weight:	287.15
Melting Point:	130-132°C
Boiling Point:	187°C (explodes)
Water Solubility:	Insoluble
Vapor Pressure:	-
Log Octanol/ Water Partition Coefficient:	-

Priority Pollutant: No

Natural Occurrences: None

Artificial Sources/Uses: Component of binary explosives, arsenic indicator.

Releases to Environment: -

Detected In: Groundwater (RFI)

E.4 AGENT BREAKDOWN PRODUCTS

ISOPROPYLMETHYL PHOSPHONIC ACID (isopropyl methylphosphonate) (IMPA)

Molecular Formula:	C ₄ H ₁₀ O ₂ P
Molecular Weight:	140.0
Melting Point:	-
Boiling Point:	-
Water Solubility:	48 g/l
Vapor Pressure:	-
Log Octanol/ Water Partition Coefficient:	K _{ow} -0.54

Priority Pollutant: No

Natural Occurrences: Occurs as a hydrolysis breakdown product of Sarin (GB), and as a decontamination product of GB.

Detected In: Groundwater (historical)

E.5 TARGET METALS

Target metals occurring in soils and groundwater at TEAD-S are presented in Table E-2.

Table E-2 • Target Metals Occurring in Both Soil and Groundwater Page 1 of 1

Metal	Atomic Weight	Melting Point	Boiling Point	Physical Properties	Uses
Arsenic	74.98	818° C at 36 atm.	Sublimes at 612° C	Insoluble in water. Most forms toxic. Component of Lewisite, and raw materials and byproducts of Lewisite manufacture.	Produced as the trioxide when smelting true metals. Used in metallurgy for hardening copper and lead alloys.
Beryllium	9.012	1287° C	2500° C	Soluble in acids. Suspect carcinogen.	Produced industrially from beryl, used in radio tube parts; additive in rocket fuels.
Cadmium	112.4	321° C	765° C	Insoluble in water. Highly toxic. Naturally associated with zinc.	Constituent of easily fusible alloys; used for electroplating, photo-electric cells, Ni-Cd storage batteries.
Chromium	51.99	1900° C	2200° C	Reacts with dilute HCl. Not oxidized by air.	Used in the manufacture of chrome-steel or chrome-nickel-steel alloys, increases resistance and durability of metals.
Copper	63.55	1083° C	2595° C	Slowly soluble in ammonia water. Tendency to bioaccumulate.	Used in manufacture of bronze, brass, and other copper alloys, electrical conductors, and ammunition.
Lead	207.2	327.4° C	1740° C	Insoluble in water, but dissolves slowly in water with weak acid. Decomposition product of lead azide. Occurs naturally in soil and water.	Used in construction material for tank linings, piping, and other building construction, storage batteries, ammunition, gasoline additive.
Mercury	200.6	38.87° C	356.7° C	Insoluble in water, alcohol, and hydrochloric acid. Highly toxic.	Used in barometers, thermometers, mercury-arc lamps, mirrors, switches; catalyst in the oxidation of organic compounds.
Nickel	58.69	1455° C	2837° C	Not affected by water; stable in air at ordinary temperatures; burns in oxygen.	Used for nickel plating of alloys; storage batteries, magnets; electrical contacts and electrodes; spark plugs, machinery parts.
Silver	107.9	960.5° C	2212° C	Not attacked by water or atmospheric oxygen. Found native or occurring with Au, Cu, or Pb.	Used for coinage, electroplating, has been used to purify drinking water.
Sodium	22.98	97.82° C	881.4° C	Violently decomposes water forming sodium hydroxide and hydrogen which may spontaneously ignite.	Used in manufacture of sodium compounds such as cyanide, azide, peroxides; photoelectric cells.
Zinc	65.38	419.5° C	908° C	Not found native. Insoluble in water, soluble in acids and alkalis.	Used for galvanizing sheet iron; ingredient in alloys, electrical apparatus including dry-cell batteries.