BAE SYSTEMS
ORDNANCE SYSTEMS INC.

MATERIAL DATA SHEET

Manufacturer: ORDNANCE SYSTEMS INC. 4509 WEST STONE DRIVE KINGSPORT, TN 37660-9982	HOLSTON MSDS NUMBER: 4425

For Emergency Call CHEMTREC® 800-424-9300
For more information about this MSDS, call (423) 578-6345
The notation N/A is used to indicate that a section or item of information is not applicable for the chemical or ingredient.

SECTION I MATERIAL IDENTIFICATION

EFFECTIVE DATE: October 25, 2007 **LABEL NAME:** RDX	**OSI CHEMICAL NUMBER:** 506 **UN NUMBER:** 0072

CHEMICAL NAME: Cyclotrimethylene-trinitramine
TRADE, COMMON NAMES, OTHER: Cyclonite, Hexogen, FEM RDX
CHEMICAL FORMULA: $C_3H_6N_6O_6$ (RDX)
MOLECULAR WEIGHT: 222.1

HAZARD CODES/RATINGS: Fire – 4, Chemical Reactivity – 3, Skin – 2, Respiratory – 2 (See SECTION X for Hazard Rating Scales)

SECTION II HAZARDOUS INGREDIENTS OF MIXTURE

CHEMICAL NAMES	COMMON NAME(S)	WEIGHT %	ACGIH TLV (UNITS)
Cyclotrimethylene-trinitramine *CAS #121-82-4)	RDX, Hexogen, Cyclonite, FEM RDX		0.5 mg/m^3 Skin

SECTION III PHYSICAL DATA

BOILING POINT (°C): N/A **MELTING POINT (°C):** 190 minimum, 205 With Decomposition **VAPOR PRESSURE (mm Hg):** N/A	**VAPOR DENSITY (AIR = 1):** N/A **PERCENT VOLATILES WT. %):** N/A **SPECIFIC GRAVITY (H_2O = 1):** 1.8 **EVAPORATION RATE:** N/A (Physical data for RDX)

SOLUBILITY IN WATER: Insoluble
APPEARANCE AND ODOR: White, granular, odorless solid

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (°C): N/A **METHOD USED:** N/A	**FLAMMABLE LIMITS (VOL%)** **LEL:** N/A **UEL:** N/A

EXTINGUISHING MEDIA: Water sprinkler/deluge system recommended.

FIRE FIGHTING PROCEDURES: Do not attempt to manually extinguish fires. Burning explosives may accelerate to a detonation at any time when subjected to confinement, shock, or other sufficient initiation source.

No attempt to fight fires involving explosives should be made except for manual activation of installed fire extinguishing equipment. Personnel should leave the building immediately using as much protective cover as possible and activating deluge systems and fire alarm equipment while escaping

FIRE AND EXPLOSION HAZARDS: Must not be confined if burning. Confinement can cause deflagration or transition to detonation with extremely violent results. Explosives may be retained in fissures, cracks, and crevices of structures, equipment, and containers which have been exposed to explosives. Property which may be contaminated by explosives must not be subjected to heat, sparks, or flame. Detonation can occur. When in the particle size is smaller, as in the case of FEM RDX, a greater dust explosion hazard is present. Thermal decontamination under controlled conditions is the recommended method for complete decontamination. Thermal decontamination must be preceded by washing/steaming and chemical neutralization or dissolution. Contaminated property must not be buried.

SECTION V REACTIVITY DATA

STABILITY: RDX is a military high explosive. RDX has been assigned the United Nations Organization Classification of Class 1, Division 1 (mass detonating) based on the Department of Defense Explosives Hazard Classification Procedures, Army Technical Bulletin 700-2.

CONDITIONS TO AVOID: Avoid shock, heat, electrostatic discharge, impact, impingement and friction. High explosive will detonate when exposed to sufficient energy level.

MATERIALS TO AVOID: Avoid alkalis, particularly at elevated temperatures, strong acids and physical sensitizers such as glass, sand, and metal fragments..

HAZARDOUS DECOMPOSITION PRODUCTS: During decomposition toxic oxides of nitrogen are emitted.

HAZARDOUS POYLMERIZATION: Will not Occur

SECTION VI HEALTH HAZARD DATA

TOXICOLOGY: The toxicological properties of RDX have not been fully investigated. RDX LD-LO (lowest lethal dose) Oral – Rabbit – 500 mg/kg; Intraperitonel – Rat – 10 mg/kg; Oral – Cat – 100 mg/kg; Intravenous – Rat – 18 mg/kg; Oral – Mouse – 500 mg/kg. LD_{50} Oral - Rat – 100 mg/kg; Oral – Mouse – 500 mg/kg. TLV – 0.5 mg/m³ "skin" notation.

EFFECTS OF EXPOSURE:

SKIN AND EYES: Can cause allergic skin reaction. Can cause eye irritation. Avoid prolonged contact with skin. Avoid contact with eyes.

INHALATION AND INGESTION: Chronic exposure to RDX dust has been reported to cause convulsions or unconsciousness. Chronic local and systemic effects are not fully known. Inhalation and ingestion can result in systemic poisoning, usually affecting the bone marrow (blood-cell-producing system) and the liver. Avoid inhalation and ingestion of dust. When RDX particle size is very small, as in the case of FEM RDX, a greater respiratory hazard is present.

EMERGENCY AND FIRST AID PROCEDURES:

EYES: In case of contact, flush thoroughly with large amounts of low pressure water for at least 15 minutes. Get medical attention.

SKIN: Wash with soap and warm running water. Clean clothing thoroughly and dispose of shoes contaminated with explosives in accordance with explosive disposal procedures. Get medical attention for rash or irritation.

INHALATION (Dried solids or decomposition gases): Remove to fresh air, treat any irritation symptomatically. If breathing is difficult, give oxygen. Get medical attention.

INGESTION: If conscious, induce vomiting immediately by giving 1 or 2 glasses of water and touching back of throat with finger or blunt object or by giving syrup of ipecac. Never give anything by mouth to an unconscious person. Get medical attention.

SECTION VII SPECIAL PROTECTION INFORMATION

RESPIRATION PROTECTION: Use NIOSH approved respirator for dusts and particulates if exposed to dusting.

VENTILATION:

LOCAL EXHAUST: Hoods for dusty operations are required.

SPECIAL: Dust collection equipment required.

MECHANICAL: General, moderate

OTHER: N/A

PROTECTIVE GLOVES: If prolonged or repeated skin contact may occur, impervious gloves are recommended.

EYE PROTECTION: Industrial safety glasses with side shields are recommended for any type of industrial chemical handling.

OTHER PROTECTIVE EQUIPMENT: For explosive-handling workers, caps and coveralls for full body (arms & legs) protection are recommended. Cotton coveralls, underwear, socks, and conductive shoes are recommended to avoid human static discharge. A safety shower, an eye bath, and washing facilities should be available. As a precaution, handle only in well-ventilated areas, change clothing daily, bathe at the end of the work period, and wash hands thoroughly after handling.

SECTION VIII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN THE EVENT MATERIAL IS RELEASED OR SPILLED: Clean up spills immediately using a soft bristle brush and a rubber or plastic pan or shovel. Avoid pinching material, metal to metal contact, impact with sharp objects, friction or other situations which may initiate the explosive. Avoid sand, glass, grit, and metal fragments which may sensitize the material to impact and/or friction. Wet with water to desensitize.

WASTE DISPOSAL METHOD: Explosives should be destroyed by open burning, by burning in an approved incinerator, or by chemical treatment with caustics. The disposal site should be located to provide adequate quantity-distance protection for adjacent facilities and personnel. Explosives should not be burned in containers. The explosives should be ignited remotely. Personnel should wear flame resistant clothing. The disposal of explosives should comply with all applicable federal, state, and local regulations.

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Refer to Section IV for precautions when burning. Store and handle waste explosives as Class 1 explosives. Transport in accordance with the Department of Transportation regulations for Class 1.1 explosives. Obtain approval from appropriate Safety Agency before disposal

ECOLOGICAL EFFECTS: RDX has a benign effect in the environment. RDX does not bio-accumulate in living organisms. RDX is destroyed by both UV light and anaerobic processes: therefore it does not accumulate in sediments or on the ground surface and is eventually broken down is surface water. RDX is not acutely toxic in trace amounts (ref. EPA IRIS database.)

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN STORAGE AND HANDLING: High explosives should be stored in approved explosives magazines in accordance with AMCR 385-100. Storage and handling must be carried out in accordance with appropriate Safety Agency regulations concerning quantity distance, barricading, personnel exposure and material handling equipment. Recycle or dispose of used containers in accordance with appropriate Safety Agency regulations. In buildings and locations where explosives with spark energies for initiation not greater than 0.02 Joules are handled, the relative humidity should be 50% or greater. Dust generated by handling must be cleaned up on a continuing basis.

OTHER PRECAUTIONS: Explosives must be tested for compatibility with any materials which they contact. Materials include other explosives, solvents, adhesives, metals, plastics, paints, cleaning compound, floor and table coverings, packing materials, and other similar materials and equipment. Keep container closed. Wash thoroughly after handling. Wash contaminated clothing before reuse. Extreme care should be exercised during maintenance of explosive contaminated equipment. Decontamination procedures include washing/steaming, chemical decontamination, and thermal decontamination. Decontamination should be performed prior to welding, cutting or grinding metal parts. Penetrating oil should be used liberally on nuts, bolts, and all threaded connections to aid in desensitizing hidden explosives prior to disassembly. Refer to AMCR 385-100, paragraph 16-18.

SECTION X MISCELLANEOUS

HAZARD CODES/RATINGS:

FIRE HAZARD: 0 – Noncombustible; 1 – Low; 2 – Moderate; 3 – Severe; 4 – High
CHEMICAL REACTIVITY: 0 – Stable; 1 – Low; 2 – Moderate; 3 – Severe; 4 – High
SKIN HAZARD: 1 – Low; 2 – Moderate; 3 – High
RESPIRATORY HAZARD: 1 – Low; 2 – Moderate; 3 - High

OTHER: Additional information about the properties of explosives can be found in the Engineering Design Handbook, Explosives Series, Properties of Explosives of Military Interest, Army Material Command Pamphlet 706-177.

Additional information about fire fighting procedures; collection and destruction of waste; and storage and handling precautions can be found in the Army Safety Manual, Army Material Command Regulation 385-100 and the Department of Defense Contractor's Safety Manual for Ammunition, Explosives and Related Dangerous Material, DOD 4145.26M.

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