ROY F. WESTON, INC.

WESTON®
MANAGERS DESIGNERS/CONSULTANTS

SITE-SPECIFIC SAFETY & HEALTH PLAN

Non-Time Critical Removal Action
Causeway Phase I
Building Demolition & Causeway Preparation

Stratford Army Engine Plant - Stratford, Connecticut

Contract No. DAAD05-97-D-7004
Delivery Order No. 0187

AUGUST 2001

Prepared by

ROY F. WESTON, INC.
148 Eastern Boulevard
Glastonbury, Connecticut 06033

SITE SPECIFIC HEALTH AND SAFETY PLAN APPROVAL/SIGNOFF FORM

Non-Time Critical Removal Action
Phase I Causeway
Stratford Army Engine Plant
Stratford, Connecticut

Contract Number: DAAD05-97-D-7004

SITE HEALTH AND SAFETY PLAN APPROVALS

By their specific signature, the undersigned certify that this Site Specific Health and Safety Plan is approved for utilization during the Non-Time Critical Removal Action (Phase I Causeway) at the Stratford Army Engine Plant in Stratford, Connecticut.

WESTON – Program Manager Todd Walles	8/3/01 Date
WESTON - Project Manager John-Eric Andersson	8/3/01 Date
WESTON - Program CIH George M. Crawford, CIH	8/3/01 Date
WESTON - Site Manager Steven A. O'Brien	8/3/01 Date

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

ACM ..... Asbestos Containing Material
AST ..... Aboveground Storage Tank
BEC ..... Base Environmental Coordinator
BRAC ..... Base Realignment and Closure Act
CDC ..... Center for Disease Control
CERCLA ..... Comprehensive Environmental Response, Compensation and Liability Act
CGI/O2 ..... Combustible Gas Indicator/Oxygen Meter
CQCP ..... Contractor Quality Control Plan
CRZ ..... Contamination Reduction Zone
EC ..... Emergency Coordinator
Engineer ..... Harding ESE Representative
EMS ..... Emergency Medical Services
EPP ..... Environmental Protection Plan
EZ ..... Exclusion Zone
FID ..... Flame Ionization Detector
FLD ..... Field Operating Procedures
FM ..... Factory Mutual Engineering Corp.
HAZWOPER ..... Hazardous Waste Operations & Emergency Response
HCS ..... Hazard Communication Standard
HR ..... Heart Rate
IDLH ..... Immediately Dangerous to Life or Health
IPM ..... International Property Management Representative
LEL ..... Lower Exposure Limit
MSDS ..... Material Safety Data Sheets
NESC ..... National Electrical Safety Code
NCP ..... National Oil and Hazardous Substances Pollution Contingency Plan
NCRA ..... Non-time Critical Removal Action
NIOSH ..... National Institute for Occupational Safety and Health
OHP ..... Occupational Health Program
OHS ..... Occupational Health Services
OSHA ..... Occupational Safety and Health Administration
PCBs ..... Polychlorinated biphenyls
PID ..... Photo Ionization Detector
PM ..... Project Manager
PPE ..... Personnel Protective Equipment
RCRA ..... Resource Conservation and Recovery Act
RSRs ..... Remediation Standard Regulations
SAEP ..... Stratford Army Engine Plant
SAP ..... Sampling and Analysis Plan
SCBA ..... Self Contained Breathing Apparatus
SHM ..... Safety and Health Manager
SHSC ..... Site Health and Safety Coordinator
SOW ..... Scope of Work
SS ..... Site Superintendent
SHSC ..... Site Health & Safety Coordinator
SSHP ..... Site-Specific Safety and Health Plan
SZ ..... Support Zone
TCE ..... Trichloroethylene
QA/WC ..... Quality Assurance/Quality Control
VOCs ..... Volatile Organic Compounds
WESTON ..... Roy F. Weston, Inc.

1. INTRODUCTION

1.1 PROJECT DESCRIPTION

This Site-Specific Safety and Health Plan (SSHP) was prepared by Roy F. Weston, Inc. (WESTON®) for the Scope of Work (SOW) described by the U.S. Army Corps of Engineers – New England District (CENAE) and Harding ESE Inc. (Harding) for the work at the Stratford Army Engine Plant (SAEP) in Stratford, Connecticut. This work will be performed under the Directorate of Safety, Health and Environment (DSHE) Base Environmental Support (BEST) Contract (Delivery Order No. 0187 of Contract No. DAAD05-97-D-7004) to fulfill the requirements of the Base Realignment and Closure Act (BRAC),.

The information contained in this SSHP is specific to the SAEP project site. Per discussions held with CENAE at the Pre-Construction Meeting, WESTON submits this SAEP for approval with the understanding that the procedures and requirements of WESTON's corporate Health & Safety Plan (HASP) and Field Operating Procedures (FLDs) will apply to this project. These documents have been historically reviewed and approved by and are currently on file with CENAE. Therefore, in the interest of expedited review and approval of this SSHP, WESTON has not attached a copy of the HASP, as is our standard practice format. The corporate HASP and FLD will be maintained at the WESTON on-site project office.

The work for this project will generally include the following:

- *Mobilization & Pre-Construction*: including; plan preparation, a job opening meeting, site specific health and safety orientation, equipment delivery, a brief environmental survey of the work area to identify and test potentially hazards environmental conditions and materials (i.e. light ballasts, paints, suspected ACM, radiation screening). Data collected during the survey will be incorporated into the Site Safety and Health Plan (SSHP).

- *Site Preparation*: including; construction layout, installation of heave platforms, installation of erosion and sedimentation controls, set-up of temporary waste and equipment staging areas, set-up of the temporary project field offices (Building 4), well abandonment, and tree/brush removal and chipping.

- *Demolition*: The initial field construction tasks following site preparation will include demolition at three work locations, specifically, Building 5, Building 59 and the former containment area adjacent to Building 34. Subsequent tasks will include demolition and material removal from the Causeway, removal of the boat ramp, weather station and bulky concrete oversized debris.

- *Soil Excavation* at six distinct areas on the Causeway found to contain elevated concentrations of VOCs, SVOCs, vanadium and zinc.

- *Waste Management* prior to disposal including: handling, stockpiling, containerization, sampling and loading.

- *Site Restoration and Preparation for Phase II Construction*: including; completion of a topographic survey of the causeway, submittal of Phase I as-built drawings, pavement of the building 34 containment area, disposal of demolition waste and unsuitable materials.

- *Decontamination & Demobilization* of non-essential equipment and sampling of decontamination liquids for suitability for treatment through the Building 63 Chemical Waste Treatment Plant. Phase II construction is anticipated to immediately follow Phase I. Equipment not retained for use during Phase II will be decontaminated and demobilized.

- *Phase I Completion Report*

1.2 PROJECT REQUIREMENTS

Appropriate, Relevant and Applicable Requirements (ARARs) for this project include the following:

- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA);
- National Oil and Hazardous Substances Pollution Contingency Plan (NCP);
- Base Realignment and Closure Act (BRAC) Cleanup Plan Guidebook;
- Resource Conservation and Recovery Act (RCRA);
- Connecticut Department of Environmental Protection's (CT DEP) Remediation Standard Regulations (RSRs);
- Occupational Safety and Health Administration (OSHA); 10 CFR 20, 29 CFR 1904. 1910 and 1926; 40 CFR 61, 763; 49 CFR 171, 172, 173, 177-179;
- U.S. Army Corps of Engineers Safety and Health Requirements Manual EM 385-1-1;
- Other specific requirements detailed in the text, Table 2-1, and Appendix A of the Non-time Critical Removal Action Basis of Design Causeway Design, Harding ESE May 2001.

1.3 SITE DESCRIPTION

1.3.1 Site Location and Description

The Stratford Army Engine Plant (SAEP) is located at 550 Main Street in Stratford, Fairfield County, Connecticut (see Figure 1-1). SAEP occupies approximately 124 acres, with an estimated 76 acres of improved land housing 49 buildings, five paved parking lots, paved roadways and grounds, and an estimated 10 acres along the Housatonic river where fill was placed, including the Causeway. Between the early 1900s through 1998 the property was used for the manufacturing and testing of military and commercial engines. Other historical operations included the manufacturing and assembly of missile components. Industrial processes included milling, fabricating and plating.

1.2.2 Site Background

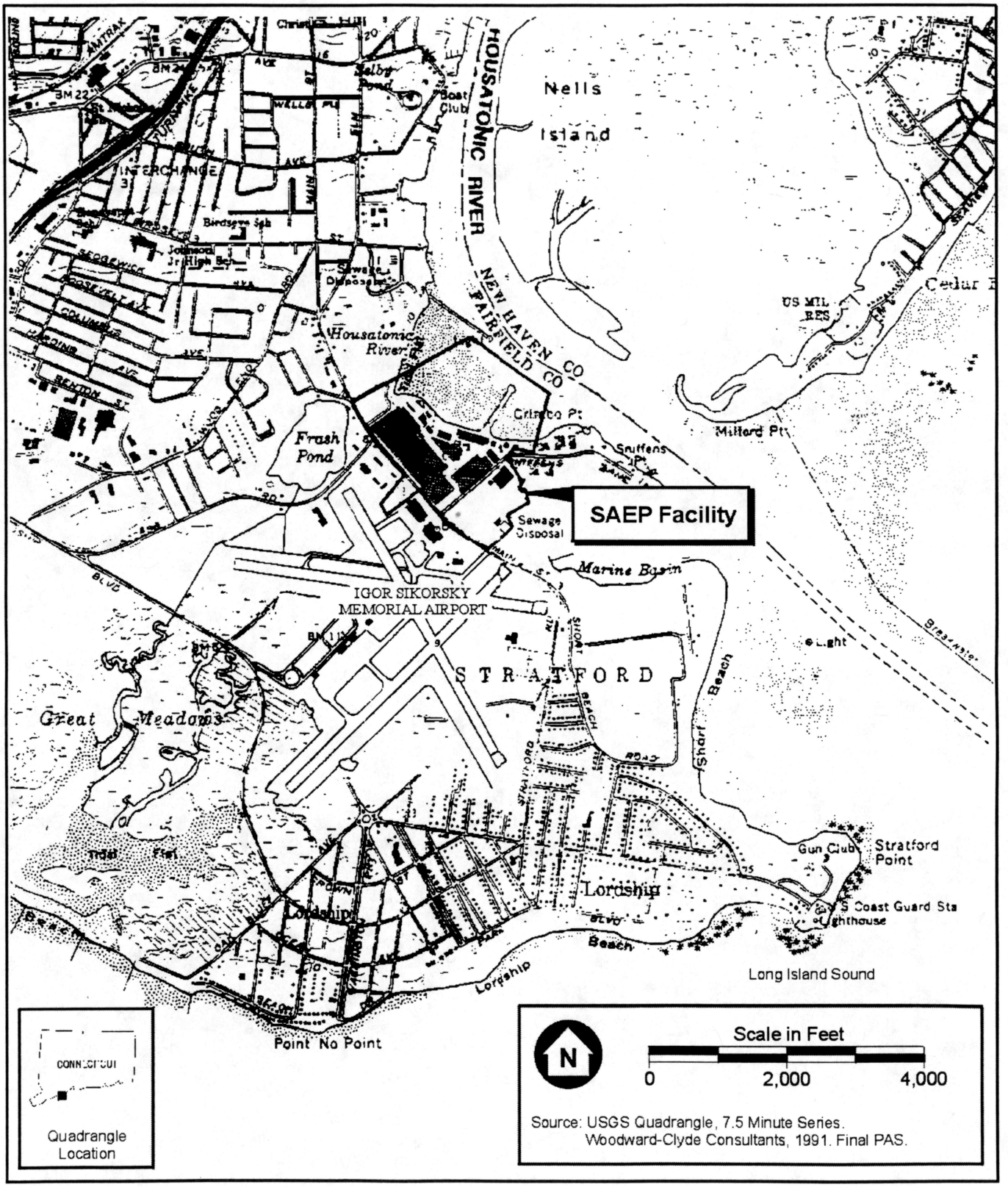
The Causeway was originally built during the 1930's to allow for seaplane access to the property. The source of the fill used to construct the Causeway is currently unknown. Additional material of unknown origin was reportedly deposited on the northern edge of the Causeway during the 1950s and 1960s. Harding advanced several soil borings along the Causeway and has collected soil and groundwater sample data. Contaminants of concern identified by Harding include VOCs, SVOCs, polychlorinated biphenyls (PCBs), and metals. Table 3-1 presents contaminant concentrations detected in soil borings (CB) and test pits (TP) on the Causeway.

Between April 2000 and May 2001, Foster Wheeler and Harding ESE (Harding) generated several investigation and engineering reports detailing site contaminants, past uses and future plans for the Causeway portion of the site. The Non-time Critical Removal Action (NCRA) Basis of Design (Harding) dated May 2001 identifies six locations on the Causeway requiring soil removal due to concentrations of VOCs, SVOCs, vanadium or zinc in excess of the CT Remediation Standard Regulations (RSRs) Pollution Mobility Criteria, ten times the Groundwater Protection Criteria, or ten times the federal Ambient Water Quality Criteria (AWQC).

During the manufacture, testing and development of high performance military engines certain engine components used contained radioactive components, primarily thorium. The site was licensed by the Nuclear Regulatory Commission (NRC) while conducting these activities. According to Harding, during geotechnical investigation work on the Causeway low-level radioactive contamination was discovered. The affected area was remediated by Honeywell in March 2000. The NRC licensing has since been terminated.

Phase I includes those activities necessary to prepare the Causeway for installation of an engineered cover system (Phase II). The cover system is being installed to comply with the regulatory requirements established for the closure of this facility. Also included in Phase I is the demolition of Buildings 5, 59, and the former aboveground storage tank (AST) containment area adjacent to Building 34. The ASTs were previously removed, the containment area filled with clean fill and capped with asphalt. Building 5 , Building 59 and the Building 34 containment area are being demolished to improve access to the Causeway.

Figure 1-1
Site Location Map



2. PROJECT PERSONNEL AND RESPONSIBILITIES

2.1 STAFFING AND RESPONSIBILITIES

An organizational chart naming WESTON staff responsible for control and execution of this project is presented as Figure 2-1. A discussion of the roles and responsibilities of the key WESTON personnel is provided in the subsections that follow.

Key Project Team Members

ANTHONY RICCIO, Program Manager

Mr. Riccio has more than 25 years of engineering and construction experience. He has worked extensively with the USACE, New England and New York Districts. Mr. Riccio will be an advocate for SAEP, and routinely solicit feedback on WESTON's performance. He will assist in reviewing deliverables, participating in site inspections and meetings, and conduct quality assurance reviews.

TODD K. WALLES, Regional Operations Manager

Mr. Walles is a certified Project Management Professional (PMP), and has more than 16 years of experience at WESTON. Mr. Walles has the authority to direct resources, address contractual matters, and negotiate on behalf of WESTON. Mr. Walles will provide leadership and direction to ensure that project activities are conducted in a manner that is consistent with CENAE and SAEP objectives.

JOHN-ERIC ANDERSSON, Project Manager

Mr. Andersson is an experienced environmental professional in the areas of environmental compliance and remediation project management. In the role of Project Manager, Mr. Andersson will be responsible for the technical and operations management of safety, quality, schedule, resources, and costs. Mr. Andersson is qualified to act as an Alternate Site Health & Safety Coordinator (SHSC), as necessary.

STEVEN O'BRIEN, Construction Superintendent

Mr. O'Brien has more than 15 years of experience supervising the construction of environmental projects. On the SAEP Causeway project, Mr. O'Brien will supervise construction and direct on-site WESTON resources and subcontractors. His responsibilities will include managing the daily execution of work, recording of work progress, and coordination with CENAE, SAEP, Harding and other project representatives. Mr. O'Brien is qualified to act as an Alternate SHSC, as necessary.

ANDREW HARRIS, Construction Quality Control

Mr. Harris is experienced in performing remedial actions and in the preparation of technical specifications for demolition projects. He will be the Quality Control lead during implementation of Phase I. Prior to mobilization, he will lead the preparation of project plans, permit reviews and procurement packages. He will also assist with project management, record keeping, and technical reports.

TIMOTHY LAQUERRE, Site Health & Safety Coordinator

Mr. Laquerre is an experienced safety and construction manager, with more than 12 years of experience. During Phase I, Mr. Laquerre will perform safety briefings, subcontractor oversight, safety inspections and record keeping, and task-specific supervision of the construction crew.

Project Support Specialists

JOSEPH WASIUK, P.E., Senior Construction/QC Manager

Mr. Wasiuk has over 25 years of experience in environmental engineering and construction. On the SAEP Causeway project, he will assist the Project Team, as needed, to ensure the schedule and quality of WESTON's work. Mr. Wasiuk will conduct quality assurance reviews, participate in meetings, and inspect and review work in progress. In addition, Mr. Wasiuk will work closely with Mr. Andy Harris to ensure proper implementation of the QC program.

DAVID COSTOLNICK, P.G., LEP, Technical Director

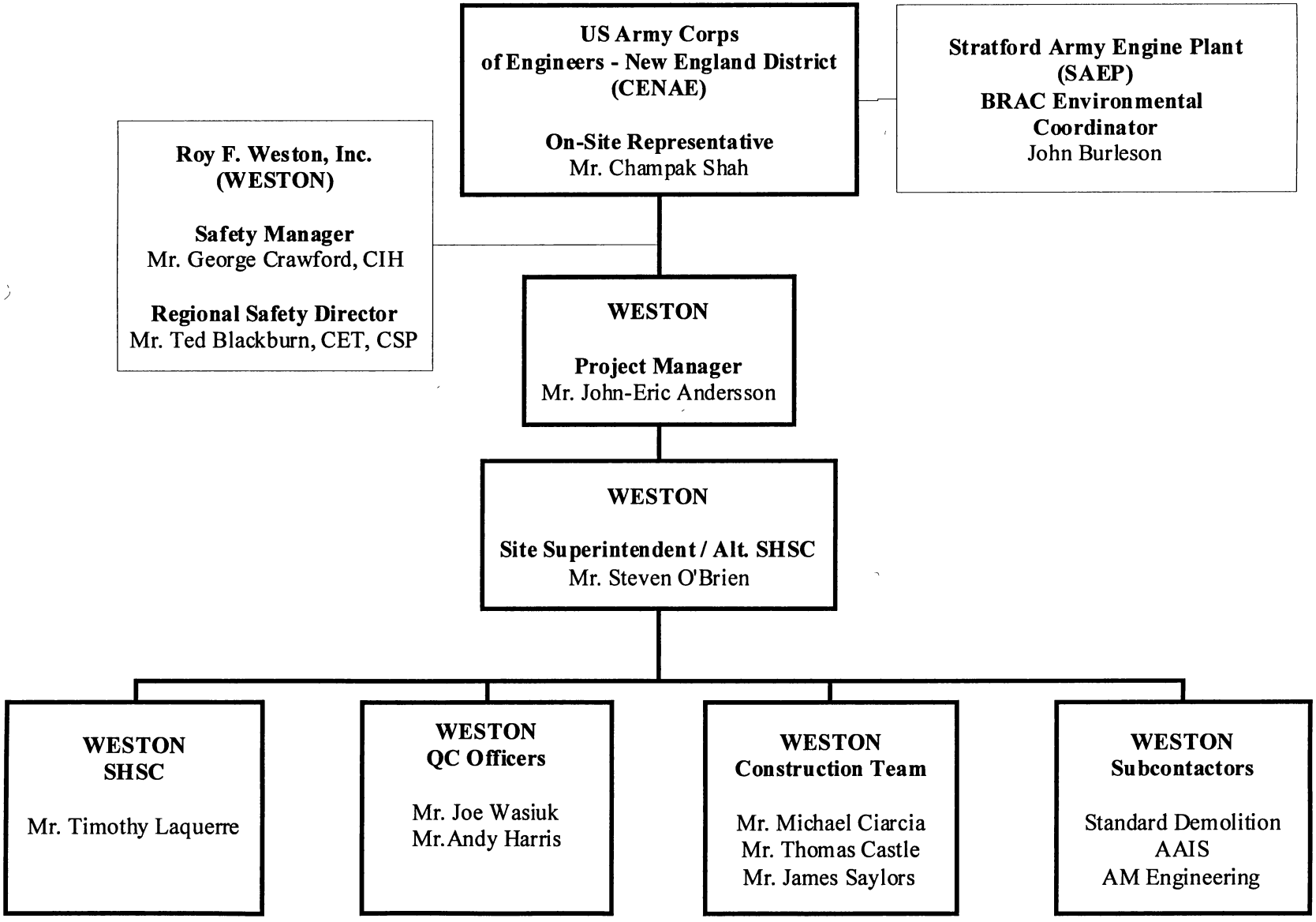
Mr. Costolnick has more than 17 years of experience in the assessment, investigation, and remediation of hazardous waste sites. Mr. Costolnick is a Licensed Environmental Professional (LEP) in the State of Connecticut, a certified hazardous materials manager (CHMM) and has practical experience evaluating contaminated sites versus the Connecticut remediation standard regulations (RSRs). Mr. Costolnick will review environmental data and consult with the team on an as-needed basis.

GEORGE M. CRAWFORD, JR., CIH, Safety Manager

Mr. Crawford has more than 30 years of experience in health, safety, industrial hygiene, hazardous materials response, and occupational health management. Mr. Crawford is the program-level Certified Industrial Hygienist (CIH) for all of WESTON's assignments under the Directorate of Safety, Health and Environment (DSHE) Base Environmental Support (BEST) contract and current CENAE contracts.

For the SAEP Causeway project, Mr. Crawford is the Health and Safety Director and Certified Industrial Hygienist. He will review and approve the Site-Specific Safety and Health Plan (SSHP) and assist with changes and amendments to the SSHP and other environmental compliance assurance reviews.

Figure 2-1 Health & Safety Organizational Chart



2.2 WESTON SUBCONTRACTORS

Subcontractors will be brought onto the site for the specialty services listed below. These subcontractors will be under the direct supervision of the WESTON Construction Superintendent, and will be required to comply with the established SAEP security and communications procedures.

NAME	SERVICE
Standard Demolition	Demolition
Asbestos Abatement & Insulation Services (AAIS)	Asbestos Abatement
AM Engineering	Surveying
Advanced Diving Technology	Marine Construction
Mitkem Corporation	Laboratory

3. CONTAMINANT CHARACTERIZATION

According to the Non-time Critical Removal Action (NCRA) Basis of Design (Harding) dated May 2001 six locations on the Causeway contain contaminants of concern that exceed CT DEP RSR's. Previous consultants identified these areas during subsurface investigations as part of the design for the Causeway cover system. Low-level radiological contamination was identified during sampling on the Causeway and the affected areas were excavated in March 2000. Table 3-1 presents contaminant concentrations detected in soil borings (CB) and test pits (TP) on the Causeway.

In addition to these areas of soil remediation, the Scope of Work (SOW) for Phase I Construction and Demolition has identified hazardous and potentially hazardous building materials, including asbestos, lead-containing paint, and fluorescent light ballasts, that may be encountered during site work. Based on the analytical results of this investigation, the contaminants of concern were identified as presented in Table 3-1. The chemical data sheets for the contaminants of concern are provided in Appendix E.

Table 3-1
Contaminants of Concern

Contaminant	Concentration	Contaminant	Concentration
VOCs		**SVOCs continued**	
Cis, 1-2 DCE	120 mg/kg	Fluorene	250 mg/kg (J)
Methylene Chloride	3.3 mg/kg (J)	Hexachlorobenzene	1.4 mg/kg
Tetrachloroethene	81 mg/kg	Indeno(1,2,3-cd)Pyrene	350 mg/kg
Trichloroethylene	8.8 mg/kg	Napthalene	97 mg/kg (J)
Vinyl Chloride	24 mg/kg	Phenanthrene	2400 mg/kg
		Pyrene	1800 mg/kg (J)
SVOCs			
2-Methylnaphthalene	45 mg/kg	**PCB**	
Acenaphthene	190 mg/kg	Aroclor-1016	1.2 mg/kg (J)
Anthracene	520 mg/kg (J)	Aroclor-1260	2.2 mg/kg
Benzo(a)Anthracene	1200 mg/kg (J)		
Benzo(a)Pyrene	880 mg/kg (J)	**Inorganics**	
Benzo(b)Fluoranthene	940 mg/kg (J)	Arsenic	34.5 mg/kg
Benzo(k)Fluoranthene	880 mg/kg (J)	Beryllium	13.1 mg/kg
Carbazol	310 mg/kg	Cadmium	94.7 mg/kg
Chrysene	2700 mg/kg	Lead	1510 mg/kg (J)
Dibenz(a,h)Anthracene	8.1 mg/kg	Thallium	8.3 mg/kg
Dibenzofuran	130 mg/kg	Vanadium	2640 mg/kg
Fluoranthene	2700 mg/kg	Zinc	41.4 mg/kg (J)

Note: J=estimated value

3.1 CHEMICAL HAZARDS: ON SITE ACTIVITIES

Phase I activities may require that chemicals be brought on site in support of heavy equipment operation and maintenance, air monitoring, and decontamination. The following chemicals may be used during site activities:

- Alconox/liquinox
- Calibration gases (methane, isobutylene, pentane)
- Diesel fuel
- Gasoline
- Oil & Grease

A Site Specific Hazard Communication Program as described in Appendix D, will be established by the Site Safety and Health Officer. An inventory of the chemicals and MSDSs will be available for review in the MSDS binder maintained in the WESTON site office. All subcontractors shall inform WESTON of all chemical materials brought on-site and the location of their MSDSs.

4. SCOPE OF WORK AND FIELD ACTIVITIES

The primary objective of this project is to prepare the Causeway for cap system construction and to demolish buildings 5, 59, and the building 34 AST containment berm. To accomplish this objective, WESTON will perform the following tasks:

- Task 1. Mobilization: This task will include procurement and mobilization of all equipment and personnel necessary to perform the work.

- Task 2. Site Preparation: This task will include installation of erosion and sedimentation controls, clearing and grubbing, and establishing equipment staging and material stockpile areas, abandonment of monitoring well MW-00-01 and protection of the remaining four monitoring wells.

- Task 3. Demolition: This task will include demolition at three work locations, specifically, Building 5, Building 59, and the former AST containment area adjacent to Building 34. Subsequent tasks will include demolition and material removal from the Causeway, including the boat ramp, weather station, and oversized concrete and debris.

- Task 4. Soil Excavation: This task will include advancing five-foot wide by two-foot deep excavations at six locations identified on the Causeway site plans provided by the Engineer. On-site Harding representatives will direct WESTON to the exact location of the excavations and be responsible for post-excavation confirmation sampling.

- Task 5. Management of wastes: This task will include handling of waste materials, and maintenance of stockpiles and container storage areas prior to waste disposal.

- Task 6. Site Restoration: This task will include completion of sub-grade preparation for Phase II construction, completion of an A-1 topographic survey of the causeway, submittal of Phase I as-built drawings, pavement of the Building 34 containment area, disposal of demolition waste and unsuitable materials.

- Task 7. Demobilization: This task will include removing all equipment, trailers and excess materials from the site not required for Phase II activities.

5. ACTIVITY HAZARD ANALYSIS

The activity hazard analysis is an ongoing process from the initiation of the SSHP preparation through the implementation and completion of the project. Therefore, the activity hazard analyses shall be completed for each activity associated with the project. Site-specific activity hazard analyses are presented in this Section. WESTON Field Operating Procedures (FLDs) are contained in the WESTON Safety Officer Field Manual. The manual will be maintained on-site. The hazards associated with each activity and the control measures are provided Table 5-1.

Equipment, inspection, and training requirements for each activity are identified in Table 5-2. Inspection and training requirements for the FLDs referenced in the Activity Hazard Analysis tables in this section are described in WESTON's corporate Health & Safety Plan. Health and safety equipment to be used, such as monitoring instruments and Personnel Protective Equipment (PPE), is specified in subsequent sections of this SSHP. Additional field equipment is specified in the Work Plan (WP) and Sampling and Analysis Plan (SAP) for this project.

5.1 PHYSICAL HAZARDS

In addition to the physical hazards outlined in the Activity Hazard Analysis Sheets (see Table 5-1), special physical hazards that have the potential to affect worker safety are addressed below.

5.1.1 Excavations

Excavations will be barricaded or marked (barricade tape, safety fence and/or traffic cones or equivalent) during active excavation activities. In the event excavations must remain open prior to backfill, those excavations will be fenced or barricaded. Compliance with OSHA, 29CFR1926 Subpart P, and COE EM 385-1-1, Section 25, will be maintained. Connecticut state and local regulations will be followed as pertain to traffic control plans.

Contaminated source area soil will be removed and placed in a staging location where it will be covered. Persons involved in handling the soil should handle it carefully to avoid spreading the contamination.

5.1.2 Working With/Around Heavy Equipment

Equipment used to remove the soil, and handle materials will be inspected daily, maintained according to the manufacturer's directions, and will be operated by qualified operators. Gross contamination shall be removed from equipment each day. Solids and rinsate from decontamination activities will be contained and disposed of at the on-site decontamination sump. Personnel shall not walk underneath the loads being removed and shall stay clear of the turning radius of the machinery. A two-way radio communication system will be used for the excavation and transportation to avoid traffic hazards. High visibility vests will be worn.

5.1.3 Working Over/Near Water

All equipment and procedures used while working over or near water will conform to US Coast Guard and/or OSHA requirements and applicable local regulations. WESTON has established a Field Operating Procedure (FLD) for this type of activity, a copy of which is on file with CENAE and will be maintained on site.

Table 5-1
Activity Hazard Analysis

Activity 1 - Mobilization

Activity 1	Hazards	Hazard Control
This activity will involve the mobilization of equipment and personnel necessary to perform the work and the completion of a baseline site environmental hazards inspection and sampling event.	***Chemical Hazards***—Minimal intrusive activities and therefore, the level of risk of exposure to site contaminants during these activities is low.	Work will begin in level D for mobilization. A brief environmental inspection and sampling event will be conducted to identify potential hazardous building materials/components and conditions including· PBC light ballasts, mercury switches, etc and a radiation survey of the work area. Baseline air monitoring will be conducted to ensure the levels of protection are correct. Personnel conducting the Baseline environmental survey will utilize modified level D PPE Action levels established in the Table 6-1 will be used.
	Physical Hazards—Slip, trips, falls, tools, terrain or vegetation, uneven walking surfaces. Weather hazards, such as snow and ice, lightning; and poor visibility.	The work area shall be visually inspected. Slip, trip, and fall hazards shall be either removed or marked and barricaded. Sufficient illumination shall be maintained. Site personnel shall conduct walkover in groups of two as a minimum. Site personnel shall refer to and follow WESTON FLDs 02-Inclement weather and 39-Illumination. Also, see FLD 11 and 12.
	Housekeeping	Materials will be stored to prevent intrusion into the work areas. Work areas will be kept organized and ice, snow, and mud will be cleared from steps to reduce slip hazards. See FLD12
	Strains and sprains from manually lifting and moving.	Use proper lifting techniques such as keeping straight back, lifting with legs, avoid twisting back, use mechanical equipment, or get help from others. See FLD 10.
	Fire	Flammable liquids will be stored in safety containers and flammable storage cabinets. Propane cylinders will be stored outside in secured areas. Fuel storage tanks will be placed in impermeable dikes. Properly rated fire extinguishers will be placed within 50 ft of the fuel storage area, in construction equipment, and strategically in the construction area.
	Hands or fingers caught between objects; abrasions and lacerations.	Personnel shall be made aware of the hazard and asked to coordinate carefully the handling and placement of heavy objects. Materials and objects being handled will be inspected for rough or sharp edges, and appropriate precautions shall be taken to avoid contact. Personnel shall wear work gloves and avoid placing hands between objects.

Activity 1	Hazards	Hazard Control
	Electric Hazards	Generators will be grounded unless self-grounded. Extension cords will be properly rated for intended use. Prior to any intrusive activity, authorities will be contacted for permits. Elevated parts of machinery, ladders, and antennas will be kept at least 10' from overhead electric lines. Qualified electricians will make electrical installations. A lockout/tagout program consistent with FLD42 will be used for equipment maintenance.
	Moving mechanical parts from heavy equipment operations.	Personnel shall be made aware of the hazard and will coordinate carefully during handling equipment operations. Guards will be kept in place during operation. Maintain safe distance from moving mechanical parts. Always use appropriate PPE. See FLD 22.
	Hand tools, manual and power.	Tools shall be inspected prior to use. Damaged tools will be tagged out of service until a qualified person can perform repair. Use tools properly and for their intended purpose. All power circuits used for hand tools will be protected by a ground fault circuit interrupter (GFCI). See FLD 38.
	Grubbing and vegetation removal. Chain saws and chippers.	Qualified persons will operate chain saws and chippers. Chain saw operators will wear chaps. Chippers will be inspected before use, operators will be refreshed in operation by the vendor, all guards will be in place, and per EM 385-1-1 direction, the distance from chipping blades to the ground along the center line of the feed hopper will be maintained at 72 inches. Persons cutting trees will be appropriately trained and experienced. Trees to be cut will be checked by experienced persons prior to cutting to identify increased hazard situations. Experienced persons, if required, will do tree climbing. Climbing gear will be inspected and will conform to EM 385-1-131.B.1. Retreat routes from trees to be cut will be planned before cutting begins, and no one except the tree cutter will be permitted within 2 tree lengths of trees being cut. See FLD 47.

Activity 1	Hazards	Hazard Control
	Striking and being struck by operating equipment, loads, falling objects, and pinch points.	Workers shall stay out of the swing area of all equipment and from under loads. No personnel shall ride on the equipment unless seats are provided. See FLD 20, 22A, 23, and 24. Workers with potential exposure to traffic hazards will wear traffic safety vests. Vehicles will be checked during maintenance and cribbed if wheels need to be changed.
	Inclement weather, Heat/Cold stress	Workers shall be briefed and cognizant of heat and cold stress symptoms. Fluids will be available to workers. See FLD 05 and 06. Work rest periods will be established according to ACGIH and NIOSH guidelines.
	Traffic	Work areas will be clearly barricaded and appropriate signs displayed. Traffic will be rerouted as necessary. Persons working near roadways or directing traffic will wear high visibility vests. See FLD 20.
	Biological—Poisonous plants, insects, and snakes.	Review recognition of poisonous plants, insects, or snakes typical of this area. Use appropriate measures as required. Adhere to WESTON Bloodborne Pathogens Exposure Control Plan—First Aid Procedures FLD43.
	Radiation—ionizing: Previous investigations identified low-level radioactive material on-site. The affected areas were remediated by prior consultants. A work area radiation survey will be completed on the Causeway during site set-up to confirm no hazard exists Non-ionizing: Potential sun burn/sun poisoning hazard on bright, sunny days.	A baseline radiological survey of the Causeway will be conducted to verify removal of historical low-level radiological sources. Utilize appropriate PPE to prevent exposure via ionizing radiation. Personnel will comply with the requirements of the Site-Specific Radiation Dosimetry program detailed in this SSHP. Use sunblock as appropriate. Avoid direct exposure to sun for long periods of time. If Nuclear Density Gauges are used, they will be properly licensed and will be operated by qualified technicians

Activity 2 – Site Preparation

Activity 2	Hazards	Hazard Control
This activity will involve the installation of E&S controls, clearing and grubbing of the Causeway, abandon monitoring well mw-00-01, and protecting the remaining four wells.	***Chemical Hazards***—Minimal intrusive activities (grubbing, well abandonment) and therefore, the level of risk to exposure to site contaminants during these activities is low.	Work will begin in level D with the potential for upgrade based on contact potential and on monitoring results. Care must be taken when abandoning the monitoring well to minimize contact with potentially contaminated groundwater. Personnel will also avoid contact with soil while handling stumps and roots. At a minimum, gloves must be worn while handling roots and stumps. Well abandonment personnel will wear appropriate PPE for splash hazards to prevent dermal contact. Avoid liquid pools if possible. A background survey with PID/FID will be conducted to ensure the levels of protection are correct prior to initiating work. Continuous air monitoring for organic vapors will be conducted during well abandonment and grubbing. Dust monitoring will also be conducted during grubbing activities. Action levels established in the Table 6-1 will be used.
	Physical Hazards—Slip, trips, falls, tools, terrain or vegetation; uneven walking surfaces. Weather hazards, such as snow and ice, lightning; and poor visibility.	The work area shall be visually inspected. Slip, trip, and fall hazards shall be either removed or marked and barricaded. Sufficient illumination shall be maintained. Site personnel shall conduct walkover in groups of two as a minimum. Site personnel shall refer to and follow WESTON FLDs 02-Inclement weather and 39-Illumination. Also, see FLD 11 and 12.
	Housekeeping	Materials will be stored to prevent intrusion into the work areas. Work areas will be kept organized and ice, snow and mud will be cleared from steps to reduce slip hazards. See FLD12
	Strains and sprains from manually lifting and moving.	Use proper lifting techniques such as keeping straight back, lifting with legs, avoid twisting back, use mechanical equipment, or get help from others. See FLD 10.
	Fire	Flammable liquids will be stored in safety containers and flammable storage cabinets. Propane cylinders will be stored outside in secured areas. Fuel storage tanks will be placed in impermeable dikes. Properly rated fire extinguishers will be placed within 50 ft of the fuel storage area, in construction equipment, and strategically in the construction area.
	Hands or fingers caught between objects; abrasions and lacerations.	Personnel shall be made aware of the hazard and asked to coordinate carefully the handling and placement of heavy objects. Materials and objects being handled will be inspected for rough or sharp edges, and appropriate precautions shall be taken to avoid contact. Personnel shall wear work gloves and avoid placing hands between objects.

Activity 2	Hazards	Hazard Control
	Electric Hazards	Generators will be grounded unless self-grounded. Extension cords will be properly rated for intended use. Prior to any intrusive activity, authorities will be contacted for permits. Elevated parts of machinery, ladders, and antennas will be kept at least 10' from overhead electric lines. Qualified electricians will make electrical Installations. A lockout/tagout program consistent with FLD42 will be used for equipment maintenance.
	Moving mechanical parts from heavy equipment operations.	Personnel shall be made aware of the hazard and will coordinate carefully during handling equipment operations. Guards will be kept in place during operation. Maintain safe distance from moving mechanical parts. Always use appropriate PPE. See FLD 22.
	Hand tools, manual and power.	Tools shall be inspected prior to use. Damaged tools will be tagged out of service until a qualified person can perform repair. Use tools properly and for their intended purpose. All power circuits used for hand tools will be protected by a ground fault circuit interrupter (GFCI). See FLD 38.
	Grubbing and vegetation removal. Chain saws and chippers.	Qualified persons will operate chain saws and chippers. Chain saw operators will wear chaps. Chippers will be inspected before use, operators will be refreshed in operation by the vendor, all guards will be in place, and per EM 385-1-1 direction, the distance from chipping blades to the ground along the center line of the feed hopper will be maintained at 72 inches. Persons cutting trees will be appropriately trained and experienced. Trees to be cut will be checked by experienced persons prior to cutting to identify increased hazard situations. Experienced persons, if required, will do tree climbing. Climbing gear will be inspected and will conform to EM 385-1-131.B.1. Retreat routes from trees to be cut will be planned before cutting begins, and no one will be permitted within 2 tree lengths of trees being cut. See FLD 47.

Activity 2	Hazards	Hazard Control
	Striking and being struck by operating equipment, loads, falling objects, and pinch points.	Workers shall stay out of the swing area of all equipment and from under loads. No personnel shall ride on the equipment unless seats are provided. See FLD 20, 22A, 23, and 24. Workers exposed to traffic hazards will wear traffic/reflectorized vests. Vehicles will be checked during maintenance and cribbed if wheels need to be changed.
	Inclement weather, Heat/Cold stress	Workers shall be briefed and cognizant of heat and cold stress symptoms. Fluids will be available to workers. See FLD 05 and 06. Work rest periods will be established according to ACGIH and NIOSH guidelines.
	Traffic	Work areas will be clearly barricaded and appropriate signs displayed. Traffic will be rerouted as necessary. Persons working near roadways or directing traffic will wear high visibility vests. See FLD 20.
	Biological—Poisonous plants, insects, and snakes.	Review recognition of poisonous plants, insects, or snakes typical of this area. Use appropriate measures as required. Adhere to WESTON Bloodborne Pathogens Exposure Control Plan—First Aid Procedures FLD43.
	Radiation—. Based on site history and previous investigation work, the potential for sources of ionizing radiation exist. Potential sun burn/sun poisoning hazard on bright, sunny days.	Previous investigations identified low-level radioactive material on-site. The affected areas were remediated. A work area radiation survey will be completed during site set-up to confirm no hazard exists. Real time radiation monitoring will be conducted during intrusive activities (grubbing). Personnel will comply with the requirements of the site-specific radiation dosimetry program detailed in this SSHP. Use sunblock as appropriate. Avoid direct exposure to sun for long periods of time. If Nuclear Density Gauges are used, they will be properly licensed and will be operated by qualified technicians.

Activity 3—Demolition and Soil Excavation

Activity 3	Hazards	Hazard Control
Building 5, 59 and the building 34 AST containment area will be demolished, bulky and oversized material including concrete asphalt and steel will be cleared from the surface of the Causeway, soil will be excavated from six small locations (5-foot dia.) on the Causeway.	***Chemical Hazards***—The potential for exposure is present while conducting these activities because the soil may be contaminated. The risk level associated with these activities is moderate.	Work will begin in Level D with the potential for upgrade based on air monitoring data review. Engineering controls will be utilized as necessary. Avoid direct contact with soil and wash water. Appropriate PPE will be utilized during these activities. Air monitoring will be performed as described in Section 7.
	Physical Hazards— Demolition	There are numerous hazards associated with demolition, such as expected (or unexpected) utilities, fire, falls, slips/trips, heavy equipment, rigging, chemical hazards, structural integrity, welding and cutting, and confined space. See FLD 33, 01, 10, 11, 12, 13, 21, 22, 23, 27. As demolition activities on this project will be performed by a subcontractor, see also their Means & Methods and the approved Demolition Plan.
	Slip, trips, falls, equipment, materials, tools, terrain, and uneven walking surfaces. Weather hazards, such as severe weather and lightning; poor visibility.	The work area will be visually inspected. Slip, trip, and fall hazards shall be either removed or marked and barricaded. Sufficient illumination shall be maintained to ensure a safe working environment and weather conditions to be continuously monitored. See FLD 11, 12, and 39.
	Strains and sprains from manually lifting and moving objects.	Use proper lifting techniques such as keeping straight back, lifting with legs, avoid twisting back, use mechanical equipment, or get help from others. The work area will be visually inspected. See FLD 10.
	Housekeeping	Materials will be stored to prevent intrusion into the work areas. Work areas will be kept organized and ice, snow, and mud will be cleared from steps to reduce slip hazards. See FLD12
	Inclement weather, including rain/snow, lightning, and heat/cold stress.	Personnel shall be dressed according to weather conditions; personnel working in high temperatures or direct sunlight shall follow FLD 05. Personnel working in cold temperatures or rain shall follow FLD 06. Work will cease during lightning.
	Moving mechanical parts from heavy equipment operations.	Personnel shall be made aware of the hazard and will coordinate carefully during handling equipment operations. Guards will be kept in place during operation. Maintain safe distance from moving mechanical parts. Always use appropriate PPE. See FLD 22.

Activity 3	Hazards	Hazard Control
	Hands or fingers caught between objects; abrasions and lacerations.	Personnel shall be made aware of the hazard and will coordinate carefully the handling and placement of heavy objects. Materials and objects being handled will be inspected for rough or sharp edges, and appropriate precautions shall be taken to avoid contact. Personnel shall wear work gloves and avoid placing hands between objects. See FLD 10.
	Noise during the operation of heavy equipment and during operation of the treatment system.	A hearing conservation program consistent with FLD01 will be established. High noise areas will be identified. Hearing protection will be provided as appropriate. The latest ACGIH TLVs will be used.
	Fire	Flammable liquids will be stored in safety containers and flammable storage cabinets. Propane cylinders will be stored outside in secured areas. Fuel storage tanks will be placed in impermeable dikes. Properly rated fire extinguishers will be placed within 50 ft of the fuel storage area, in construction equipment, and strategically in the construction area.
	Electric Hazards	Generators will be grounded unless self-grounded. Extension cords will be properly rated for intended use. Prior to any intrusive activity, authorities will be contacted for permits. Elevated parts of machinery, ladders, and antennas will be kept at least 10' from overhead electric lines. Qualified electricians will make electrical Installations. A lockout/tagout program consistent with FLD42 will be used for equipment maintenance.
	Inclement weather, Heat/Cold stress	Personnel will be informed of the heat/cold stress symptoms. Appropriate PPE and fluids will be supplied to workers. See FLD 05 and 06. Work rest periods will be established according to ACGIH and NIOSH guidelines.
	Biological—Poisonous plants, insects, snakes.	Review recognition of poisonous plants, insects, or snakes typical of this area. Use appropriate measures as required. Adhere to WESTON Bloodborne Pathogens Exposure Control Plan—First Aid Procedures FLD 43.
	Radiation—Based on-site history and previous investigation work, the potential for sources of ionizing radiation exist on-site Potential sun burn/sun poisoning hazard on bright, sunny days	Previous investigations identified low-level radioactive material on-site. The affected areas were remediated. A work area radiation survey will be completed during site set-up to confirm no hazard exists. Real time radiation monitoring will be conducted during intrusive activities. Personnel will comply with the requirements of the site-specific radiation dosimetry program detailed in this SSHP. Use sunblock as appropriate. Avoid direct exposure to sun for long periods of time. If Nuclear Density Gauges are used, they will be properly licensed and will be operated by qualified technicians

Activity 4—Waste Management

Activity 4	Hazards	Hazard Control
Waste shall be staged in the appropriate stockpiles or containers prior to off-site disposal by others. Heavy equipment operation during excavation, loading, transferring, and unloading staging activities. Waste characterization sampling and routine equipment decontamination.	***Chemical Hazards***—The likelihood of exposure is present while conducting these activities because the sediments are contaminated. The risk level associated with these activities is moderate.	Work will begin in level D with the potential for upgrade based on monitoring results. Engineering controls will be utilized as necessary to control dust. Appropriate PPE will be utilized during waste handling activities to prevent dermal contact with soil. Real-time monitoring will be conducted to measure particulate, organic vapor, and radiological exposure levels.
	Physical Hazards—Slip, trips, falls from construction debris, equipment, materials, tools, terrain; uneven walking surfaces or deep excavation limits. Weather hazards, such as severe weather and lightning; poor visibility.	The work area will be visually inspected. Slip, trip, and fall hazards shall be either removed or marked and barricaded. Sufficient illumination shall be maintained to ensure a safe working environment and weather conditions to be continuously monitored. See FLD 11, 12, and 39.
	Moving mechanical parts from heavy equipment operations.	Personnel shall be made aware of the hazard and will coordinate carefully during handling equipment operations. Guards will be kept in place during operation. Maintain safe distance from moving parts. Always use appropriate PPE. See FLD 22.
	Strains and sprains from manually lifting and moving objects.	Use proper lifting techniques such as keeping straight back, lifting with legs, avoid twisting back, use mechanical equipment, or get help from others. The work area will be visually inspected. See FLD 10.
	Housekeeping	Materials will be stored to prevent intrusion into the work areas. Work areas will be kept organized and ice, snow and mud will be cleared from steps to reduce slip hazards. See FLD12
	Water Hazards, Inclement weather, including rain, lightning, and cold stress.	Personnel shall have appropriate PPE; personnel working in/near water, rain, or cold shall follow FLDs 02, 06 and 19.
	Hands or fingers caught between objects; abrasions and lacerations.	Personnel shall be made aware of the hazard and will coordinate carefully the handling and placement of heavy objects. Materials and objects being handled will be inspected for sharp edges, and appropriate precautions shall be taken to avoid contact. Personnel shall wear work gloves and avoid placing hands between objects. See FLD 10.

Activity 4	Hazards	Hazard Control
	Striking and being struck by operating equipment, loads, falling objects, and pinch points.	Workers shall stay out of the swing range of all equipment and from under loads. No personnel shall ride on the equipment. Remain within view of operator. All heavy equipment should be equipped with back-up alarms. See FLD 20, 22A, 23, and 24. Workers exposed to traffic hazards will wear traffic/reflectorized vests. A traffic control system for positioning and moving haul vehicles will be established. Heavy vehicle operators may remain in their vehicles only if they have cab over protection. If operators must check loads, loading will cease until the operator is back in the cabin or away from the vehicles in a safe location.
	Fire	Flammable liquids will be stored in safety containers and flammable storage cabinets. Propane cylinders will be stored outside in secured areas. Fuel storage tanks will be placed in impermeable dikes. Properly rated fire extinguishers will be placed within 50 ft of the fuel storage area, in construction equipment, and in the construction area.
	Electric Hazards	Generators will be grounded unless self-grounded. Extension cords will be properly rated for intended use. Prior to any intrusive activity, authorities will be contacted for permits. Elevated parts of machinery, ladders, and antennas will be kept at least 10' from overhead electric lines. Qualified electricians will make electrical installations. A lockout/tagout program consistent with FLD42 will be used for equipment maintenance.
	Noise during the operation of heavy equipment.	A hearing conservation program consistent with FLD01 will be established. High noise areas will be identified. Hearing protection will be provided as appropriate. The latest ACGIH TLVs will be used.
	Soil excavating.	Personnel working near or around an open excavation shall avoid walking or standing near the edge of the excavation. Proper sloping and benching will be used to prevent cave-ins and undermining. Excavation equipment and stockpiled soil will not be closer than two feet from the edge of excavation. No personnel are allowed in excavations greater than four feet deep unless the required bracing, shoring, inspection, and monitoring is performed. Excavation edge will be flagged and barricaded. Visually inspect excavation daily for signs of stress fractures. See FLD 28.
	Underground and aboveground utilities.	Utility companies will be contacted prior to any excavation. All known utilities will be marked prior to digging. Proper clearances from above ground wires will be maintained during all activities. SHSC to be notified upon detection of any buried utilities. See FLD 34.
	Pressure washing equipment.	Personnel will be informed of the hazards associated with the operation of pressure washers including water under pressure and steam. Personnel will wear appropriate PPE including splash protection. See FLD 37.

Activity 4	Hazards	Hazard Control
	Inclement weather, Heat and Cold stress	Personnel will be informed of the heat/cold stress symptoms. Appropriate PPE and fluids will be supplied to workers. See FLD 05 and 06. Work rest periods will be established according to ACGIH and NIOSH guidelines.
	Biological—Poisonous plants, insects, and snakes.	Review recognition of poisonous plants, insects, or snakes typical of this area. Use appropriate measures as required. Adhere to WESTON Bloodborne Pathogens Exposure Control Plan—First Aid Procedures FLD43.
	Radiation—Based on site history and previous investigation work, the potential for sources of ionizing radiation exist on-site Potential sun burn/sun poisoning hazard on bright, sunny days	Previous investigations identified low-level radioactive material on-site. The affected areas were remediated. A work area radiation survey will be completed during site set-up to confirm no hazard exists. Real time radiation monitoring will be conducted during waste handling activities. Personnel will comply with the requirements of the site-specific radiation dosimetry program detailed in this SSHP. Use sunblock as appropriate. Avoid direct exposure to sun for long periods of time. If Nuclear Density Gauges are used, they will be properly licensed and will be operated by qualified technicians

Activity 5—Site Restoration

Activity 5	Hazards	Hazard Control
The Causeway subgrade will be prepared for Phase 2 construction. Erosion and sedimentation controls will be maintained for Phase 2 activities.	***Chemical Hazards***—Non contaminated fill will be used for backfilling. Therefore, the risk level associated with these activities is low.	Clean fill will be used for backfill. Use dust suppression as necessary. Appropriate PPE will be utilized during these activities.
	Physical Hazards—Slip, trips, falls from construction debris, materials, tools, terrain or vegetation; uneven walking surfaces; weather hazards, such as severe weather and lightning; poor visibility.	The work area shall be visually inspected. Slip, trip, and fall hazards shall be either removed or marked and barricaded. Sufficient illumination shall be maintained to ensure a safe working environment and weather conditions to be continuously monitored. See FLD 11, 12, and 39.
	Housekeeping	Materials will be stored to prevent intrusion into the work areas. Work areas will be kept organized and ice, snow and mud will be cleared from steps to reduce slip hazards. See FLD12
	Striking and being struck by operating equipment, crushing, pinch points, and overhead hazards from use of heavy equipment.	Workers shall stay out of the swing area of all equipment and from under loads. No personnel shall ride on the equipment unless seats are provided. See FLD 20, 22A, 23, and 24. Workers exposed to traffic hazards will wear traffic/reflectorized vests. A traffic control system for positioning and moving haul vehicles will be established. Heavy vehicle operators may remain in their vehicles only if they have cab over protection. If operators must check loads, loading will cease until the operator is back in the cabin or away from the vehicles in a safe location.
	Moving mechanical parts from heavy equipment operations.	Personnel shall be made aware of the hazard and will coordinate carefully the handling equipment operations. Maintain safe distance from moving mechanical parts. Always use appropriate PPE. See FLD 22.
	Fire	Flammable liquids will be stored in safety containers and flammable storage cabinets. Propane cylinders will be stored outside in secured areas. Fuel storage tanks will be placed in impermeable dikes. Properly rated fire extinguishers will be placed within 50 ft of the fuel storage area, in construction equipment, and strategically in the construction area.
	Water Hazards, Inclement weather, including rain, lightning, and cold stress.	Personnel shall have appropriate PPE; personnel working in/near water, rain, or cold shall follow FLDs 02, 06 and 19.

Activity 5	Hazards	Hazard Control
	Noise during the operation of heavy equipment	A hearing conservation program consistent with FLD01 will be established. High noise areas will be identified. Hearing protection will be provided as appropriate. The latest ACGIH TLVs will be used.
	Traffic	Work areas will be clearly barricaded and appropriate signs displayed. Use traffic vests as necessary. See FLD 20.
	Electric Hazards	Generators will be grounded unless self-grounded. Extension cords will be properly rated for intended use. Prior to any intrusive activity, authorities will be contacted for permits. Elevated parts of machinery, ladders, and antennas will be kept at least 10' from overhead electric lines. Qualified electricians will make electrical Installations. A lockout/tagout program consistent with FLD42 will be used for equipment maintenance.
	Inclement weather, including rain, lightning, and heat/cold stress.	Personnel shall be dressed according to weather conditions; personnel working in high temperatures or direct sunlight shall follow FLD 05; personnel working in cold temperatures or rain/snow shall follow FLD 06. Work will cease during lightning.
	Biological—Poisonous plants, insects, snakes.	Review recognition of poisonous plants, insects, or snakes typical of this area. Use appropriate measures as required. Adhere to WESTON Bloodborne Pathogens Exposure Control Plan—First Aid Procedures FLD43.
	Radiation—Potential sun burn/sun poisoning hazard on bright, sunny days.	Use sunblock as appropriate. Avoid direct exposure to sun for long periods of time.
	Monitoring for ionizing radiation will be conducted during intrusive and waste handling activities. The potential for exposure during restoration is low. No real time monitoring required	Follow site-specific radiation dosimetry plan

Table 5-2
Equipment and Training Requirements

Activity	Equipment	Inspection	Training
Mobilization, Demobilization and Site Preparation	Equipment to be brought by the demolition and marine anchor installation subcontractors. WESTON will secure rental equipment for clear and grub and bulky debris removal. Also air monitoring and radiation monitoring equipment, and Level D/Modified Level D PPE.	WESTON and the subcontractors shall be required to conduct daily inspections and necessary maintenance for the equipment. Follow WESTON Inspection requirements per WESTON Health & Safety Program. Personnel utilizing monitoring equipment will inspect it daily.	Qualified operators with 40-hr training with 8-hr refresher course will operate equipment. An initial site-specific training will be conducted. Daily safety meetings will be conducted before beginning the work. Safe work practices, and good housekeeping will be followed. Personnel will be informed of the contaminants and chemicals at the site and availability of MSDS. Personnel responsible for operating monitoring equipment will be trained in the equipment operation and calibration.
Clear and Grub, erosion control installation.	Chainsaws and wood chippers, backhoe and excavator, boat and hydraulic anchor installer, hand tools, air and radiation monitoring equipment, and Level D /Modified Level D PPE.	As above	In addition to the requirements stated above, personnel utilizing chainsaws and chippers during clear and grub must have equipment specific training in accordance with WESTON Fld. 47. Personnel operating chippers will comply with EM 385-1-1 Sec. 31.D.03. and utilize PPE in compliance with Subpart I of 29CFR 1910.133
Soil excavation and handling	Excavator, dump truck, hand tools, air monitoring equipment, and Level D and modified level D PPE	As above	Qualified operators with 40-hr training with 8-hr refresher course will operate equipment. An initial site-specific training will be conducted. Daily safety meetings will be conducted before beginning the work. Safe work practices, and good housekeeping will be followed. Personnel will be informed of the contaminants and chemicals at the site and availability of MSDS. Personnel responsible for operating monitoring equipment will be trained in the equipment operation and calibration
Decontamination and site restoration	Bulldozer ,dump truck, excavator, water trucks, decontamination equipment, air monitoring equipment, and Level D/Modified Level D PPE.	As above	As above

6. EXCLUSION ZONES

The establishment and communication of Exclusion Zones (EZs), Contaminant Reduction Zones (CRZs), and Support Zones (SZs) will be an ongoing process throughout Phase I implementation. Definition of these zones will be performed on a task-by-task basis, based on the activity to be conducted, monitoring results and personnel assignments. In general, the following zones definitions are anticipated:

Demolition Activities:

EZ..... Building 5, Building 59 and the containment area adjacent to Build 34, including an approximate 25-foot buffer around each building and equipment in operation.

CRZ.... The hazardous materials identified in Building 5 (asbestos-containing materials, potential lead-containing paint chips) will have been removed prior to demolition of the building. The CRZ definitions and procedures will be detailed in the Asbestos Abatement Plan completed by AAIS

SZ ..... The remainder of the project site, with the exception of the Causeway, will be considered the SZ during demolition activities.

Causeway Material Removal:

EZ..... The entire area of the Causeway, beginning at the landward edge of Building 59, will be considered the EZ during all removal activities on the Causeway, including; clearing & grubbing, weather station and boat ramp removal, over-sized debris removal, monitoring well abandonment, and grading.

CRZ.... The area between Building 59 and the Causeway access gate/fence will be designated the CRZ. This area will contain equipment and personnel decontamination facilities and supplies.

SZ ..... The remainder of the project site, with the exception of those areas designated EZs during demolition activities, will be considered the SZ during Causeway activities.

Task-specific zones will be graphically presented and verbally communicated at the Daily Safety Briefings to be conducted during implementation.

7. ACTION LEVELS

As shown in Table 3-1, the soil at the SAEP site is contaminated with volatile organics (cis-1,2-DCE, Tetrachloroethylene, Vinyl chloride, Trichloroethylene, Methylene Chloride) semivolatile organics, PCB's, and metals. Historical investigations found low-level radioactive contamination on the Causeway. Explosives were historically stored in Building 59. The low-level radioactive contamination on the Causeway has since been remediated and Building 59 is no longer used for explosives storage. Although these action have been taken, WESTON will perform visual monitoring for UXOs and real-time monitoring for ionizing radiation during demolition and excavation activities. These hazards will be continuously evaluated and, as necessary, this SSHP will be amended based on input from health and safety experts.

The action levels in Table 6-1 will be followed, using monitoring procedures as described in Section 7 of this SSHP. Action levels are based on organic vapors, aerosol particulate monitors and real-time radiation monitoring. Monitoring will be performed around the perimeter of the excavations and staging areas to detect possible exposure or migration of airborne contaminants. Action levels may be modified based on monitoring and change in site conditions or activity.

6.1 ORGANIC AND INORGANIC VAPORS

A flame ionization detector (FID) will be utilized during intrusive and waste handling activities to monitor the concentrations of volatile organics. Monitoring and action levels will be in accordance with Table 6-1. Compliance with monitoring and rescue provisions of 29 CFR1926.651(g) will be implemented in the event workers are required to enter any excavation greater than 5 feet deep where inadequate natural ventilation may be a factor (i.e., trench vs. open excavation). A combustible gas indicator (CGI) and oxygen (O_2) meter will be used as necessary for the intrusive activities.

6.2 PARTICULATE-BASED CONTAMINANTS

Worker respiratory protection for particulate-based contaminants will be initiated at 2.5 mg/m^3 based upon WESTON's action level for Particulates Not Otherwise Classified (PNOC), respirable fraction. Engineering controls will be utilized to limit exposure to less than the PNOC action level. However if real time radiation monitoring indicates the presence of radioactive isotopes personal air samples will be collected in accordance with the requirements of the site specific radiation dosimetry plan. Action levels may be modified based upon initial sampling results. An amendment to this SSHP will be required to modify action levels.

Table 7-1
Action Levels for All Appropriate Tasks - Direct-Reading Air Monitoring Instruments

Hazard	Instrument	Action Level
Explosive atmosphere	CGI as required	<10% LEL: Continue investigation. >10% and <20% LEL (ambient air): Continue work with caution, continue monitoring. >10% LEL (confined space): Stop work and evacuate site until levels <10% are measured. >20% LEL (ambient air): Stop work and evacuate site until levels <20% are measured.
Oxygen content	O_2 meter (included with CGI instrument) as required	<19.5%: Stop work and evacuate work area until levels are >19.5% and <23% 19.5% to 23% (ambient air): Acceptable levels >23%: Stop work and consult CIH and Omaha District-Rapid.
Organic vapors	PID/FID	Worker protection 0- 5 units: Level D, provided vinyl chloride is less than 0.5 ppm. See below*. 5- 25 units: Level C provided vinyl chloride is less than 0.5 ppm. See below. >25 units : Level B Perimeter: > 5 units above background or discernable odor is noted: Halt work temporarily until levels subside and take actions to keep level low such as increase foaming. > 25 units: Stop work.
Particulates	Mini-Ram	Worker and Work Area: Background to 1.25 mg/m^3: Initiate dust control measures 1.25 mg/m^3 to <2.5mg/m^3: Increase level of dust control >2.5 mg/m^3: Upgrade to Level C PPE.
Ionizing Radiation	Micro R	< 3 x background: Continue work according to plan. Follow procedures outlined in the site-specific Radiation Dosimetry Plan. > 3 x background: Stop work. Notify CIH and consult with a radiation health physics specialist. **If determined necessary, the Radiological Operations Procedures provided Appendix C will be used to develop a site-specific Radiation Dosimetry Plan for approval and implementation.**

Note: Vinyl Chloride has been identified as a contaminant of concern in one soil sample from the Causeway at a concentration of 24 mg/L. Until subsequent data validation eliminates vinyl chloride as a contaminant of concern, the following procedure will be used for potential vinyl chloride exposure:

PID reading of 0- 5 units: OK

>5.0 units: Utilize draeger 0.5/A or equivalent for vinyl chloride if vinyl chloride <1.0 PPM continue Level D Monitor at 30 minute intervals. If vinyl chloride >1.0 PPM (sustained in breathing zone).: Level B.

Utilizing the Hazardous Waste Action Coalition (HWAC) action level calculation for particulate based contaminants and the highest concentration of cadmium reported by Harding ESE (94.7 mg/kg), a concentration of total dust in air of approximately 132 mg/m^3 would be required before the cadmium action level concentration (1/2 of the PEL or TLV/TWA) of 0.0025 mg/m^3 would be reached.

The OSHA PEL for Particulates Not Otherwise Regulated (respirable) is 5.0 mg/m^3 using a 50% action level total dust level as measured by an MIE miniRAM or equivalent is 2.5 mg/m^3.

Table 7-2
Action Levels for All Appropriate Tasks Using Air Monitoring

Contaminant	Exposure Value :: Air Sampling Action Level	Total Dust Action Level (mg/m^3) Metals	Total Organics Action Levels (ppm)
Cadmium	0.005 mg/m^3 :: 0.0025 mg/m^3	2.5 mg/m^3	
Chromium	0.5 mg/m^3 :: 0.25 mg/m^3	2.5 mg/m^3	
Copper	1.0 mg/m^3 :: 0.5 mg/m^3	2.5 mg/m^3	
Lead	0.05 mg/m^3 :: 0.025 mg/m^3	2.5 mg/m^3	
Nickel	1.5 mg/m^3 :: 0.75 mg/m^3	2.5 mg/m^3	
Zinc	10 mg/m^3 :: 5 mg/m^3	2.5 mg/m^3	
TCE	50 ppm :: 25 ppm		15 ppm
Cis-1,2-DCE	200 ppm :: 100 ppm		47 ppm
Vinyl Chloride	1.0 ppm :: 0.5 ppm		0.5 ppm
Benzene	1.0 ppm :: 0.5 ppm		0.5 ppm

Concentration	Corrective Action
Background to 1.25 mg/m^3.	Initiate dust control measures.
1.25 mg/m^3 above background to <2.50 mg/m^3 above background.	Increase dust suppression.
2.5 mg/m^3 above background.	Workers upgrade to level C PPE. Evaluate cause of dust. Stop work if engineering controls are not effective.

8. AIR MONITORING

Air monitoring will be conducted during site activities to evaluate potential chemical hazards, to determine the effectiveness of control measures, and to evaluate the PPE requirements. Real-time air monitoring using direct reading instruments will be used to quantify the presence of airborne chemical hazards.

7.1 DIRECT READING INSTRUMENTS

Real-time monitoring using direct reading instruments will be conducted to identify potential exposure levels or Immediately Dangerous to Life or Health (IDLH) conditions. Air monitoring at breathing zones and within work areas will be conducted during the field activities. Areas monitored will be chosen to determine worst-case exposure potential. Background readings will be taken in an area known to be clean.

Since the contaminants of concern at the site are TCE, cis-1,2-DCE, Vinyl Chloride, BTEX, cyanides, and metals, continuous real-time monitoring will be conducted for volatile organics using an FID (Foxboro 128 OVA) or equivalent and for airborne particulate will be conducted using a MIE Mini-Ram, or equivalent. The presence of ionizing radiation will also be monitored during site activities using a direct-reading Micro-R. When required, a CGI/O2 meter will be used to monitor explosive or oxygen-deficient or rich atmospheres.

9. LEVELS OF PROTECTION

All personnel performing operations on-site shall be required to use the appropriate level of protection. The minimum level of protection required to begin each activity of this project is shown in Table 8-1. If hazards are identified requiring a lower or a higher level of protection, then this SSHP will be re-evaluated and upgraded or downgraded prior to re-entry to the site.

Table 9-1
Minimum Level of Protection Requirements

Activity	Level of Protection
Mobilization/Demobilization/Site Preparation	Level D or Modified Level D
Demolition and Soil Removal	Level D or Modified Level D
Transportation & Disposal	Level D or Modified Level D
Site Restorations	Level D or Modified Level D

* Consult action levels and notes in Table 7-1 for necessary upgrades.

8.1 LEVEL D PPE

Level D PPE will be worn during site mobilization/demobilization and other non-intrusive activities where no known contamination is present. Level D PPE consists of:

- Work clothes, e.g. coveralls (cotton).
- Work gloves - leather or cotton as necessary for physical hazards.
- Boots, certified according to ANSI.
- Safety glasses.
- Hard hat.

8.2 MODIFIED LEVEL D PPE

Modified Level D PPE will be worn when conducting activities with known or potential contact with minimally contaminated materials. In addition to Level D components, Modified Level D consists of:

- Chemical resistant coveralls.
- Chemical resistant over boots or chemical boot covers.
- Gloves-nitrile or latex inner; chemical resistant outer.
- Eye protection - safety glasses or goggles.

8.3 LEVEL C PPE

Level C PPE consists of:

- Inner boots certified according to ANSI or chemical resistant boots with toe protection certified according to ANSI.
- Chemical resistant coveralls.

- Chemical resistant over boots or chemical boot covers.
- Full-face APR with appropriate filter cartridge (NIOSH/MSHA approved).
- Chemical-resistant gloves-nitrile or latex inner; and chemical resistant outer

8.4 LEVEL B PPE

Level B PPE will be worn if appropriate action levels are reached during site activities. Level B PPE consists of:

- Inner boots certified according to ANSI or chemical resistant boots with toe protection certified according to ANSI.
- Chemical resistant coveralls.
- Self-contained breathing apparatus (SCBA) or air-line system (NIOSH/MSHA approved).
- Coveralls-cotton.
- Chemical resistant over boots.
- Chemical resistant gloves-nitrile or latex inner; and chemical resistant outer.

10. EMERGENCY RESPONSE

9.1 EMERGENCY CONTACTS

The following emergency telephone numbers shall be prominently posted in WESTON's field office:

Table 10-1
Emergency Contacts

Service	Telephone Number
Emergency Services	911
Ambulance Service	911
Site Security	Radio or (203) 385-6654
Police – Stratford, CT (Fairfield County)	911
Fire - Stratford, CT (Fairfield County)	911
Hospital: Bridgeport Hospital 267 Grant Street Bridgeport, CT 06610	(203) 384-3000
Poison Control Center (Bridgeport, CT)	(203) 576-5178
Oil and Chemical Spills (CT DEP)	(860) 424-3338
24-hour Emergency Service (CHEM-TEL)	(800) 255-3924
WESTON Medical Emergency (Continuum)	(800) 229-3674
WESTON Emergency (24 hour) (West Chester)	(610) 692-3000
Ted Blackburn (pager)	(603) 860-4457
George Crawford (pager)	(800) 206-1507
Matt Dillon- Risk Management	(610) 701-7413

In the event of an emergency requiring outside emergency services, WESTON personnel will immediately dial 911 to contact the appropriate organization. Following the phone call, WESTON personnel will contact U.S. Army Corps of Engineers on-site personnel to inform them that emergency service personnel and equipment will be entering the facility. Subsequent to these notifications, appropriate off-site personnel of the U.S. Army Corps of Engineers and WESTON will be contacted and informed about the situation.

9.2 HOSPITAL ROUTE

A map showing the route to the hospital will be posted near the site telephone. A copy of the hospital route map is provided as Figure 9-1. The hospital route will be field verified prior to work initiation. The following written description of the route will be attached to the map:

- Turn right, North, onto Main Street
- Turn left onto West Broad Street
- Enter traffic rotary and take second exit onto West Broad Street
- Turn left onto Barnum Avenue./ U.S.Route1
- Turn right onto Boston Avenue./ U.S.Route1
- Turn left onto Mill Hill Avenue.
- Turn Right onto Grant Street.
- Hospital is at 267 Grant Street.

Figure 9-1
Hospital Route Map

Route	Travel Distance
▪ Turn right, North, onto Main Street	1.6 miles
▪ Turn left onto West Broad Street	0.1 miles
▪ Enter traffic rotary and take second exit onto West Broad Street	0.6 miles
▪ Turn left onto Barnum Avenue./ U.S.Route1	0.2 miles
▪ Turn right onto Boston Avenue./ U.S.Route1	0.9 miles
▪ Turn left onto Mill Hill Avenue.	0.3 miles
▪ Turn Right onto Grant Street.	
▪ Hospital is at 267 Grant Street.	

APPENDIX A

ACCIDENT PREVENTION PLAN

APPENDIX A
ACCIDENT PREVENTION PLAN

1. INTRODUCTION

This Accident Prevention Plan (APP) has been prepared by Roy F. Weston, Inc. (WESTON®) to describe actions that will be taken by WESTON site personnel in the event of an emergency at the Stratford Army Engine Plant, Stratford, Connecticut site. Pre-emergency planning procedures must be in place to immediately respond to accidents. Site personnel must be knowledgeable of their roles and responsibilities and act within their abilities and training. WESTON will prohibit its employees from responding to any accidents/emergency situations that would require them to be exposed to hazards beyond their degree of training. Prior to site activities, the Site Health & Safety Coordinator (SHSC) and project staff will communicate with outside response agencies (fire, police, ambulance, and medical) to coordinate response efforts. A complete list of emergency contacts can be found in Section 9.1 of the SAEP Site Health and Safety Plan.

Situations which could be anticipated at the site are as follows:

- Minor Accidents (slip, trips, falls)
- Major Injuries
- Chemical Exposure
- Small Spills
- Large Spills
- Minor Fires
- Large Fires
- Explosions
- Severe Weather
- Fugitive Air Emissions
- Respiratory Hazards (dust)

2. ROLES AND RESPONSIBILITIES

The SHSC will be the primary Emergency Response Coordinator (ERC) for all work conducted at the site. The alternate SHSC will act as backup ERC. The SHSC or designated alternate will contact the appropriate authorities as determined by the type and nature of incident. Section 9 of the SSHP lists emergency contacts and appropriate agencies.

2.1 SHSC/ERC/OSC ROLE

The SHSC/ERC/OSC responsibility during emergency situations are as follows:

- Evaluate emergency situation and special needs.
- Monitor wind/weather conditions.
- Notify and interact with emergency response agencies.
- Notify WESTON and USACE BRAC on-site representative.
- Oversee medical and decontamination procedures.
- Serve as the point of contact for local fire department(s) and/or Regional Hazardous Material Team.
- Document incident, advise management, and initiate debriefing.

2.2 CONSTRUCTION SUPERINTENDENT

The Construction Superintendent/alternate SHSC roles during emergency situations are as follows:

- Act as backup ERC.
- Make non-emergency notifications (e.g., management, client).
- Assist ERC as necessary or directed.

2.3 PROGRAM SAFETY OFFICER ROLE

- Provide technical assistance and lead post-event investigations.

3. ACCIDENT RECOGNITION AND PREVENTION

All WESTON personnel will be instructed on a daily basis to be constantly alert for potentially hazardous situations or conditions. In addition, WESTON personnel will perform daily checks on hazardous materials equipment for possible leaks, operational status, and maintenance. Immediate recognition of the potential hazardous conditions can avert an emergency. Accident/emergency response discussions will be incorporated into regular safety meetings and will include such topics as:

- Tasks to be performed.
- Hazards that may be encountered, along with their effects and how to recognize symptoms.
- Emergency procedures.

All WESTON site personnel shall have a minimum of the following safety training:

- 40-hour Hazardous Waste Operations (HAZWOPER).
- 8-hour Annual Refresher Course.
- Site-specific training.

In addition, several personnel shall have First Aid/CPR training and 8-hour Site Health and Safety Coordinator Training.

4. COMMUNICATION

Daily health and safety briefings will be used to remind personnel of their roles, responsibilities, and emergency procedures. A record of the safety briefings will be completed and maintained on-site. All work at the site will be conducted while maintaining communication with two-way radios. Emergency telephone numbers will be posted in break areas and in the reception area. Personnel will be instructed to immediately contact the SHSC or Construction Superintendent if an emergency situation arises.

A backup emergency notification system will also be used during all site activities consisting of air horns located at each work location. In the case of an emergency, the signal for personnel to evacuate the area will be a series of long blasts. The assembly/gathering point for individual work locations will be provided during the daily safety briefing. Should site radios and/or air horns be inoperable or not readily available during an emergency, standard hand signals shall be used to communicate basic instructions.

5. EMERGENCY PROCEDURES

During an emergency, the following actions will be taken, with some actions conducted concurrently. No one will attempt an emergency response/rescue until the situation has been assessed and the appropriate response outlined. A rescue/response may include the following:

- **Assessment:** Assess the type and extent of the emergency, then assess existing and potential hazards to site personnel and the off-site population. Determine, based on the type and extent of the emergency, the following:

  - Whether and how to respond.
  - The extent of any injuries and/or damage.
  - The need for evacuation of site personnel and off-site population.
  - The resources needed for evacuation and response.

- **Evacuate:**

  - Move site personnel to a safe distance upwind of the incident.
  - Monitor the incident for significant changes. The hazards may diminish, permitting personnel to re-enter the site, or hazards may increase and require public evacuation.

- **Enforcing the buddy system:** Allow no one (including rescuers) to enter a contaminated area or hazardous area without a partner or without a radio and proper PPE. At the time of the incident, one person will be designated to record the names, job titles, time of entry, time of exit, and mission to be accomplished for all personnel entering the EZ. At all times, personnel in the EZ should be in line-of-sight or communications contact with the supervisor or his designee.

- **Survey casualties:**

  - Locate all victims and assess their condition.
  - Determine resources needed for stabilization and transport.

- **Request aid:** Contact the required off-site/on-site personnel or facilities, such as the ambulance, fire department, or police.

- **Allocate resources:** Allocate appropriately qualified on-site personnel and equipment to the rescue and initiate incident response operations.

- **Extricate:** Remove or assist victims from the area, using appropriate PPE and procedures.

- **Control measuring, including containment:** Assist in bringing the hazardous situation under complete or temporary control and use measures to prevent the spread of the emergency.

- **Decontaminate:** Use established procedures to decontaminate uninjured personnel in the decontamination area. If the emergency makes this area unsafe, establish a new decontamination area at an appropriate distance. Decontaminate victims before or after stabilization as their medical condition indicates. Decontamination may be delayed if the injuries suffered by the victim pose an immediate threat to the victim's life or health. Instead, the victim should be placed on a tarp, sheet

of plastic or non-absorbent backboard to allow handling of the victim without the threat of contaminating support personnel until the victim is stabilized.

- **Stabilize:** Administer any medical procedures that are necessary before the victim can be moved. Stabilize or permanently remediate the hazardous condition. Address the cause of the emergency and anything that was damaged or endangered by the emergency (e.g., drums, tanks).

- **Transport:** No one will be transported without being decontaminated or protected from contaminating others. Measures will be taken to minimize chemical contamination of the transport vehicle, ambulance, and hospital personnel.

- **Casualty logging:** Record the names(s) of the victim(s), the time, the destination, and their condition upon transport.

- **Casualty tracking:** Record the disposition, condition, and location of the casualties.

5.1 MINOR INJURY

In the event of a minor injury, site personnel will take the following actions:

- Evaluate the scene for safe entry.
- Assess the type and extent of injury.
- Provide initial First Aid to injured person.
- Notify SHSC and Construction Superintendent.
- Decontaminate the injured personnel.
- If required, transport to local medical facility.
- Notify Program Safety Manager and Project Manager.

5.2 MAJOR INJURY

In the event of a major injury, site personnel will take the following actions:

- Evaluate the scene for safe entry.
- Assess the type and extent of injury.
- Provide initial First Aid.
- Notify SHSC and Construction Superintendent.
- Notify emergency medical services of need for transportation.
- Decontaminate the injured personnel.
- Notify Program Safety Officer, Project Manager, and CO.

5.3 EXTRICATION

In the event a person becomes trapped and requires extrication, site personnel will take the following actions:

- Notify SHSC and Construction Superintendent.

- Evaluate the scene for safe entry.
- ERC will contact the local Fire Department and local EMTs.
- Notify Program Safety Officer, Project Manager, and CO.

5.4 CHEMICAL EXPOSURE

In the event of chemical exposure, site personnel will take the following actions:

- Evaluate the scene for safe entry.
- Provide assistance with emergency shower, eyewash, or other initial First Aid, as required.
- Decontaminate exposed personnel.
- Notify emergency medical services of need for transportation.
  - If injured person can be moved to support zone, contact ambulance service through local Fire Department.
  - If transportation to support zone is not possible, ERC will contact Regional Hazardous Material Response Team through the Local Fire Chief. The local Fire Chief(s) are the only persons authorized to activate the Regional Hazardous Material Response Team.
- Notify Program Safety Officer, Project Manager, and CO.

5.5 SMALL FIRE

A small fire is defined as a fire that can be extinguished with a 4A:20B:C type fire extinguisher or incipient stage fires that can safely be extinguished with material readily at hand. In the event of a small fire, site personnel will take the following actions:

- Evacuate all unnecessary personnel from the area, if possible, to an upwind location.
- Notify SHSC and Construction Superintendent.
- Attempt to extinguish fire using portable fire extinguishers or by smothering from an upwind location.
- Request emergency response assistance as appropriate.
- Notify the appropriate officials (Construction Superintendent, Local Fire Department, and CO).

5.6 LARGE FIRE

In the event of a large fire or a small fire that cannot be extinguished, the following actions will be taken:

- Alarm and notify all field personnel.
- Evacuate all unnecessary personnel from the area, if possible, to an upwind location.
- Notify local Fire Department, request other emergency response services (police, ambulance, hospital) as needed.
- Notify the appropriate officials (Construction Superintendent, local Fire Department, and CO) of the current situation.

5.7 EXPLOSION

In the event of an explosion, all nonessential personnel will evacuate the site. Required support equipment, services, and personnel will be requested and then the CO notified. Response will follow the steps identified under Section 5.4 (Chemical Exposure). Notification action as indicated in Section 5.6 (Large Fires) will be followed. Based upon an evaluation of cause, the local fire response agency may authorize activation of the Regional Hazardous Materials Response Team.

5.8 SMALL SPILL

In the event of a small spill, appropriate actions will be taken to prevent the spill from reaching groundwater, surface water, or drains.

Actions include:

- Verification of spilled material, volume, and hazards.
- Determine appropriate response procedures including PPE.
- Assess type and extent of injuries to personnel; take appropriate first aid steps if necessary.
- Assess quantity and size of the spill to determine the level of response to contain and clean it up.
- Confine or containing spill with booms, pads, or berm.
- Neutralizing spill with appropriate agents (if safe/possible).
- Notify Program Safety Officer and Construction Superintendent.
- Notify CO (report required within 2 working days).
- WESTON will collect spilled material including absorbent material and place in appropriate containers. All hazardous material shall be disposed of in accordance with all applicable hazardous waste regulations.
- WESTON will keep all records related to the spill of hazardous waste for a period of at least three years after the spill has been cleaned up or such longer period of time as required in any unresolved enforcement action.

5.9 LARGE SPILL

Large spills are defined by a volume equal to or greater than state or federal reportable quantity and/or those beyond the capabilities and resources of on-site personnel. Appropriate remedial actions will be conducted according to state and federal regulations. General procedures are as follows:

- Verification of spilled material, volume, and hazards.
- Confine the spill to the smallest area possible using booms, pads, berms, or any other effective material.
- Assess type and extent of lateral damages and injuries to personnel; take appropriate first aid steps if necessary.
- Notify Program Safety Manager and Construction Superintendent.
- Notify CO (report required within 2 days).
- In the event the additional emergency clean-up assistance is needed, WESTON will request assistance from off-site response contractors.

- WESTON will collect all hazardous waste including contaminated booms and absorbent material. All hazardous clean-up residue shall be disposed of as hazardous waste in accordance with all applicable hazardous waste regulations.
- All emergency equipment will be decontaminated prior to being put back into service. Expendable or damaged supplies will be immediately replaced.
- WESTON will keep all records related to the spill of hazardous waste for a period of at least three years after the spill has been cleaned up or such longer period of time as required in any unresolved enforcement action.

Notification

In the event of a spill or a release, WESTON will immediately notify the Program Safety Officer and Construction Superintendent, the designated representative, and appropriate regulatory agencies (if necessary).

5.10 SEVERE WEATHER

In the event of adverse weather conditions occurring on-site such as lightning, high winds, or extreme heat (extended periods with temperatures above 90 degrees), the SHSC will instruct the workers to discontinue field operations. These natural phenomena complicate work activities and add or increase risk to all site personnel. The following actions should be taken in the event of lightning:

- Stop work.
- Secure all loose materials, metal tool boxes, plywood, trash cans, etc.
- Bring all workers to safe areas indoors when lightning is in the area.
- Verify that all buildings and trailer doors are locked and windows closed.
- Shut down and disconnect all electrical equipment to protect the equipment from electrical surges and abrupt power loss.

In the event of hazardous temperature extremes, the SHSC, in consultation with the PSM and/or CIH, will determine the need to shut down or modify work activities.

6. EMERGENCY RESPONSE EQUIPMENT

WESTON will maintain the following emergency response equipment on-site in the event of an emergency. Unless otherwise noted below, emergency equipment will be stored in the temporary project office.

Decontamination Equipment:

- (2) pair medical trauma scissors
- (2) pair seat belt cutters
- (2) large sponges
- (2) Short handle brushes
- (2) Bottles of eye wash solution
- (2) 3 to 5 gallon buckets
- (1) Bottle liquid soap
- (2) Emergency blankets
- (1) Carry bag / identified as emergency decon
- (1) 3 gallon pressure sprayer

Spill Control

- Over-packs (85-gallon)
- Spill pads
- Absorbent booms
- Shovels
- Absorbent material
- Squeegees

First Aid Kits: Located in the temporary project office, each piece of heavy equipment and in each WESTON vehicle.

Fire Extinguishers: Located in the temporary project office, each piece of heavy equipment and in each WESTON vehicle.

PPE: Levels B, C, and D will be stored and/or used on-site.

- Self-contained breathing apparatus (SCBA)
- Air purifying respirator (APR)
- Saranex coveralls or equivalent
- Boot covers
- Slush boots
- Nitrile gloves
- Neoprene gloves
- Leather gloves
- Hard hats
- Goggles
- Face shields

APPENDIX B

EMERGENCY RESPONSE & CONTINGENCY PLAN

APPENDIX B
EMERGENCY RESPONSE AND CONTINGENCY PLAN

1. INTRODUCTION

This Emergency Response and Contingency Plan (ERCP) has been prepared by Roy F. Weston, Inc. (WESTON®) to describe actions that will be taken by WESTON site personnel in the event of an emergency situation.

The purpose of this plan is to:

a) Anticipate events to ensure proper planning and preparation.

b) Act as a guide in the event of an emergency situation.

c) Minimize hazards to human health and the environment from anticipated emergency events.

d) Familiarize response personnel with equipment and procedures

This plan is determined to comply (where necessary) with the requirements of OSHA (including emergency action planning, Process Safety Management and HazWoper), DOT (reporting and response actions), and EPA (including SPCC, RCRA and RMP).

Pre-Emergency Planning

In order to handle emergencies properly and effectively, planning and training is essential. Pre-emergency planning procedures must be in place to immediately respond to emergency situations. Site personnel must be knowledgeable of their roles and responsibilities and act within their abilities and training. WESTON will prohibit its employees from responding to emergency situations that would require them to be exposed to hazards beyond their degree of training. As necessary and prior to site activities, the Site Health & Safety Coordinator (SHSC) or project staff will communicate with outside response agencies (e.g., fire, police, ambulance, and medical) to coordinate response efforts. Contacts with each response agency will be informed of any changing site conditions that may affect emergency response. A complete list of emergency contacts can be found in Attachment A.

Roles and Responsibilities

The Site Health and Safety Coordinator (SHSC) will be the primary Emergency Response Coordinator (ERC) or Incident Commander (IC) as termed through Uniform Incident Command. The SHSC or designated alternate will contact the appropriate personnel or authorities as determined by the type and nature of incident. **Attachment A** lists emergency contacts and serves as documentation of this site-specific chain-of-command. **Attachment C** includes checklists for use during emergency incidents.

This chain-of-command is established to minimize confusion and to leave no doubt as to whom has decision-making authority in the event of an emergency situation.

ERC Role

ERC responsibilities during emergency situations are as follows:

- Evaluate emergency situation and special needs.
- Direct all emergency efforts, including evacuation of personnel and assignment of personnel to response roles.
- Notify and interact with emergency response agencies.
- Oversee medical and decontamination procedures.
- Serve as the point of contact for local fire department(s) and/or hazardous material team(s).

ERC responsibilities after the emergency phase is complete includes:

- Supervise cleanup efforts; ensure proper recovery, disposal and accounting of any hazardous material/waste.
- Ensure all emergency equipment and supplies are cleaned and/or made available for future use.
- Document incident, advise management, and initiate debriefing.

The ERC will delegate, as necessary, specific roles and duties outlined above.

Alternate ERC's Role

- The Construction Superintendent is the primary backup to the ERC.
- Additional personnel may be trained as alternate ERC's based upon site complexity and/or size.

Site Superintendent Role

- Alternate ERC.
- Initial Media Contact

Program Safety Manager Role

- Provide technical assistance and lead post-event investigations.

Regional Safety Director Role

- Receive reports from the ERC.
- Provide information to appropriate management and track reports.
- Workers compensation liaison.
- Focal point for medical return to work.
- Incident investigation as necessary.

Project Manager Role

- Assure funding as necessary for emergency operations.
- Report and interact with regulatory agencies and client as necessary.
- Media Contact

Emergency Response Teams

Based upon the size and complexity of the site or task activities, Emergency Response Teams (ERTs) will either be jointly comprised of all personnel on-site, cross-trained to actions necessary (e.g., spills, confined space rescue, high-angle rescue), comprised of named individuals, local response agencies or a combination of the above. Attachments A and D indicate roles and responsibilities for this site.

Emergency Recognition, Prevention and Training

All WESTON personnel will be instructed on a daily basis to be constantly alert for potentially hazardous situations or conditions. Immediate recognition with necessary corrective actions of potential hazardous conditions can avert an emergency. Emergency response discussions will be incorporated into regular safety meetings and will include such topics as:

- Tasks to be performed;
- Hazards that may be encountered, along with their effects and how to recognize symptoms.
- Emergency procedures, including evacuation.

Training required to be given (initially and periodically) to all site workers includes the following:

- Site topography, site layout and prevailing weather conditions.
- Procedures for reporting incidents.
- Roles and procedures in the event response may include local, state or federal responders.
- Alarm systems and all applicable aspects of this ERCP.

If Site is Regulated Under 29 CFR 1910.120 (HAZWOPER):

In addition to the above requirements, all WESTON site personnel shall have a minimum of the following safety training:

- 40-hour Hazardous Waste Operations (HAZWOPER);
- 8-hour Annual Refresher Course; and
- Site-specific Training.
- At least (1) member of the WESTON team shall have First Aid/CPR training.
- At least (1) member (SHSC) shall have 8-hour Site Health and Safety Coordinator Training.

Communication

Daily health and safety briefings will be used to remind personnel of their roles, responsibilities, and emergency procedures. A record of the safety briefings will be completed and maintained on-site.

Emergency communications will be voice, audible horn/alarm or 2-way radio. See Attachment B for site-specific requirements. Telephone capability will be a requirement for all sites; the location of either a site telephone or the nearest off-site phone is listed in Attachment E. Emergency telephone numbers will be kept in the WESTON site vehicle and/or site office. Personnel will be instructed to immediately contact the SHSC or Construction Superintendent if an emergency situation arises.

A backup emergency notification system will also be used during all site activities (e.g., air horns located at each work location). In the case of an emergency the signal for personnel to evacuate the area will be a series of long blasts. The assembly/gathering point for individual work locations will be provided during the daily safety briefing. After a head count has been taken further evacuation may be required based on wind direction and

weather conditions. Five short blasts of the air horn will signal all clear, workers may than return to designated work areas.

Each type of communication will be tested to insure that site personnel can identify the signals above background noise, as well as to check for system efficacy and accuracy. In the event that air horns prove to be inefficient, alternative methods (e.g., 2-Way Radios) will be implemented and tested to prove efficient use.

In the event of an emergency requiring outside assistance the ERC or designated alternate will contact outside help using the nearest telephone or other pre-established means.

Support Areas, Evacuation Procedures and Personnel Accounting

The primary support area for all work at the site will be determined before commencement of work at the site.

Evacuation routes and assembly areas will be determined. Means of accounting for site personnel and visitors will be based upon site size and complexity (typical methods include sign-in logs). In the event of an evacuation these logs will be brought to the assembly area in order to verify safe evacuation by all.

Alternate routes and assembly areas will be determined and utilized based upon wind speed and direction as well as emergency requirements. See Attachment E for site map, location and information.

Emergency Procedures

General

During an emergency, the following actions will be taken, with some actions conducted concurrently. No one will attempt an emergency response/rescue until the situation has been assessed and the appropriate response outlined by the ERC or local responders.

It will be determined prior to work initiation, whether any tasks on site are critical operations requiring one or more persons to shut down sensitive equipment in a time-critical manner. If it is determined that critical operations are evident, specific procedures will be outlined in Attachment D.

Certain sites (e.g., UXO, CSM) or clients (e.g., DOE, DOD) may have specific criteria and actions to be followed in the event of an emergency situation. If so, these procedures will be outlined in Attachment D.

General guidelines for rescue/response may include the following:

- Assessment: Assess the type and extent of the emergency, then determine and verify existing and potential hazards to site personnel and the off-site population. Determine, based on the type and extent of the emergency, the following:
  - Whether and how to respond.
  - The extent of any injuries and/or damage.
  - The need for evacuation of site personnel and off-site population.
  - The resources needed for evacuation and response.
- Evacuate:
  - Move site personnel to a safe distance upwind of the incident.

- Monitor the incident for significant changes. The hazards may diminish, permitting personnel to re-enter the site, or hazards may increase and require public evacuation.

Note: *Should site personnel or visitors be handicapped to the point of needing assistance during an evacuation, the ERC will ensure that appropriate numbers of site workers are trained to provide any needed assistance.*

Note: *Work sites with potential hazards that could involve adverse community risk, and require evacuation of the local community must be discussed and coordinated with the client and local fire and police agencies before fieldwork begins.*

- Enforcing the buddy system: Allow no one (including rescuers) to enter a contaminated area or hazardous area without a partner or without appropriate communications means and proper PPE. At the time of the incident, one person will be designated to record the names, time of entry, and time of exit for all personnel entering the EZ. At all times, personnel in the EZ should be in line-of-sight or communications contact with the ERC or his designee.

- Survey casualties:

  - Locate all victims and assess their condition.
  - Determine resources needed for stabilization and transport.

- Request aid: Contact the required off-site/on-site personnel or agencies (such as the ambulance, fire department, police, etc). Ensure that previous communications and understanding or response actions to be conducted by the off-site resources have been accomplished. In certain cases (e.g., confined space rescue) the off-site responder(s) must be brought to the site before work is initiated so that an evaluation of and training on the confined spaces is accomplished.

- Allocate resources: Allocate appropriately qualified on-site personnel and equipment to the rescue and initiate incident response operations.

- Remove or assist victims from the area, using appropriate equipment and procedures.

- Control measures, including containment: Assist in bringing the hazardous situation under complete or temporary controls and use measures to prevent any escalation of the emergency.

- Decontaminate: Use established procedures to decontaminate personnel in the decontamination area. If the emergency makes this area unsafe, establish a new decontamination area at an appropriate distance. Decontaminate victims before or after stabilization as their medical condition indicates. Decontamination may be delayed if the injuries suffered by the victim pose an immediate threat to the victim's life or health. Instead, the victim should be placed on a tarp, sheet of plastic or non-absorbent backboard to allow handling of the victim without the threat of contaminating support personnel until the victim is stabilized.

- Stabilize: Administer any medical procedures that are necessary before the victim can be moved. Stabilize or permanently remediate the hazardous condition. Address the cause of the emergency and anything that was damaged or endangered by the emergency (e.g., drums, and tanks).

- Transport: No one will be transported without being decontaminated or protected from contaminating others. Measures will be taken to minimize chemical contamination of the transport vehicle, ambulance, and hospital personnel.

- Casualty Logging: Record the names(s) of the victim(s), the time, the destination, and their condition upon transport.
- Casualty tracking: Record the disposition, condition, and location of the casualties.
- Media Reporting: Media contacts should be named (see Attachment A) and utilized whenever contact with reporters is necessary. The Construction Superintendent will be the immediate media contact. The PM is listed as the media contact for most sites.

Security Issues

Both routine and emergency response actions dictate the need for prevention of unauthorized access and for the protection of vital records and equipment. Site size, location, political or social environment, and equipment needs are criteria necessary to evaluate whether security (private or public) is needed.

In the event of unauthorized access, personnel should avoid confrontation (verbal or physical). Attempts must be made to explain site hazards, and Corporate and client expectations for a safe worksite. Continued presence by unauthorized persons will require a team member to notify the local police force. Site activities may need to be halted in the event unauthorized persons create an adverse risk to themselves, to WESTON personnel or to subcontractor personnel.

Severe Weather/Natural Disasters

In the event of adverse weather conditions occurring on-site such as lightning, high winds, tornado, hurricane or extreme heat the SHSC will instruct the workers to discontinue or modify field operations. These natural phenomena complicate work activities and add or increase risk to all site personnel. The following actions should be evaluated or taken in the event of severe weather:

- Stop work
- Secure all loose materials, toolboxes, plywood, and trashcans. etc.
- Bring all workers to safe areas indoors when lightning or severe weather is in the immediate area.
- Verify that all buildings and trailer doors are locked and windows closed.
- Shut down and disconnect all non-critical electrical equipment to protect the equipment from electrical surges and abrupt power loss.

Injury or Illness

In the event of injury or illness, site personnel will take the following action:

- Evaluate the scene for safe entry.
- Notify SHSC and Construction Superintendent.
- Assess the type and extent of injury.
- Provide initial First Aid to injured person.
- Decontaminate the injured personnel, if or as necessary.
- If required and injury or illness not potentially life-threatening, transport to local medical facility.
- If injury or illness potentially life-threatening notify emergency medical services of need for transportation.
- Notify Regional Safety Officer and Project Manager.

Extrication

In the event a person becomes trapped and requires extrication site personnel will take the following action:

- Notify SHSC and Construction Superintendent.
- Evaluate the scene for safe entry.
- Contact the local Fire Department or Rescue Service.
- Provide first aid as necessary.
- Notify Regional Safety Officer and Project Manager.

Chemical Exposure

In the event of chemical exposure site personnel will take the following action:

- Evaluate the scene for safe entry.
- Notify SHSC and Construction Superintendent.
- Provide assistance with emergency shower, eyewash, or other initial First Aid, as required.
- Decontaminate exposed personnel.
- Notify emergency medical services of need for transportation as necessary.
- Notify Regional Safety Officer (RSO) and Project Manager (PM).

Small Fire

A small fire is defined as a fire that can be extinguished with a 4A:20BC type fire extinguisher or incipient stage fires, which can safely be extinguished with material readily at hand. In the event of a small fire, site personnel will take the following actions:

- Evacuate all unnecessary personal from the area, if possible, to an upwind location.
- Notify SHSC and Construction Superintendent.
- Attempt to extinguish fire using portable fire extinguishers or by smothering from an upwind location.
- Request emergency response assistance as appropriate.
- Notify the RSO and Project Manager.

Large Fire

In the event of a large fire, or a small fire, which cannot be extinguished, the following actions will be taken:

- Sound alarm.
- Evacuate all unnecessary personnel from the area, if possible, to an upwind location.
- Notify local fire department; request other emergency response services (police, ambulance, and hospital) as needed.
- Notify Construction Superintendent and RSO and other appropriate personnel or agencies.

Explosion

In the event of an explosion, all nonessential personnel will evacuate the site. Required support equipment, services, and personnel will be requested. Response will follow steps identified under the Chemical Exposure section. Notification action as indicated in the Large Fires section will be followed.

Small Spill

In the event of a small spill, appropriate actions will be taken to prevent the spill from reaching groundwater, surface water or drains.

Actions include:

- Verification of spilled material, volume and hazards.
- Determine appropriate response procedures including PPE (see MSDS or Chemical Data Sheet).
- Assess quantity and size of the spill to determine the level of response to contain and clean it up.
- Confine or contain spill with booms, pads, or berm.
- Neutralize spill with appropriate agents (if safe/possible).
- Notify Regional Safety Officer and Construction Superintendent.
- WESTON will collect spilled material including absorbent material and place in appropriate containers. All hazardous material shall be disposed of in accordance with all applicable hazardous waste regulations and client requirements.

WESTON will keep all records related to the spill of hazardous waste for a period of at least three years after the spill has been cleaned up or such longer period of time as required in any unresolved enforcement action.

Note: MSDS's for materials onsite with potential to spill (e.g., gasoline, diesel, acids, solvents) will be provided as Attachment D to this emergency response plan or the location of MSDS's will be documented in Attachment D. Procedures and requirements for spill response will follow criteria outlined in the MSDS.

Large Spill

A volume equal to or greater than State or Federal reportable quantity (RQ) and/or those beyond the capabilities and resources of on-site personnel defines large spills. Appropriate remedial actions will be conducted according to State and Federal Regulations.

General procedures as follows:

- Verification of spilled material, volume and hazards.
- As safe to do so, confine the spill to the smallest area possible using booms, pads, berms or any other effective material.
- Assess type and extent of damages and injuries to personnel; take appropriate first aid steps if necessary.
- Notify Regional Safety Officer and Construction Superintendent.
- In the event the additional emergency clean-up assistance is needed, WESTON will request assistance from off-site response contractors.
- WESTON will collect all hazardous waste including contaminated booms and absorbent material. All hazardous clean-up residues shall be disposed of in accordance with all applicable hazardous waste regulations.
- All emergency equipment will be decontaminated prior to being put back into service. Expendable or damaged supplies will be immediately replaced.

WESTON will keep all records related to the spill of hazardous waste for a period of at least three years after the spill has been cleaned up or such longer period of time as required in any unresolved enforcement action.

In the event of a spill or a release requiring agency reporting, the Project Manager will notify the client and appropriate regulatory agencies.

Critiques and Corrective Actions

Post emergency response activities include documentation, investigation and appropriate corrective actions to avoid future problems. The Program Safety Manager (PSM), operations safety staff, the RSO or the SHSC will lead the post-incident critique to assure worker knowledge of actions taken and proposals for changes as necessary. The SHSC and the RSO are responsible for documenting incident reports and providing communication to management. The PSM and/or operations safety staff is responsible for providing direction and assistance. Corrective actions necessary based upon appropriate review and investigation of the incident are required prior to assumption of work. In the event corrective actions cannot be made on an immediate basis, documented plans and schedules will be formulated.

ATTACHMENT A
EMERGENCY CONTACTS

A copy of this form is to be posted near the site telephone and available in all site vehicles.

EMERGENCY CONTACTS AND PHONE NUMBERS	
SERVICE	**TELEPHONE NUMBER**
Ambulance Service	911
Police 2-way radios for on-site security	911 (Stratford Police)
Fire	911
Hospital: Bridgeport Hospital 267 Grant Street, Bridgeport	(203) 384-3000
WESTON Medical Emergency (CONTINUUM)	(800) 229-3674
WESTON Emergency (GCT Office)	(860) 368-3200
WESTON Emergency (24 hour) (West Chester)	(610) 701-3000
WESTON Program or Operations Safety Manager: Todd Walles	(860) 368-3211
Client or Media Contact: John Burlson	(203) 385-4316
WESTON Regional Safety Officer: Ted Blackburn (pager)	(603) 860-4457
Spill Response Contractor(s) Franklin Environmental	(203) 630-2472
National Response Center	800-424-8802
Federal Regulatory Agency: EPA Superfund Hotline	800-424-9346
State Regulatory Agency: CT DEP Oil and Chemical Spills	(860) 424-3338
SHSC/ERC (Tim Laquerre, GCT,) Home phone #	Redacted - Privacy Act
Construction Superintendent (Steve O'Brien, GCT) Home Phone #	Redacted - Privacy Act
Alternate ERC(s) (Mike Ciarcia, GCT) Home Phone #	Redacted - Privacy Act
Project Manager: John-Eric Andersson	(860) 368-3209
WESTON Risk Management	(610) 701-3046
WESTON Risk Management	Fax (610) 701-3656

ATTACHMENT B
EMERGENCY RESPONSE EQUIPMENT

WESTON will complete and maintain an inventory of emergency response equipment on-site in the event of an emergency. This attachment will be completed during site mobilization activities, with copies posted in the project office and provided to the On-Site CENAE Representative, TACOM and facilities management (IPM).

Communications Equipment and Alarms:

Fire Control Equipment:

Spill Control Equipment:

Personal Protective Equipment:

Emergency Decontamination Equipment:

First Aid Equipment:

Rescue Equipment:

Equipment Testing:

It is the responsibility of the Emergency Coordinator to periodically test communications and fire control equipment and to ensure that all spill response/control, personal protective equipment; first aid supplies and rescue equipment is available and usable.

Maintenance of Equipment:

Fire extinguishers are to be inspected monthly with annual testing by an outside firm. First aid supplies are to be inspected weekly on construction sites and monthly otherwise. The wearer will inspect personal protective equipment prior to donning.

ATTACHMENT C
FORMS

(e.g., Incident Report, Investigation Report, Client Report Form)

- ❑ Forms are attached. or

- ❑ Forms will be provided in SHSC files.

Minimum forms required on-site include:

- ❑ Notice of Incident (NOI)
- ❑ Incident Report Log (e.g., OSHA 200 Log)
- ❑ Incident Investigation Form
- ❑ Corps of Engineers Accident Report Form 3394 (if CoE Site).
- ❑ Spill Report Form (see attachment D)
- ❑ ERC Incident Checklists
    - o General
    - o HazMat
    - o Fire
    - o Safety and Research
    - o Incident Termination

ATTACHMENT D
SITE-SPECIFIC SPILLS or RESPONSE ACTIONS

Specific procedures are required of the ERC in the event of an emergency situation, these actions include:

- Activate or ensure activation of alarm systems, notify appropriate local or state response agencies.
- Identify the character, exact source, amount and areal extent of any released material.
- Assess possible direct and indirect hazards to human health or the environment that may result from the release, fire or explosion.
- Determine if evacuation of local areas is required, and immediately notify either the government official designated as the on-scene coordinator or the National Response Center.
- Ensure that fires, explosions, and releases do not occur, recur, or spread to other parts of the site or facility.
- Monitor for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment if facility operations cease.
- Provide treatment, storage and disposal of any material that results from a release, fire, or explosion immediately after an emergency.
- Ensure that no waste incompatible with the released material is processed until cleanup procedures are completed and all emergency equipment listed in this plan is cleaned and fit for its intended use.

Evaluate the chemicals or contaminants on your site to determine whether any of the following regulatory spill reports are applicable. Fill out the necessary information in the planning phase to assure prompt and reliable reporting in the event of a spill or release.

Determine If CERCLA Release:

1. Are any chemicals regulated as CERCLA hazardous substance? (see 40 CFR Part 302.4). If so, list.
2. If listed chemicals indicate RQ for each.
3. In the event of a spill of the referenced hazardous substance, has the release equaled of exceeded the RQ within 24 hours?
4. Is the release totally contained within buildings or structures? If no, it must be reported.
5. If Reporting required, notify (in addition to internal/client):
   a. National Response Center 800-424-8802
   b. State Emergency Response Commission (enter phone number) _____
   c. Local Emergency Response Commission (enter phone number) _____
6. Provide information as indicated in Attached Spill Report Form.
7. Ensure written reports prepared and submitted in accordance with regulation and corporate policy.

Determine If Emergency Planning and Community Right-To-Know Act (EPCRA) Release:

1. Are any chemicals listed as extremely hazardous substances? (See 40 CFR Part 350).

2. Are any of the listed chemicals produced, used or stored in excess of the threshold planning quantity (TPQ)? If so, list chemical and quantity above TPQ.

3. Could a release of item 2 chemicals expose people outside of the facility boundaries? If no, is not EPCRA report requirement.

4. If a release of RQ of a listed chemical, notify (in addition to internal and client):
   a. SERC (enter phone number) _____
   b. LEPC (enter phone number) _____

5. Provide information as indicated in Attached Spill Report Form.

6. Ensure written reports prepared and submitted in accordance with regulation and corporate policy.

Determine If Resource Conservation and Recovery Act (RCRA) Release:

1. Is the chemical regulated as a hazardous waste? If not, is not a RCRA report.

2. Does the release constitute a "release, fire, or explosion that could threaten human health or the environment outside the facility? (Note, there are no particular RQs or concentrations in this case).

3. If the release meets the requirements of item 2, notify (in addition to internal and client):
   a. "Appropriate local authorities" if an evacuation is necessary (list name and phone or all).
      _____
   b. State or Federal On-Scene Coordinator (name and phone number).
      _____
   c. **National Response Center**.....800-424-8802

4. Provide information as indicated in Attached Spill Report Form.

5. Ensure written reports prepared and submitted in accordance with regulation and corporate policy.

Determine If Clean Water Act (CWA) Release:

1. Has the spill/release polluted water by:
    a. Being a hazardous substance (40 CFR Part 117) equaling or exceeding its RQ? If hazardous substance list and indicate RQ. *Or*
    b. Being an oil that creates a sheen or discoloration of the water surface, or violates a water quality standard?
2. If release meets the above criteria you must report to the NRC (800-424-8802) as soon as knowledge of the spill.
3. Provide information as indicated in Attached Spill Report Form.
4. Ensure written reports prepared and submitted in accordance with regulation and corporate policy.

Determine If Toxic Substance Control Act (TSCA) Release of PCBs (note determine if other TSCA reporting chemicals (e.g., asbestos) on-site):

1. Does the PCB material concentration equal to or greater than 50 ppm and has contaminated surface and/or drinking water, sewers, grazing lands, or vegetable gardens? *Or*
2. Does the 10 pounds or more of materials that contain 50 ppm or greater concentration of PCBs wherever they are spilled?
3. If so, then notify (in addition to corporate and client requirements)
    a. NRC immediately upon knowledge _____
    b. EPA Regional Office of Pesticides and Toxic Substances Branch (list name and phone number)
    _____
4. Provide information as indicated in Attached Spill Report Form.
5. Ensure written reports prepared and submitted in accordance with regulation and corporate policy.

Spill Report Form

This form is to be used is the event a release or spill Use this form to assist in the initial report phase of an incident Have the following information available (to the extent possible) before the call Do not wait for information that would put you at risk of not reporting in a timely manner and in accordance with applicable regulation(s).

1. Name, Address, Telephone Number of Person Reporting:

2. The identity (chemical name), location and nature of the release, including its source, quantity and duration.

3. Whether the release is to air, ground or water.

4. Whether any injuries or property damage.

5. What are the weather conditions?

6. What types of corrective actions are underway (e.g., containment, evacuation, etc.)?

ATTACHMENT E
SITE PLAN, EVACUATION ROUTES, AND EQUIPMENT LOCATIONS

A map **depicting the site, evacuation routes and equipment locations** will be prepared and posted in the project office. The hospital location will be determined prior to work initiation. **All personnel will be made aware of evacuation signals, evacuation routes and procedures prior to site work.** Evacuation and other site emergencies must be discussed and/or practiced to assure employee awareness and ability to respond properly.

Hospital Route and Directions

A map showing the route to the hospital will be posted near the site telephone. A written description of the routes will be attached to the map. The hospital routes will be verified prior to work initiation.

APPENDIX C

RADIOLOGICAL OPERATIONS PROCEDURES

SAMPLE
(to be completed, if necessary)

WROP-06-625
Issue A
7/10/01

WESTON

Radiological Operations Procedure

PERSONNEL DOSIMETRY

Prepared by:

Robert W. Massengill, RRPT
Site Radiation Safety Manager

Date

Reviewed by:

John-Eric V. Andersson
Project Manager

Date

Approval Recommended by:

George W. Crawford, CIH
Program Safety Manager

Date

Approved by:

Robert. P Schoenfelder, CHP

Date

This procedure shall become effective upon approval.

WROP 06-625
PERSONNEL DOSIMETRY

1.0 PURPOSE

This procedure describes the duties and responsibilities within the Project external dosimetry program that are performed by Radiological Protection Technicians (RPTs) under the direction of the Radiation Safety Manager (RSM).

Scope. This procedure addresses those activities within the external dosimetry process that are either initiated by, controlled by, or require input from the Project Radiation Safety Program personnel

The following activities are described in Section 4.0 of this procedure.

4 1 General

4.2 Multiple Dosimetry

4.3 Extremity Dosimetry

4.4 Eye Dosimeters

4.5 Relocation of the Routine Issue Dosimeter

4.6 Personnel Nuclear Accident Dosimetry

4.7 Lost Dosimetry

2.0 REFERENCES

10 Code of Federal Regulations (CFR) 835, "Occupational Radiation Protection; Final Rule," December 14, 1993.

WESTON Radiological Operations Procedure WRPO-06-626, "Neutron Dose Estimation Using the Quick Scan Approximation Technique."

DuPont Deepwater Project "Site Health and Safety Plan" (HASP)

WESTON "Radiation Safety Program Manual."

3.0 GENERAL

3.1 Equipment

Personal computer; IBM or compatible.

3.2 Safety Considerations

Not applicable

3.3 Responsibilities

3.3.1 The RSM is responsible for the following:

- Implementation of this procedure and for assuring that RPTs are qualified to perform this procedure and are documented as such.
- Assuring that training on this procedure is developed, kept up-to-date, documented, and offered to RPTs needing it

3.3.2 RPTs are responsible for the following:

- Recommending and using dosimetry devices in accordance with this procedure In addition, if for any reason an RPT is unable to follow this procedure, the RPT shall immediately stop, and notify the RSM

3.3.3 Dosimetry Processing Center is responsible for the following.

- Providing all Project workers with the required dosimetry for performing their jobs.
- Providing analysis of all issued dosimeters
- Providing results of analysis to the RSM.

3.4 Prerequisites

Not applicable.

3.5 Records

Various records may be generated during the performance of this procedure. The original copy of the records is the record copy for the dosimetry program. The record copy is given to the Radiation Protection Recorded Information Records Center for processing, including arrangement and filing. Copies of the records shall be transmitted to the RSM.

These record copies are used by the Radiation Safety Program for the documentation of external and internal dosimetry information of this project for corporate records.

The records are stored, arranged, indexed, retrieved, scheduled, retained, and disposed of in accordance with RPXD-02-01 and with the Project Recordkeeping Procedures. All project dosimetry records will be forwarded to the WESTON Corporate Radiation Safety Officer.

3.6 Precautions and Limitations

Not applicable

3.7 Revisions

Not applicable

3.8 Other

Not applicable.

4.0 PROCEDURE

4.1 General

> **Note: All dosimetry will be provided by WESTON, or approved Subcontractor, in accordance with all WESTON procedures and requirements.**

4.1.1 All special personnel dosimetry activities shall be accomplished in accordance with this procedure and any applicable internal and external dosimetry procedures. In the case of a conflict, contact the RSM prior to proceeding

4.1.2 Dosimeters shall be worn outside of normal work clothing and/or in accordance with any instructions given by dosimetry personnel and the RSM

4.1.3 Dosimeters shall be worn inside of protective clothing, unless instructed otherwise by the RSM or dosimetry personnel

4.2 Multiple Dosimetry

This section gives guidance on when and how to assign multiple whole body dosimeters. The whole body is defined as: the head, trunk, arms above and including the elbow, and legs above and including the knee. The use of extremity dosimeters is covered in Section 4.3.

> **Caution:** When multiple dosimeters are used, the normal-issue dosimeter shall not be used in addition to the multiple dosimeters. It shall be removed and not worn into the work area with multiple dosimeters.

4.2.1 Review radiation survey results for the work area to determine if multiple whole body dosimeters are required. Multiple whole body dosimeters shall be used if:

a. The radiation level varies by >50% over the area of the whole body, and

b The anticipated deep dose equivalent to an individual will exceed 100 mrem.

4.2.2 Determine the number and placement of multiple dosimeters required This may be based on the area survey results, type of work to be done, past job history, etc Additional input may be requested from the External Dosimetry group to assist with this process.

4.2.3 Request multiple dosimeters from the RSM, who will contact the Dosimetry Processing Center. The RSM will provide the following information when requesting multiple dosimeters: (this request may be made by telephone)

a The type of dosimetry needed.

b The estimated number of dosimeters required.

c When the dosimeters will be required.

> **Note:** The multiple dosimeters will be provided in a pouch with numbered labels (not assigned to any individual), a thermoluminescent dosimeter (TLD) Area Monitoring/Multibadging Dosimetry form, and a data entry disk. This pouch may be picked up or sent via interoffice mail.

4.2.4 Enter all applicable data onto the disk following the directions in Attachment 1

4.2.5 Enter all applicable data onto the TLD Area Monitoring/Multibadging Dosimetry form. Directions for completion of this form are contained on the form

4.2.6 Return all dosimeters, the TLD Area Monitoring/Multibadging Dosimetry form, and the data disk to the SNL Dosimetry Processing Center after use. If results are needed quickly, inform the SNL Dosimetry Processing Center when returning the package.

4.3 Extremity Dosimeters

An extremity dosimeter (finger ring) can only be issued to an individual who has a whole body badge and is on the routine exchange program. The individual must also be fitted for a finger ring at the Dosimetry Processing Center prior to initial issue.

4.3.1 Extremity dosimeters will be issued by RWP only. Extremity dosimeters shall be issued under the following conditions:

a. Contact readings on items to be handled are at least 100 mrad/hr and 5 times general area dose rates; and

b. Dose to the extremity is likely to be > 100 mrem; or

c. Any glovebox/glovebag work.

4.3.2 Request extremity dosimeters from the Dosimetry Processing Center using a Radiation Dosimetry Request form. Personnel obtaining extremity dosimeters must report to the Dosimetry Processing Center to obtain the dosimeter for the initial issuance.

4.3.3 When not being worn on the finger, the finger ring shall be attached to the routine issue dosimeter

4.4 Eye Dosimeters

Supplemental eye dosimeters are required when the dose rate to the lens of the eye differs significantly from the whole body dose rate, after taking into account any eye protection being worn. Eye dosimetry is performed using a pair of TLD badges in conjunction with the routine exchange TLD. Both the eye badge and the control must be used simultaneously for eye monitoring to be done.

4.4.1 Review radiation survey results for the work area to determine if eye dosimeters are required Eye dosimeters shall be used if the dose rate to the head/eye area exceeds the chest area whole body dose rate by more than 1.5 times, taking into account any extra eye protection in the form of safety glasses, respirator, etc.

Note:	The dose rate to the lens of the eye includes penetrating radiation (gamma and neutron) and beta This dose rate is determined in accordance with WROP-04-405.

4.4.2 Request eye dosimetry from the Dosimetry Processing Center.

4.4.3 Enter all applicable data on the Eye Dosimetry Data Sheet supplied by the Dosimetry Processing Center.

4.4.4 Wear the eye dosimetry in accordance with the instructions on the Eye Dosimetry Data Sheet.

4.4.5 Return the eye dosimeters and the data sheet to the Dosimetry Processing Center after use. This may be done in conjunction with the routine dosimeter exchange.

4.5 Relocation of the Routine Issue Dosimeter

In certain cases where the highest whole body dose may not be received by the chest area, the routine issue dosimeter should be moved to the body location where the highest whole body dose will be measured. Keep in mind that in order to comply with applicable federal limits, the highest whole body dose must be measured.

4.5.1 When it is accurately known, based on past experience or survey data, what whole body location will receive the highest deep dose equivalent,

move the routine issue dosimeter to that location for the duration of that task only

4.5.2 Inform workers of this requirement prior to entry to the work area

4.5.3 Document and provide instructions for the movement of the routine issue dosimeter on the applicable RWP in the "Special Instructions" section

4.6 Personnel Nuclear Accident Dosimetry

Personnel Nuclear Accident Dosimeters (PNADs) are assigned to personnel based on evaluations of their work locations and the requirement for installed criticality alarms The RSM and RPT duties regarding PNADs involve the estimation of individual doses following a criticality accident. The potential for a criticality accident is negligible on this project, but if it should occur;

4.6.1 Collect all PNADs from personnel in the vicinity of a suspected or actual criticality accident.

4.6.2 Perform an individual dose estimation for each recovered PNAD in accordance with WROP-06-626.

4.6.3 Document the results of the dose estimation in accordance with WROP-06-626

4.7 Lost Dosimetry

4.7.1 Notify the RSM immediately in the event of a lost dosimeter. An External Dosimetry Investigation Report will then be initiated, with completion required prior to the issuance of a replacement dosimeter. Initiate a search for the dosimeter prior to requesting a replacement.

4.7.2 Provide requested survey data, RWP data, etc. to the RSM to assist in the investigation and assignment of dose.

4.7.3 The worker may not return to a radiologically controlled area until a dosimeter is reissued.

5.0 ATTACHMENTS

Attachment 06-625-1 Directions for Using Dosimeter Data Diskette

Attachment 06-625-2 Lost Dosimetry Badge Information Form.

WROP-06-625
TABLE OF CONTENTS

ATTACHMENT 06-625-1
DIRECTIONS FOR USING
DOSIMETER DATA DISKETTE

INITIAL DATA ENTRY

1. Insert the disk into the disk drive of an IBM-compatible computer, access the disk, and TYPE (or double click on, as applicable) "WA" to start the program.

2. The Work Area Dosimetry Main Menu will appear on the screen. Push the "Enter" key to choose the "Update Information" option from the menu.

3. When the next screen appears, push the "INSERT" key to begin the process of data entry

   3.1. Enter a number into the "Log Number." space followed by the "Enter" key The Log Number can be any number you desire, dosimetry staff will change it to their number when they receive the disk back For multibadging, each individual must be assigned their own log number at this time

   3.2. Enter a name into the "Name." field followed by the "Enter" key. This is normally the name of the person to whom the report should be sent, not the person to whom the dosimetry is assigned.

   3.3. Enter the facility name into the "Facility:" field followed by the "Enter" key. (This can be anything you want to enter as long as it fits in the field.) For multibadging, this must be the person's name and social security number.

   3.4. Enter the work site code into the "Work Site Code:" field followed by the "Enter" key If you don't know the proper code, (normally A1, A2, etc. for each Technical Area) do not enter anything, just push the "Enter" key.

      a. The message "Please choose a valid work site code. Press any key..." will then appear on the screen.

      b. Push any key; a list of valid codes will appear.

      c. Select the proper code from the options by using the ← or → key followed by the "Enter" key.

   3.5. Enter dates for the "Field Cycle:" followed by the "Enter" key. These are the dates the dosimeters are used. (Both dates must be entered now; the end date can be changed later if needed.)

   3.6. After the dates are entered, a list of Neutron Codes will automatically appear. Select one using the ↑ or ↓ key followed by the "Enter" key twice. If unsure of what to enter here, consult with Radiation Protection Technical Services and/or personnel from the facility where the dosimeters will be used.

   3.7. Enter the Source Information into the "Source Information:" field followed by the "Enter" key. Anything you wish can be entered into this field; up to four lines are available.

DIRECTIONS FOR USING THE DOSIMETER DATA DISKETTE (THE DISK MAY BE ACCESSED AND USED IN EITHER WINDOWS 7 OR DOS 7

3 8. Enter a number into the "Number of Shots " field followed by the "Enter" key This is normally the number of times a machine is run with the TLDs in place, for multiple dosimeters use "1".

3 9. Enter a "Y" or "N" for the "Print Location Number on Report:" followed by the "Enter" key. This is normally "Y"

3.10. The message "There are currently no detail records, would you like to add one? (Y/N)" will appear Enter a "Y" followed by the "Enter" key to begin the dosimeter entry process.

3.11. Enter a dosimeter number from one of the supplied dosimeters into the "Dosimeter." field followed by the "Enter" key

3.12. Enter a location number into the "Location Number:" field followed by the "Enter" key. This should be a sequential number starting with 1.

3.13. Enter the dosimeter location into the "Location:" field.

a. For multibadging, this should be the body location for the dosimeter.

b. For area monitoring, this should be the physical location of the dosimeter.

c. If a map of dosimeter locations is used, the location can say "see attached map." If this is done, the map should be supplied to dosimetry when the dosimeters are returned for processing. Ensure that the location numbers on the map match the location numbers entered onto the data disk.

3.14. If more dosimeters are to be entered: (if not, proceed to Step 3.15.)

a. For multibadging, press the "F3" key, followed by the "Esc" key twice, and the "Insert" key. Repeat Steps 3 1 through 3.13 for the remaining dosimeters.

b. For area dosimeters, press the "Enter" key and repeat Steps 3.11 through 3.13 until all dosimeters are entered.

3.15. After the last dosimeter is entered, press the "F3" key to save the information to the disk.

3.16. Press the "Esc" key three times to return to the Main Menu.

3.17. Select the "Exit This Menu" option using the ↓ key followed by the "Enter" key to exit the program.

DATA EDITING

1. To edit any data, follow Steps 1.0 and 2 0 under Initial Data Entry.

2. Select the group of data to be edited by using the ↑ or ↓ key followed by the "Enter" key.

3 Using the ↑ or ↓ keys, select the field(s) to be edited Editing is accomplished the same as initial data entry.

4 Press the "F3" key to save the data

5 Press the "Esc" key two times to return to the Main Menu.

6. Select the "Exit This Menu" option using the ↓ key followed by the "Enter" key to exit the program.

ATTACHMENT 06-625-2
LOST DOSIMETRY BADGE INFORMATION FORM

ATTACHMENT 06-625-2
LOST DOSIMETRY BADGE INFORMATION FORM

Fill out the following information regarding your site work during the quarter listed below.

Quarter. _____ Date _____

Name· _____ Social Security #: _____

Temporary Badge #: _____ Issue Date. _____

Location and nature of task: _____
Duration of task hours: _____
Other employees performing same task: _____

Location and nature of work: _____
Duration of task hours: _____
Other employees performing same task: _____

Location and nature of work: _____
Duration of task hours: _____
Other employees performing same task: _____

Location and nature of work: _____
Duration of task hours: _____
Other employees performing same task: _____

List any other sites that you visited on the back of the form in the above format.

The following information will be completed by the Radiation Safety Manager

Dose assigned for the lost badge (mrem): Whole Body _____ Skin _____

Dose from the temporary badge (mrem): Whole Body _____ Skin _____

Total dose for the quarter (mrem): Whole Body Skin

*Attach more sheets if necessary

Policy Directive 11-05 Radiation Safety

1.0 Policy

It is the policy of Roy F. Weston, Inc. (WESTON) that all managers and employees will conduct radiological work activities in a manner that keeps radiation exposures as low as reasonably achievable (ALARA), and in compliance with the requirements of WESTON's source material licenses and applicable regulations as specified in Section 3.

WESTON and its subcontractors will take all reasonable precautions in planning and conducting work activities at sites actually or potentially contaminated with radioactive materials to minimize exposures to workers and the public, and to prevent the spread of contamination to the environment. WESTON will maintain this policy by implementing project designs, field engineering controls, administrative exposure limits, and work practices in accordance with guidance provided in this directive. WESTON may adopt as policy the recommendations of the International Commission of Radiological Protection (ICRP) and the National Council on Radiation Protection and Measurements (NCRP) to the extent that they are consistent with existing corporate policy and regulatory requirements. In addition, WESTON and its subcontractors shall conduct work activities in compliance with applicable Federal, state and local regulations.

2.0 Purpose

This policy directive defines the WESTON radiation safety organization and the administrative health and safety responsibilities of project personnel.

It provides guidance for radiological projects from conceptual design through field implementation. It specifies criteria for complying with regulatory standards, and describes radiological protection program components, guidelines for storage and transportation of radioactive materials, and administrative limits applicable to radiological operations. It is intended to provide uniformity in WESTON's approach to field projects involving potential exposures to ionizing radiation.

3.0 Standards and Regulations

WESTON and its subcontractors will comply with all applicable Federal, state, and local radiation safety regulations and requirements including, but not limited to, those established by the Occupational Safety and Health Administration (OSHA) and the Nuclear Regulatory Commission (NRC). Special attention should be given to the regulations listed below. Other requirements may apply at facilities owned or regulated by other Federal Departments or State Agencies.

- 29 CFR Part 1910, "Occupational Safety and Health Standards."

- 49 CFR 172-174, "Transportation of Hazardous Materials."
- 10 CFR Part 20, "Standards for Protection Against Radiation."
- 10 CFR Part 835, Chapter 3 – Department of Energy "Occupational Radiation Protection."

4.0 Radiation Exposure Standards and WESTON Administrative Limits

To ensure compliance with applicable radiation exposures standards, WESTON institutes administrative limits for WESTON employees and subcontractors. These administrative limits are 100 millirem (mrem) per calendar year and 10 percent of the applicable limits for inhalation and ingestion. The applicable limits for inhalation and ingestion will be taken from 10 CFR 20 Subpart C when no other regulatory limits apply. The administrative limits will not be exceeded without prior approvals in accordance with the following provisions:

- Exposures up to 500 mrem per year and 30 percent of the 10 CFR 20 Appendix B, Table I limits may be approved by the Profit Center Manager or Project Manager only if affected employees have received site-specific training that describes the potential exposure levels and health risks associated with the project, appropriate health physics monitoring is conducted under the supervision of a professional health physicist, and a task-specific ALARA program has been reviewed by the health physicist and implemented for the project.
- Planned exposures above 500 mrem per year may be permitted only with the project-specific written approval of the Corporate Environmental, Health and Safety Director (CEHSD).
- Documented doses in excess of 100 mrem per year or 50 mrem per calendar quarter without the prior approvals described above must be reported immediately to the CEHSD.
- Exposures in excess of 5000 mrem per year or 3000 mrem per calendar quarter must be immediately reported to the CEHSD and the U.S. Nuclear Regulatory Commission or other responsible agency.

The annual occupational dose limits for minors are 10 percent of the annual dose limits specified for adults. In addition, the dose to a woman who has declared herself to be pregnant must be less than 500 mrem during the entire gestation period. Work activities must not increase exposures to individuals in unrestricted areas above 100 mrem per year. These regulatory and administrative limits exclude exposures due to natural background and medical sources.

5.0 Radiation Safety Program Organization and Responsibilities

The Radiation Safety Program is administered by WESTON's Corporate Environmental, Health, and Safety (CEHS) Department. The corporate programs are implemented by the Division Managers. The Profit Center Managers and Project Managers implement specific programs and procedures associated with radioactive materials licenses and radiological projects. Individual responsibilities are described in the following subsections.

5.1 Corporate Environmental, Health, and Safety Director

The Corporate Environmental, Health, and Safety (CEHS) Director has overall responsibility for establishing and managing the programs of the CEHS Department. The CEHS Director's duties in maintaining the Radiation Safety Program include the following:

- Revise this Policy Directive and radiation safety guidance documents when required to ensure compliance with regulatory changes.
- Develop and maintain supplemental guidance documents for WESTON's radiation safety programs.
- Inform the Division Managers of the Radiation Safety Program requirements, as necessary.
- Organize and manage a central recordkeeping file to maintain the personnel radiation dose records and other data required by this directive.
- Approve or deny requests for variances from the guidelines of this directive and requests to exceed administrative limits.
- Ensure that radiation safety training is provided to employees as needed, and in compliance with license requirements.

5.2 Division Manager

The Division Manager is ultimately responsible for implementing the policy and procedures associated with health and safety. The day-to-day management and implementation are normally delegated to the Profit Center Manager or Project Manager.

5.3 Profit Center Manager

The Profit Center Manager is responsible for approving requests and applications for radioactive materials licenses and ensuring that radiation safety programs are established and maintained to ensure compliance with license conditions. Specific responsibilities include the following:

- Sign license applications to indicate the company's agreement to meet commitments described in the application.

- Ensure that license fees are paid in a timely manner.
- Ensure that radiation safety programs, source inventories, personnel monitoring, and inspections are conducted as required by licenses.
- Ensure that documentation and recordkeeping are completed as required by regulations and license requirements.

5.4 Project Manager

The Project Manager is responsible for establishing and maintaining radiation safety programs on projects that involve radiological hazards. Specific responsibilities include the following:

- Develop, approve, and implement a project-specific health and safety plan that describes detailed requirements for the project Radiation Safety Program.
- Ensure that professional health physics support is provided to the project during planning and field activities.
- Document the results of radiological measurements, contamination monitoring, and personnel dosimetry and place them into the permanent project files.
- Provide personnel dosimetry results to the CEHSD for inclusion in the corporate database.

5.5 WESTON Employees and WESTON Subcontractors

All employees of WESTON and WESTON subcontractors who work on radiological projects have health and safety responsibilities that include the following:

- Read and become familiar with health and safety plans for projects in which they are involved.
- Abide by applicable radiation safety policies and procedures, and state and Federal regulations.
- Help ensure that their radiation doses and doses received by their co-workers are as low as reasonably achievable.
- Report all unsafe radiological conditions to the Site Manager and suggest improvement in operations to minimize exposures of personnel.

6.0 General Requirements

The CEHS Director maintains guidance documents that provide specific radiation safety program requirements. General guidance for addressing radioactive materials licenses, acquiring radioactive sources, and responding to radiological incidents is provided in the following subsections.

6.1 Licensing, Permitting, and Legal Correspondence

All correspondence that addresses licensing, permitting, or other legal or regulatory matters will be generated and signed by the Profit Center Manager whose operations require the license and are affected by the regulations. The Profit Center Manager is responsible for ensuring that adequate resources are provided to maintain radiation safety programs that will ensure compliance with license requirements. A co-signature of the appropriate Division Manager may also be required where certain commitments of corporate funds or policy are expressed. Copies of radioactive material licenses and related correspondence must be provided to the CEHS Director for maintenance in corporate files.

6.2 Purchasing

All purchases of regulated radioactive materials must have the approval of the Profit Center Manager whose operations require the materials. The Profit Center Manager is responsible for ensuring that licenses are acquired and maintained as necessary to allow possession and use of radioactive materials, or that proper precautions are in place for using radioactive materials that may be acquired without a license.

6.3 Incident Records and Notification Procedure

Radiological incidents will be handled as specified in the emergency procedures section of the project health and safety plan. The Project Manager will follow corporate accident/injury reporting requirements as specified by the CEHS and Risk Management Departments. Additional notification and reporting requirements will be followed as required by Federal, state, or local regulations.

6.4 Transportation, Storage, and Disposal of Radioactive Materials

WESTON and its subcontractors will comply with applicable Federal and state regulations regarding transportation of radioactive contaminated materials. Prior to transport of such materials, the radionuclides and activities involved will be estimated to determine the appropriate procedures and precautions to be followed. Persons shipping or transporting radioactive materials are responsible for ensuring that regulations are met and must comply with Corporate shipping procedures. For more detailed guidance, project-specific requirements will be developed and provided in the health and safety plan.

Radioactive materials will be stored in a manner to maintain exposures to personnel ALARA and to prevent the spread of contamination. Radioactive materials will be disposed in compliance with license requirements and applicable regulations.

6.5 Emergency Response

Emergency response procedures will be developed as part of the site-specific health and safety plans to address the radiological aspects of potential accidents, spills, and contaminating events. Procedures will emphasize the importance of containing radioactive materials on the site, and will designate an individual to oversee cleanup activities and conduct contamination surveys in case of a contaminating event. Emergency response agencies will be informed of the radiological hazards that exist at the project site. Guidelines for emergency response will include notification of appropriate regulatory agencies and radiation safety personnel.

RADIATION SAFETY

THE APPROVAL SIGNATURES ARE KEPT ON FILE
WITH WESTON'S POLICIES AND PRACTICES

Document Number OP 11-01-022
Type of Document Operating Practice
Effective Date 07/01/01
Revision Number 02
Replaces Documents PD 11-05 and OPs 11-05-001 and 11-05-002 dated 04/01/93

Initiated by: R.P Schoenfelder
Legal Review. D B. Bauer
Approved by: O B Douglass
Authorized by: A M Henry

1.0 PURPOSE

It is the policy of Roy F Weston, Inc. (WESTON®) that all managers and employees will conduct radiological work activities in a manner that keeps radiation exposures as low as reasonably achievable (ALARA), and in compliance with the requirements of WESTON's source material licenses and applicable regulations as specified in Section 2.

WESTON and its subcontractors will take all reasonable precautions in planning and conducting work activities at sites actually or potentially contaminated with radioactive materials to minimize exposures to workers and the public, and to prevent the spread of contamination to the environment. WESTON will maintain this policy by implementing project designs, field engineering controls, administrative exposure limits, and work practices in accordance with guidance provided in this operating practice. WESTON may adopt as policy the recommendations of the International Commission of Radiological Protection (ICRP) and the National Council on Radiation Protection and Measurements (NCRP) to the extent that they are consistent with existing corporate policy and regulatory requirements. In addition, WESTON and its subcontractors shall conduct work activities in compliance with applicable Federal, state and local regulations.

This operating practice defines the WESTON radiation safety organization and the administrative health and safety responsibilities of project personnel.

It provides guidance for radiological projects from conceptual design through field implementation. It specifies criteria for complying with regulatory standards, and describes radiological protection program components, guidelines for storage and transportation of radioactive materials, and administrative limits applicable to radiological operations. It is intended to provide uniformity in WESTON's approach to field projects involving potential exposures to ionizing radiation

2.0 STANDARDS AND REGULATIONS

WESTON and its subcontractors will comply with all applicable Federal, state, and local radiation safety regulations and requirements including, but not limited to, those established by the Occupational Safety and Health Administration (OSHA) and the U.S. Nuclear Regulatory Commission (NRC). Special attention should be given to the regulations listed below. Other requirements may apply at facilities owned or regulated by other Federal departments or state agencies.

- 29 CFR Part 1910, "Occupational Safety and Health Standards."

- 49 CFR Parts 172-174, "Transportation of Hazardous Materials "
- 10 CFR Part 20, "Standards for Protection Against Radiation "
- 10 CFR Part 835, Chapter 3 – Department of Energy "Occupational Radiation Protection "

3.0 RADIATION EXPOSURE STANDARDS AND WESTON ADMINISTRATIVE LIMITS

To ensure compliance with applicable radiation exposure standards, WESTON institutes administrative limits for WESTON employees and subcontractors These administrative limits are 100 millirem (mrem) per calendar year and 10 percent of the applicable limits for inhalation and ingestion. The applicable limits for inhalation and ingestion will be taken from 10 CFR 20 Subpart C when no other regulatory limits apply. The administrative limits will not be exceeded without prior approvals in accordance with the following provisions

- Exposures up to 500 mrem per year and 30 percent of the 10 CFR 20 Appendix B, Table I limits may be approved by the Profit Center Manager or Project Manager only if affected employees have received site-specific training that describes the potential exposure levels and health risks associated with the project, appropriate health physics monitoring is conducted under the supervision of a professional health physicist, and a task-specific ALARA program has been reviewed by the health physicist and implemented for the project.
- Planned exposures above 500 mrem per year may be permitted only with the project-specific written approval of the Director, Corporate Environmental Health and Safety and Quality Assurance (CEHS).
- Documented doses in excess of 100 mrem per year or 50 mrem per calendar quarter without the prior approvals described above must be reported immediately to the Director, CEHS
- Exposures in excess of 5000 mrem per year or 3000 mrem per calendar quarter must be immediately reported to the Director, CEHS and the NRC or other responsible agency

The annual occupational dose limits for minors are 10 percent of the annual dose limits specified for adults. In addition, the dose to a woman who has declared herself to be pregnant must be less than 500 mrem during the entire gestation period Work activities must not increase exposures to individuals in unrestricted areas above 100 mrem per year. These regulatory and administrative limits exclude exposures due to natural background and medical sources.

4.0 RADIATION SAFETY PROGRAM ORGANIZATION AND RESPONSIBILITIES

The Radiation Safety Program is administered by WESTON's CEHS Department. The corporate programs are implemented by the Division Managers The Profit Center Managers and Project Managers implement specific programs and procedures associated with radioactive materials licenses and radiological projects. Individual responsibilities are described in the following subsections.

4.1 Director, Corporate Environmental Health and Safety and Quality Assurance

The Director, CEHS, has overall responsibility for establishing and managing the programs of the CEHS Department. The CEHS Director's duties in maintaining the Radiation Safety Program include the following:

- Revise this operating practice and radiation safety guidance documents when required to ensure compliance with regulatory changes.

- Develop and maintain supplemental guidance documents for WESTON's radiation safety programs.

- Inform the Division Managers of the Radiation Safety Program requirements, as necessary

- Organize and manage a central recordkeeping file to maintain the personnel radiation dose records and other data required by this operating practice.

- Approve or deny requests for variances from the guidelines of this operating practice and requests to exceed administrative limits

- Ensure that radiation safety training is provided to employees as needed, and in compliance with license requirements

4.2 Division Manager

The Division Manager is ultimately responsible for implementing the policy and procedures associated with health and safety. The day-to-day management and implementation are normally delegated to the Profit Center Manager or Project Manager

4.3 Profit Center Manager

The Profit Center Manager is responsible for approving requests and applications for radioactive material licenses and ensuring that radiation safety programs are established and maintained to ensure compliance with license conditions. Specific responsibilities include the following:

- Sign license applications to indicate the company's agreement to meet commitments described in the application

- Ensure that license fees are paid in a timely manner.

- Ensure that radiation safety programs, source inventories, personnel monitoring, and inspections are conducted as required by licenses.

- Ensure that documentation and recordkeeping are completed as required by regulations and license requirements.

4.4 Project Manager

The Project Manager is responsible for establishing and maintaining radiation safety programs on projects that involve radiological hazards. Specific responsibilities include the following:

- Develop, approve, and implement a project-specific health and safety plan that describes detailed requirements for the project Radiation Safety Program.

- Ensure that professional health physics support is provided to the project during planning and field activities.

- Document the results of radiological measurements, contamination monitoring, and personnel dosimetry and place them into the permanent project files.

- Provide personnel dosimetry results to the Director, CEHS for inclusion in the corporate database.

4.5 WESTON Employees and WESTON Subcontractors

All employees of WESTON and WESTON subcontractors who work on radiological projects have health and safety responsibilities that include the following.

- Read and become familiar with health and safety plans for projects in which they are involved.

- Abide by applicable radiation safety policies and procedures, and state and Federal regulations.

- Help ensure that their radiation doses and doses received by their co-workers are as low as reasonably achievable.

- Report all unsafe radiological conditions to the Site Manager and suggest improvement in operations to minimize exposures of personnel.

5.0 GENERAL REQUIREMENTS

The Director, CEHS maintains guidance documents that provide specific radiation safety program requirements. General guidance for addressing radioactive materials licenses, acquiring radioactive sources, and responding to radiological incidents is provided in the following subsections.

5.1 Licensing, Permitting, and Legal Correspondence

All correspondence that addresses licensing, permitting, or other legal or regulatory matters will be generated and signed by the Profit Center Manager whose operations require the license and are affected by the regulations. The Profit Center Manager is responsible for ensuring that adequate resources are provided to maintain radiation safety programs that will ensure compliance with license requirements. A co-signature of the appropriate Division Manager may also be required where certain commitments of corporate funds or policy are expressed. Copies of radioactive material licenses and related correspondence must be provided to the CEHS Director for maintenance in corporate files.

5.2 Purchasing

All purchases of regulated radioactive materials must have the approval of the Profit Center Manager whose operations require the materials. The Profit Center Manager is responsible for ensuring that licenses are acquired and maintained as necessary to allow possession and use of radioactive materials, or that proper precautions are in place for using radioactive materials that may be acquired without a license.

5.3 Incident Records and Notification Procedure

Radiological incidents will be handled as specified in the emergency procedures section of the project health and safety plan. The Project Manager will follow corporate accident/injury reporting requirements

as specified by the CEHS and Risk Management Departments Additional notification and reporting requirements will be followed as required by Federal, state, or local regulations.

5.4 Transportation, Storage, and Disposal of Radioactive Materials

WESTON and its subcontractors will comply with applicable Federal and state regulations regarding transportation of radioactive contaminated materials. Prior to transport of such materials, the radionuclides and activities involved will be estimated to determine the appropriate procedures and precautions to be followed. Persons shipping or transporting radioactive materials are responsible for ensuring that regulations are met and must comply with Corporate shipping procedures. For more detailed guidance, project-specific requirements will be developed and provided in the health and safety plan

Radioactive materials will be stored in a manner to maintain exposures to personnel ALARA and to prevent the spread of contamination Radioactive materials will be disposed in compliance with license requirements and applicable regulations

5.5 Emergency Response

Emergency response procedures will be developed as part of the site-specific health and safety plans to address the radiological aspects of potential accidents, spills, and contaminating events. Procedures will emphasize the importance of containing radioactive materials on the site, and will designate an individual to oversee cleanup activities and conduct contamination surveys in case of a contaminating event. Emergency response agencies will be informed of the radiological hazards that exist at the project site Guidelines for emergency response will include notification of appropriate regulatory agencies and radiation safety personnel.

6.0 IMPLEMENTATION

The Director, CEHS, or his/her designee, is responsible for interpreting this operating practice.

APPENDIX D

SITE-SPECIFIC HAZARD COMMUNICATION PROGRAM

APPENDIX D

SITE-SPECIFIC HAZARD COMMUNICATION PROGRAM

Location-Specific Hazard Communications Program/Checklist

In order to ensure an understanding of and compliance with the Hazard Communication Standard, WESTON will utilize this checklist/document (or similar document) in conjunction with the WESTON Written Hazard Communications Program as a means of meeting site or location specific requirements. While responsibility for activities within this document reference the WESTON Site Health & Safety Coordinator (SHSC), it is the responsibility of all personnel to effect compliance. Responsibilities under various conditions can be found within the WESTON Written Hazard Communication Program.

To ensure that information about the dangers of all hazardous chemicals used by WESTON are known by all affected employees, the following hazardous information program has been established. All affected personnel will participate in the hazard communication program. This written program as well as WESTON's Corporate Hazard Communication Program will be available for review by any employee, employee representative, representative of OSHA, NIOSH or any affected employer/employee on a multi-employer site.

___ Site or other location name/address: ***Stratford Army Engine Plant, 550 Main Street Stratford, CT.***

___ Site/Project/Location Manager: ***Steve O'Brien***

___ Site/Location Health & Safety Coordinator: _____

___ List of chemicals complied, format: HASP: X Other._____

___ Location of MSDS Files: ***Temporary project office***

___ Training Conducted by (name and date): _____

___ Indicate format of training documentation: Field Log: X Other:_____

___ Client briefing conducted regarding hazard communication: _____

___ If multi-employer site, indicate name of affected companies:

_____

___ Other employer(s) notified of chemicals, labeling and MSDS information: _____

___ WESTON notified of other employer's or clients hazard communication program as necessary.

List of Hazardous Chemicals

A list of known hazardous chemicals used by WESTON personnel must be prepared and attached to this document or in a centrally identified location with the MSDS. Further information on each chemical may be obtained by reviewing the appropriate MSS. The list will be arranged to enable cross reference with the MSDS file and the label on the container. The SHSC or location manager is responsible for ensuring the chemical listing remains up-to-date.

Container Labeling

The WESTON Site Health & Safety Coordinator (SHSC) will verify that all containers received from the chemical manufacturer, importer, or distributor for use on site will be clearly labeled. The SHSC is responsible for assuring labels are placed where required and for comparing MSDS and other information with label information to ensure correctness.

Material Safety Data Sheets (MSDS)

The SHSC is responsible for establishing and monitoring WESTON's MSDS program for the location. The SHSC will make sure procedures are developed to obtain the necessary MSDS and will review incoming MSDS for new or significant health and safety information. He/she will see that any new information is passed on to the affected employees. If an MSDS is not received at the time of initial shipment, the SHSC will call the manufacturer and have a MSDS delivered for that product in accordance with the requirements of WESTON's Written Hazard Communication Program.

A log for, and copies of, MSDS for all hazardous chemicals in use will be kept in the MSDS folder at a location known to all site workers. MSDSs will be readily available to all employees during each work shift. If an MSDS is not available, immediately contact the WESTON SHSC or designated alternate. When revised MSDSs are received the SHSC will immediately replace the old MSDSs.

Employee Training and Information

The SHSC is responsible for the WESTON site-specific personnel training program. The SHSC will ensure that all program elements specified below are supplied to all affected employees.

At the time of initial assignment for employees to the work site or whenever a new hazard is introduced into the work area, employees will attend a health and safety meeting or briefing that includes the information indicated below.

- Hazardous chemicals present at the worksite.
- Physical and health risks of the hazardous chemicals.
- The signs and symptoms of overexposure.
- Procedures to follow if employees are overexposed to hazardous chemicals.
- Location of the MSDS file and written hazard communication program.
- How to determine the presence or release of hazardous chemicals in the employees work area.
- How to read labels and review MSDSs to obtain hazard information.
- Steps WESTON has taken to reduce or prevent exposure to hazardous chemicals.
- How to reduce or prevent exposure to hazardous chemicals through use of controls procedures, work practices, and personal protective equipment.
- Hazardous, non-routine tasks to be performed (if any).
- Chemicals within unlabeled piping (if any).

When employees are required to perform hazardous non-routine tasks, the affected employee(s) will be given information by the SHSC about the hazardous chemicals he or she may utilize during such activity. This information will include specific chemical hazards, protective and safety measures the employee can use, and

steps WESTON is using to reduce the hazards. These steps include, but are not limited to, ventilation, respirators, presence of another employee, and emergency procedures.

Chemicals in Unlabeled Pipes

Work activities may be performed by employees in areas where chemicals are transferred through unlabeled pipes. Prior to starting work in these areas, the employee shall contact the SHSC at which time information as to: the chemical(s) in the pipes, potential hazards of the chemicals or the process involved, and safety precautions which should be taken will be determined and presented.

Multi-Employer Worksites

It is the responsibility of the SHSC to provide other employers with information about hazardous chemicals imported by WESTON to which their employees may be exposed, along with suggested safety precautions. It is also the responsibility of SHSC and the site manager to obtain information about hazardous chemicals used by other employers to which WESTON employees may be exposed. WESTON's chemical listing will be made available to other employers as requested. MSDSs will be available for viewing as necessary. The location, format and/or procedures for accessing MSDS information must be relayed to affected employees.

APPENDIX E

CHEMICAL SAFETY DATA SHEETS

NTP CHEMICAL REPOSITORY
CIS-1,2-DICHLOROETHYLENE

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 000932

*CAS NUMBER: 156-59-2

*BASE CHEMICAL NAME: DICHLOROETHYLENE,1,2-,CIS-

*PRIMARY NAME: CIS-1,2-DICHLOROETHYLENE

*CHEMICAL FORMULA: C2H2Cl2

*STRUCTURAL FORMULA: CHCl=CHCl

*WLN: G1U1G -Z

*SYNONYMS:
CIS-DICHLOROETHYLENE
(Z)-1,2-DICHLOROETHYLENE

-PHYSICAL CHEMICAL DATA
======================

*PHYSICAL DESCRIPTION: LITERATURE: Clear, colorless liquid
REPOSITORY: Clear, very pale yellow liquid

*MOLECULAR WEIGHT: 96.94

*SPECIFIC GRAVITY: 1.2837 @ 20/4 C [017,047]

*DENSITY: 1.284 g/cc @ 19 C (RAD)

*MP (DEG C): -80.5 C [017,038,043,430]

*BP (DEG C): 60 C [025,269,275,371]

*SOLUBILITIES:
WATER : 1-5 mg/mL @ 16 C (RAD)

DMSO : >=100 mg/mL @ 17 C (RAD)

95% ETHANOL : >=100 mg/mL @ 17 C (RAD)

METHANOL : Not available

ACETONE : >=100 mg/mL @ 17 C (RAD)

TOLUENE : Not available

OTHER SOLVENTS:
Alcohol: Soluble [017,205,421]
Chloroform: Soluble [017,053]
Benzene: Soluble [017,047,053]
Ether: Soluble [017,047,205,421]
Most organic solvents: Soluble [031,421]

*VOLATILITY:
Vapor pressure: 200 mm Hg @ 25 C [055]; 400 mm Hg @ 41 C [038,043,053]
Vapor density : 3.34 [043,102,371,451]

*FLAMMABILITY(FLASH POINT):

This chemical has a flash point of 3.9 C (39 F) [043,062,071,451]. It is flammable. Fires involving this material can be controlled with a dry chemical, carbon dioxide or Halon extinguisher. The autoignition temperature of this chemical is 460 C (860 F) [430,451].

*UEL: 12.8% [043,371,430,451] LEL: 9.7% [043,371,430,451]

*REACTIVITY:
This chemical is incompatible with strong oxidizers [043,071,102]. Contact with sodium or solid caustic alkalies (potassium hydroxide, sodium hydroxide) or their concentrated solutions gives an explosive compound. It will form explosive mixtures with nitrogen tetroxide [043,071]. It is also incompatible with copper or copper alloys. It dimerizes in the presence of organic peroxides. Oxidation in the presence of concentrated sulfuric acid or a free radical initiator gives a dangerous compound. The distillate from a mixture of 0.25% sodium hydroxide in ethanol and this compound has ignited. This chemical is corrosive to metals unless inhibited [071]. It will decompose upon contact with hot metal [346]. It will attack some forms of plastics, rubber and coatings [102].

*STABILITY:
This chemical is gradually decomposed by air, light and moisture [031, 062,071,421]. It is stable under nitrogen and protected from light at temperatures up to 60 C [052]. Solutions of this chemical in water, DMSO, 95% ethanol or acetone should be stable for 24 hours under normal lab conditions (RAD).

*OTHER PHYSICAL DATA:
Refractive index: 1.4435 @ 25 C [025,031]; 1.4490 @ 20 C [047,205]
Specific gravity: 1.291 @ 15/4 C [025]; 1.2743 @ 25/4 C [043,053]
Ethereal, slightly acrid odor [031,102,346,371]
Boiling point: 59.6 C @ 745 mm Hg [031]
Vapor pressure: 60 mm Hg @ -0.5 C; 100 mm Hg @ 9.5 C; 760 mm Hg @ 59.0 C [038]
Vapor pressure: 1 mm Hg @ -58.4 C; 5 mm Hg @ -39.2 C; 10 mm Hg @ -29.9 C [038]
Flash point also reported as 6 C (43 F) [066,205,269,275]
Odor threshold: 0.085 ppm [102]
Liquid surface tension: 24 dynes/cm [371]
Liquid water interfacial tension (estimated): 30 dynes/cm [371]
Latent heat of vaporization: 72 cal/g [371]
Heat of combustion: -2692.9 cal/g [371]

-TOXICITY

*NIOSH REGISTRY NUMBER: KV9420000

*TOXICITY: (abbreviations)

typ. dose	mode	specie	amount	units	other
LCLo	ihl	mus	65000	mg/m3/2H	
LCLo	ihl	cat	20000	mg/m3/6H	

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION:
THR: Mildly toxic by ingestion and inhalation. In high concentrations, it is irritating and narcotic. It has produced liver and kidney injury in experimental animals. A suspected carcinogen. Mutation data. It is sometimes thought to be non-flammable, but it is a dangerous fire hazard when exposed to heat or flame.

*CARCINOGENICITY:
Status: NTP Carcinogenesis Studies; selected, January 1988

*MUTATION DATA:

test	lowest dose	test	lowest dose
mmo-smc	100 mmol/L	hma-mus/smc	1300 mg/kg
mrc-smc	40 mmol/L	dns-rat:lvr	4300 umol/L

*TERATOGENICITY: Not available

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
OSHA: Federal Register (1/19/89) and 29 CFR 1910.1000 Subpart Z
Transitional Limit: PEL-TWA 200 ppm [327,545,610]
Final Limit: PEL-TWA 200 ppm [545,610]
ACGIH: TLV-TWA 200 ppm [415,421,610]
NIOSH Criteria Document: None
NFPA Hazard Rating: Health (H): 2
Flammability (F): 3
Reactivity (R): 2
H2: Materials hazardous to health, but areas may be entered freely with full-faced mask self-contained breathing apparatus which provides eye protection (see NFPA for details).
F3: Materials which can be ignited under almost all normal temperature conditions (see NFPA for details).
R2: Materials which are normally unstable and readily undergo violent chemical change but do not detonate (see NFPA for details).

*OTHER TOXICITY DATA:
Status: EPA TSCA Chemical Inventory, 1986
EPA TSCA Test Submission (TSCATS) Data Base, June 1988
IDLH value: 4000 ppm [071,346]

-OTHER DATA (Regulatory)
==========

*PROPER SHIPPING NAME (IATA): Dichloroethylene

*UN/ID NUMBER: UN1150

*HAZARD CLASS: 3 SUBSIDIARY RISK: None PACKING GROUP: II

*LABELS REQUIRED: Flammable liquid

*PACKAGING: PASSENGER: PKG. INSTR.: 305, Y305 MAXIMUM QUANTITY: 5 L, 1 L
CARGO : PKG. INSTR.: 307 MAXIMUM QUANTITY: 60 L

*SPECIAL PROVISIONS: None

*USES:
This compound is used as a solvent for waxes, resins, fats, phenol, camphor, acetyl cellulose, organic materials and heat-sensitive substances such as caffeine. It is used in rubber manufacture, as a refrigerant, as an additive to dye and lacquer solutions, in retarding fermentation, in organic synthesis, in medicines, in dye extraction, in chlorination reactions and in the manufacture of artificial pearls. It is a constituent of perfumes and thermoplastics.

*COMMENTS: Not available

-HANDLING PROCEDURES
==========

*ACUTE/CHRONIC HAZARDS:
This compound is mildly toxic by ingestion and inhalation. In high concentrations, it is irritating and narcotic [043]. Flashback along the vapor trail may occur [053,371]. When heated to decomposition it emits toxic fumes of hydrogen chloride gas, phosgene and carbon monoxide [102, 371].

*MINIMUM PROTECTIVE CLOTHING: Not available

*RECOMMENDED GLOVE MATERIALS:
Permeation Test Results For The Neat (Undiluted) Chemical:

The permeation test results for the neat (undiluted) chemical are given below. The breakthrough times of this chemical are given for each glove type tested. The table is a presentation of actual test results, not specific recommendations or suggestions. Avoid glove types which exhibit breakthrough times of less than the anticipated task time plus an adequate safety factor. If this chemical makes direct contact with your glove, or if a tear, puncture or hole develops, replace them at once.

Glove Type	Model Number	Thickness	Breakthrough Time
Viton	North F-091	0.28 mm	95 min
Butyl rubber	North B-174	0.64 mm	15 min
Neoprene	Edmont 29-870	0.46 mm	5 min
PVC	Edmont 34-100	0.15 mm	1 min

*RECOMMENDED RESPIRATOR:

When working with this chemical, wear a NIOSH-approved full face chemical cartride respirator equipped with the appropriate organic vapor cartridges. If that is not available, a half face respirator similarly equipped plus airtight goggles can be substituted. However, please note that half face respirators provide a substantially lower level of protection than do full face respirators.

*OTHER: Not available

*STORAGE PRECAUTIONS:

You should protect this chemical from exposure to light. Keep the container tightly closed under an inert atmosphere, and store it in an explosion-proof refrigerator. STORE AWAY FROM SOURCES OF IGNITION.

*SPILLS AND LEAKAGE:

If you spill this chemical, FIRST REMOVE ALL SOURCES OF IGNITION. Then, use absorbent paper to pick up all liquid spill material. Your contaminated clothing and absorbent paper should be sealed in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with 60-70% ethanol followed by washing with a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT: Not available

-EMERGENCY PROCEDURES

*SKIN CONTACT:

IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.

If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

*INHALATION:

IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital.

Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:

First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.

Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.

IMMEDIATELY transport the victim after flushing eyes to a hospital even if

no symptoms (such as redness or irritation) develop.

*INGESTION:

DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems.

If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital.

If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS:

Symptoms of exposure to this compound may include central nervous system depression, dizziness, nausea and vomiting [071,346,371]. High concentrations cause irritation and narcosis [031,062,071,102]. Irritation of the skin, eyes and mucous membranes may occur [269,301]. Other symptoms may include irritation of the respiratory tract, conjunctivitis and difficult breathing [071]. Weakness and epigastric cramps may occur [371]. Drowsiness and unconsciousness may also occur [102].

-SOURCES
=======

*SOURCES:

[015] Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. On-line Ed. National Institute for Occupational Safety and Health. Cincinnati, OH. KV9420000. March 20, 1989.

[017] Weast, R.C., M.J. Astle, and W.H. Beyer, Eds. CRC Handbook of Chemistry and Physics. 67th Ed. CRC Press, Inc. Boca Raton, FL. 1986. p. C-272, #6865.

[025] Buckingham, J., Ed. Dictionary of Organic Compounds. 5th Ed. Chapman and Hall. New York. 1982. Vol. 2, p. 1733, #D-02639.

[031] Windholz, M., Ed. The Merck Index. 10th Ed. Merck and Co. Rahway, NJ. 1983. pp. 13-14, #87.

[038] Stull, D.R. Vapor pressure of pure substances: Organic Compounds. Industrial and Engineering Chem. 39(4):517-550. 1947. p. 518.

[039] Boublik, T., V. Fried and E. Hala. The Vapor Pressures of Pure Substances. p. 599.

[043] Sax, N.I. and Richard J. Lewis, Sr. Dangerous Properties of Industrial Materials. 7th Ed. Van Nostrand Reinhold. New York. 1989. Vol. II, p. 1152, #DFI200.

[047] Weast, R.C. and M.J. Astle, Eds. CRC Handbook of Data on Organic Compounds. CRC Press, Inc. Boca Raton, FL. 1985. Vol. I, p. 623, #E00631.

[051] Sax, N. Irving, Ed. Dangerous Properties of Industrial Materials Report. Bi-monthly Updates. Van Nostrand Reinhold Company, Inc. New York. May/June 1984. Vol. 4, No. 3, pp. 48-53.

[052] Midwest Research Institute. MRI Report for cis-1,2-Dicloroethylene. Kansas City, MO. November 4, 1986.

[053] Arthur D. Little, Inc. Health and Safety Package for cis-1,2-Dichloroethylene. Arthur D. Little, Inc. Cambridge, MA. April 11, 1989.

[055] Verschueren, K. Handbook of Environmental Data on Organic Chemicals. 2nd Ed. Van Nostrand Reinhold. New York. 1983. pp. 488-489.

[062] Sax, N.I. and R.J. Lewis Sr., Eds. Hawley's Condensed Chemical Dictionary. 11th Ed. Van Nostrand Reinhold. New York. 1987. p. 378.

[066] Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd Ed. Butterworths. London. 1985. pp. 232, 1725.

[071] Sax, N. Irving, Ed. Hazardous Chemicals Information Annual, No. 1. Van Nostrand Reinhold Information Services. New York. 1986. pp. 160-165.

[082] U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substance Inventory: 1985 Edition. 5 Vols. U.S. Environmental Protection Agency. Washington, D.C. January 1986. Listed.

[099] Grant, W. Morton, M.D. Toxicology of the Eye. 3rd Ed. Charles C. Thomas, Publisher. Springfield, IL. 1986. pp. 325-326.

[102] U.S. Department of Health and Human Services and U.S. Department of Labor. NIOSH/OSHA Occupational Health Guidelines for Chemical Hazards. 3 Vols. DHHS (NIOSH) Publication No. 81-123. January, 1981. Volume 1.

[110] Oak Ridge National Laboratory. Environmental Mutagen Information Center (EMIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed.

[120] Oak Ridge National Laboratory. Environmental Teratogen Information Center (ETIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Not listed.

[205] Dean, John A., Ed. Lange's Handbook of Chemistry. 13th Ed. McGraw-Hill Book Company. New York. 1985. p. 7-287, #d346.

[269] Lenga, Robert E. The Sigma-Aldrich Library of Chemical Safety Data. Edition 1. Sigma-Aldrich Corporation. Milwaukee, WI. 1985. p. 617, #D.

[275] Aldrich Chemical Company. Aldrich Catalog/Handbook of Fine Chemical. Aldrich Chemical Co., Inc. Milwaukee, WI. 1988. p. 497, #D6,200-4.

[301] Dreisbach, R.H. Handbook of Poisoning: Prevention, Diagnosis and Treatment. 11th Ed. Lange Medical Publications. Los Altos, CA. 1983. p. 178.

[327] Office of the Federal Register National Archives and Records Administration. Code of Federal Regulations, Title 29, Labor, Parts 1900 to 1910. U.S. Government Printing Office. Washington. 1988. p. 707.

[346] Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens. 2nd Ed. Noyes, Publications. Park Ridge, NJ. 1985. pp. 321-323.

[371] U.S. Coast Guard, Department of Transportation. CHRIS Hazardous Chemical Data. U.S. Coast Guard. Washington, D.C. 1985. Volume 1.

[415] American Conference of Governmental Industrial Hygienists. Threshold Limit Values and Biological Exposure Indices for 1988-1989. American Conference of Governmental Industrial Hygienists. Cincinnati, OH. 1988. p. 18.

[421] American Conference of Governmental Industrial Hygienists. Documentation of the Threshold Limit Values. 5th Ed. American Conference of Governmental Industrial Hygienists. Cincinnati, OH. 1986. p. 185.

[430] Clayton, G.D. and F.E. Clayton, Eds. Patty's Industrial Hygiene and Toxicology. Vol. 2. Third Revised Edition. John Wiley and Sons. New York. 1981. Vol. IIB, pp. 3550-3553.

[451] National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th Ed. National Fire Protection Association. Quincy, MA. 1986. pp. 325M-34, 491M-77, 49-39.

[545] Office of the Federal Register National Archives and Records Administration. Federal Register, Dept. of Labor, Part III. U.S. Government Printing Office. Washington. January 19, 1989. p. 2933.

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Update, p. xxxvi; Section 3, p. 61.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. November 6, 1990. Listed.

NTP CHEMICAL REPOSITORY
METHYLENE CHLORIDE

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 000491

*CAS NUMBER: 75-09-2

*BASE CHEMICAL NAME: METHYLENECHLORIDE

*PRIMARY NAME: METHYLENE CHLORIDE

*CHEMICAL FORMULA: CH2Cl2

*STRUCTURAL FORMULA: CH2Cl2

*WLN: G1G

*SYNONYMS:
METHANE DICHLORIDE
DICHLOROMETHANE
METHYLENE BICHLORIDE
METHYLENE DICHLORIDE
AEROTHENE MM
DCM
NARKOTIL
SOLAESTHIN
SOLMETHINE
NCI-C50102
R 30
RCRA WASTE NUMBER U080
UN 1593

-PHYSICAL CHEMICAL DATA
==========

*PHYSICAL DESCRIPTION: LITERATURE: Clear colorless liquid
REPOSITORY: Clear liquid

*MOLECULAR WEIGHT: 84.93

*SPECIFIC GRAVITY: 1.326 @ 20/4 C [043,051]

*DENSITY: 1.3255 g/mL @ 20 C [173,421]

*MP (DEG C): -96.7 C [038,205,421,430]

*BP (DEG C): 39.8 C @ 760 mm Hg [051,058,102,371]

*SOLUBILITIES:
WATER : 10-50 mg/mL @ 21 C (RAD)

DMSO : >=100 mg/mL @ 21 C (RAD)

95% ETHANOL : >=100 mg/mL @ 21 C (RAD)

METHANOL : Not available

ACETONE : >=100 mg/mL @ 21 C (RAD)

TOLUENE : Not available

OTHER SOLVENTS:

Alcohol: Miscible [031,173,205,295]
Ether: Miscible [031,173,205,295]
Ethanol: >10% [047]
Dimethylformamide: Miscible [031,173,205]
Most organic solvents: Completely miscible [421]

*VOLATILITY:
Vapor pressure: 440 mm Hg @ 25 C [301,421,430]
Vapor density : 2.93 [043,055,058,395]

*FLAMMABILITY(FLASH POINT):
Literature sources indicate that this chemical is nonflammable under normal conditions [062,173,371,421]. However, it is flammable from 12%-19% in air with high ignition energy [036,043,066]. This compound is not explosive when mixed with air but may form explosive mixtures in atmospheres with higher oxygen content [043,051,395]. It forms flammable vapor-air mixtures at >=100 C [051,451]. Fires involving this material can be controlled with a dry chemical, carbon dioxide or Halon extinguisher. A water spray may also be used [058]. The autoignition temperature of this compound is 556 C (1033 F) [102, 451].

*UEL: 19% [058,102,371,451] LEL: 12% [058,102,371,451]

*REACTIVITY:
This chemical reacts vigorously with active metals such as lithium, sodium and potassium, and with strong bases such as potassium tert-butoxide [051,395,451]. It is incompatible with strong oxidizers, strong caustics and chemically active metals such as aluminum or magnesium powders [051, 058,102,346]. The liquid will attack some forms of plastic, rubber and coatings [102]. This compound reacts with sodium-potassium alloy, (potassium hydrogen + N-methyl-N-nitrosurea), nitrogen tetroxide and liquid oxygen. It also reacts with titanium. On contact with water it corrodes iron, some stainless steels, copper and nickel [051]. It is incompatible with alkali metals [058,269]. It is incompatible with amines, zinc and alloys of aluminum, magnesium and zinc [058]. This compound is liable to explode when mixed with dinitrogen pentoxide or nitric acid [036]. Mixtures of this compound in air with methanol vapor are flammable [043].

*STABILITY:
This chemical is sensitive to heat [043,269]. It is also sensitive to exposure to moisture [058]. It is subject to slow hydrolysis which is accelerated by light [051]. Solutions of this chemical in water, DMSO, 95% ethanol or acetone should be stable for 24 hours under normal lab conditions (RAD).

*OTHER PHYSICAL DATA:
Specific gravity: 1.36174 @ 0/4 C; 1.33479 @ 15/4 C; 1.30777 @ 30/4 C [031]
Density: 1.321 g/mL @ 25 C [047]
Vapor pressure: 20 mm Hg @ -33.4 C; 40 mm Hg @ -22.3 C [038]
Vapor pressure: 60 mm Hg @ -15.7 C; 100 mm Hg @ -6.3 C [038]
Vapor pressure: 200 mm Hg @ 8.0 C; 400 mm Hg @ 24.1 C [038]
Vapor pressure: 500 mm Hg @ 30 C [055]; 349 mm Hg @ 20 C [055,058]
Vapor pressure: 380 mm Hg @ 22 C [043,051]; 760 mm Hg @ 40.7 C [038]
Not unpleasant, sweetish odor above 300 ppm; odor becomes unpleasant ~1000 ppm [430]
log P octanol: 1.25 [395]
Odor threshold: 205-307 ppm [051,371]
UV max: 400-340 nm, 260 nm, 250 nm, 240 nm, 235 nm [275]
Evaporation rate (butyl acetate = 1): 27.5 [102]
Evaporation rate (ethyl ether = 1): 0.71 [058]
Critical temperature: 245 C [051,371]
Critical pressure: 60.9 atm [051,371]
Latent heat of vaporization: 78.7 cal/g [051,371]
Heat of fusion: 16.89 cal/g [051,371]
pH of solutions: neutral [058]
100% volatile by volume [058]
Viscosity: 0.430 centipoise @ 20 C [062]
Refractive index: 1.4244 @ 20 C [031,052,062]

-TOXICITY
========

*NIOSH REGISTRY NUMBER: PA8050000

*TOXICITY: (abbreviations)

typ. dose	mode	specie	amount	units	other
LDLo	orl	hmn	357	mg/kg	
TCLo	ihl	hmn	500	ppm/1Y-I	
TCLo	ihl	hmn	500	ppm/8H	
LC50	ihl	rat	88000	mg/m3/30M	
LC50	ihl	mus	14400	ppm/7H	
LD50	scu	mus	6460	mg/kg	
LCLo	ihl	dog	14108	ppm/7H	
LDLo	ipr	dog	950	mg/kg	
LDLo	scu	dog	2700	mg/kg	
LDLo	ivn	dog	200	mg/kg	
LCLo	ihl	cat	43400	mg/m3/4.5H	
LDLo	orl	rbt	1900	mg/kg	
LCLo	ihl	rbt	10000	ppm/7H	
LDLo	scu	rbt	2700	mg/kg	
LCLo	ihl	gpg	5000	ppm/2H	
LD50	unr	mus	4770	mg/kg	
LD50	orl	rat	1600	mg/kg	
LD50	ipr	rat	916	mg/kg	
LD50	ipr	mus	437	mg/kg	
LDLo	orl	dog	3	gm/kg	

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION:
THR: Poison by intravenous route. Moderately toxic by ingestion, subcutaneous and intraperitoneal routes. Mildly toxic by inhalation. An experimental carcinogen and tumorigen. An experimental teratogen. Experimental reproductive effects. An eye and severe skin irritant. Human mutagenic data.

*CARCINOGENICITY:
Tumorigenic Data:
TCLo: ihl-rat 3500 ppm/6H/2Y-I
TCLo: ihl-mus 2000 ppm/5H/2Y-C
TC : ihl-rat 500 ppm/6H/2H-I
Review: IARC Cancer Review: Animal Sufficient Evidence
IARC Cancer Review: Human Inadequate Evidence
IARC possible human carcinogen (Group 2B) [015,395,610]
Status: NTP Carcinogenesis Studies (Inhalation); Clear Evidence: Female Rat, Male and Female Mouse [015,620]
NTP Carcinogenesis Studies (Inhalation); Some Evidence: Male Rat [620]
ACGIH suspected human carcinogen [610]
NTP anticipated human carcinogen [610]

*MUTATION DATA: See RTECS printout for data

*TERATOGENICITY: See RTECS printout for data

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
OSHA: Federal Register (1/19/89) and 29 CFR 1910.1000 Subpart Z
Transitional Limit: PEL-TWA 500 ppm; Ceiling Limit 1000 ppm; Peak 2000 ppm/5M/2H [015,327,545,610]
Final Limit: PEL-TWA 500 ppm [610]
ACGIH: TLV-TWA 50 ppm [015,415,421,610]
NIOSH Criteria Document: Recommended Exposure Limit to this compound-air: Reduce exposure to lowest feasible limit [610]
NFPA Hazard Rating: Health (H): 2
Flammability (F): 1
Reactivity (R): 0

H2: Materials hazardous to health, but areas may be entered freely with full-faced mask self-contained breathing apparatus which provides eye protection (see NFPA for details).
F1: Materials that must be preheated before ignition can occur (see NFPA for details).
R0: Materials which are normally stable even under fire exposure conditions and which are not reactive with water (see NFPA for details).

*OTHER TOXICITY DATA:
Skin and Eye Irritation Data:
eye-rbt 162 mg MOD
eye-rbt 10 mg MLD
eye-rbt 500 mg/24H MLD
skn-rbt 810 mg/24H SEV
skn-rbt 100 mg/24H MOD
Review: Toxicology Review
Standards and Regulations: DOT-Hazard: ORM-A; Label: None
DOT-IMO: Poison B; Label: St. Andrews Cross
Status: EPA Genetox Program 1988, Positive: Cell transform.-RLV F344 rat embryo
EPA Genetox Program 1988, Positive: Histidine reversion-Ames test
EPA Genetox Program 1988, Positive: S cerevisiae gene conversion; S cerevisiae-homozygosis
EPA Genetox Program 1988, Positive: S cerevisiae-reversion
EPA Genetox Program 1988, Negative: D melanogaster Sex-linked lethal
EPA TSCA Chemical Inventory, 1986
EPA TSCA 8(a) Preliminary Assessment Information, Final Rule
EPA TSCA Section 8(e) Status Report 8EHQ-0680-0345
EPA TSCA Section 8(e) Status Report 8EHQ-0180-0324
EPA TSCA Test Submission (TSCATS) Data Base, June 1989
NIOSH Current Intelligence Bulletin 46, 1986
NIOSH Analytical Methods: see Methylene chloride, 1005
Meets criteria for proposed OSHA Medical Records Rule
OSHA Analytical Method #ID-59
IDLH level: 5000 ppm [051,371]

-OTHER DATA (Regulatory)
==========

*PROPER SHIPPING NAME (IATA): Dichloromethane

*UN/ID NUMBER: UN1593

*HAZARD CLASS: 6.1 SUBSIDIARY RISK: None PACKING GROUP: III

*LABELS REQUIRED: Keep away from food

*PACKAGING: PASSENGER: PKG. INSTR.: 605, Y605 MAXIMUM QUANTITY: 60 L, 2 L
CARGO : PKG. INSTR.: 612 MAXIMUM QUANTITY: 220 L

*SPECIAL PROVISIONS: None

*USES:
This compound is used in rubber adhesives and other rubber solutions, in the pharmaceutical industry, as a paint and varnish remover, in solvent degreasing, in aerosol formulations, in food and drug processing, in the plastic industry, in hairsprays, insecticides and spray paints, as a cosolvent or vapor pressure depressant, as a blowing agent for flexible polyurethane foams, as a cleaning solvent for circuit boards, as a stripper solvent for photoresists, as a solvent for cellulose acetate fiber, in plastic film, in protective coatings, in chemical processing, as a carrier solvent for herbicides and insecticides, to extract heat-sensitive, naturally occurring substances such as cocoa, edible fats, spices and beer hops, for decaffeinating coffee, as a refrigerant, in oil dewaxing, as a dye and perfume intermediate, in the textile industry, as a post-harvest fumigant for strawberries, as a grain fumigant, for degreening citrus fruits, as an industrial solvent, in low temperature extraction, as a solvent for oil, fats, bitumen and esters, in

coating photographic films, as a solvent for resins and rubber, as a food additive, in synthetic fibers and leather coatings, as a spotting agent and in organic synthesis.

*COMMENTS:
Carbon monoxide is a metabolite of this compound [058,151,173].

-HANDLING PROCEDURES
==========

*ACUTE/CHRONIC HAZARDS:
This compound is moderately toxic by all routes [051]. It is an irritant of the skin, eyes and respiratory tract [102,451]. It is readily absorbed through the skin [051,058,151,395]. When heated to decomposition it emits toxic fumes of chlorine, hydrogen chloride gas, carbon monoxide, carbon dioxide and phosgene [043,058,102].

*MINIMUM PROTECTIVE CLOTHING:
If Tyvek-type disposable protective clothing is not worn during handling of this chemical, wear disposable Tyvek-type sleeves taped to your gloves.

*RECOMMENDED GLOVE MATERIALS:
Permeation Test Results For The Neat (Undiluted) Chemical:
The permeation test results for the neat (undiluted) chemical are given below. The breakthrough times of this chemical are given for each glove type tested. The table is a presentation of actual test results, not specific recommendations or suggestions. Avoid glove types which exhibit breakthrough times of less than the anticipated task time plus an adequate safety factor. If this chemical makes direct contact with your glove, or if a tear, puncture or hole develops, replace them at once.

Glove Type	Model Number	Thickness	Breakthrough Time
PVA	Edmont 25-545	0.33 mm	480 min
Viton	North F-091	0.28 mm	52 min
Nitrile	North LA-1426	0.36 mm	4 min

*RECOMMENDED RESPIRATOR:
When working with this chemical, wear a NIOSH-approved full face positive pressure supplied-air respirator or a self-contained breathing apparatus (SCBA). [651]

*OTHER:
Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure.

*STORAGE PRECAUTIONS:
You should store this chemical under refrigerated temperatures, and protect it from moisture. If possible, it would be prudent to store this compound under inert atmosphere.

*SPILLS AND LEAKAGE:
If you should spill this chemical, use absorbent paper to pick up all liquid spill material. Seal the absorbent paper, as well as any of your clothing which may be contaminated, in a vapor-tight plastic bag for eventual disposal. Wash any surfaces you may have contaminated with a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT: Not available

-EMERGENCY PROCEDURES
==========

*SKIN CONTACT:
IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.
IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop.
IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas.

*INHALATION:
IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop.
Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:
First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.
Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.
IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:
DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems.
If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital.
If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS:
Symptoms of exposure to this compound may include headache, elevated blood concentrations of carboxyhemoglobin, nausea and irritation of the skin and eyes [058,102,295]. Central nervous system depression, pulmonary edema, hemolysis, chronic intoxication and paresthesia may also occur [295]. Other symptoms include narcosis, temporary neurobehavioural effects, increase in serum bilirubin, increased urinary formic acid concentrations and increased risk of spontaneous abortion [395]. In addition, intravascular hemolysis, unconsciousness, lack of response to painful stimuli, rapid followed by slowed respiration, erythema, blistering, toxic encephalopathy, painful joints, swelling of the extremities, mental impairment, diabetes, skin rash, aspiration pneumonia, gross hematuria, reduction of blood pH, gastrointestinal injury and narrowing of the intestinal lumen may also occur [301]. Other symptoms may include upper respiratory tract irritation, giddiness, stupor, irritability, numbness, tingling in the limbs and hallucinations [346,421]. A dry, scaly and fissured dermatitis, skin burns, coma and death may also result [346]. Other symptoms may include dizziness, sense of fullness in the head, sense of heat, dullness, lethargy and drunkenness [058,430]. In addition, mental confusion, lightheadedness, vomiting, weakness, somnolence, lassitude, anorexia, depression, fatigue, vertigo, liver damage, nose and throat irritation, anesthetic effects, smarting and reddening of the skin, blood dyscrasias, acceleration of the pulse and congestion in the head may result [051]. Staggering may also occur [102]. Other symptoms of exposure to this compound may include neurasthenic disorders, digestive disturbances and acoustical and optical delusions [421]. Arrhythmias produced by catecholamines may also

result [406]. Additional symptoms include edema, faintness, loss of apetite and apathy [173]. Hyporeflexia, gross hemoglobinuria, epiglottal edema, metabolic acidosis, gastrointestinal hemorrhage, ulceration of the duodeno-jejunal junction and diverticula may also occur [151]. Other symptoms may include kidney damage, lung damage, corneal injury, abdominal pain and an increase in salivary gland tumors [058]. Cyanosis may also occur [036]. Exposure may also cause altered sleep time, convulsions, euphoria and a change in cardiac rate [043].

-SOURCES
=======

*SOURCES:

[015] Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. On-line Ed. National Institute for Occupational Safety and Health. Cincinnati, OH. PA8050000. October 5, 1989.

[016] Weast, R.C., D.R. Lide, M.J. Astle, and W.H. Beyer, Eds. CRC Handbook of Chemistry and Physics. 70th Ed. CRC Press, Inc. Boca Raton, FL. 1989. p. C-349, #9060.

[025] Buckingham, J., Ed. Dictionary of Organic Compounds. 5th Ed. Chapman and Hall. New York. 1982. Vol. 2, pp. 1740-1741, #D-02723.

[031] Windholz, M., Ed. The Merck Index. 10th Ed. Merck and Co. Rahway, NJ. 1983. p. 869, #5936.

[036] Bretherick, L., Ed. Hazards in the Chemical Laboratory. 4th Ed. The Royal Society of Chemistry. London. 1986. p. 283.

[038] Stull, D.R. Vapor pressure of pure substances: Organic Compounds. Industrial and Engineering Chem. 39(4):517-550. 1947. p. 518.

[039] Boublik, T., V. Fried and E. Hala. The Vapor Pressures of Pure Substances. Listed.

[043] Sax, N.I. and Richard J. Lewis, Sr. Dangerous Properties of Industrial Materials. 7th Ed. Van Nostrand Reinhold. New York. 1989. Vol. III, pp. 2215-2216, #MDR000.

[047] Weast, R.C. and M.J. Astle, Eds. CRC Handbook of Data on Organic Compounds. CRC Press, Inc. Boca Raton, FL. 1985. Vol. I, p. 854, #M00635.

[051] Sax, N. Irving, Ed. Dangerous Properties of Industrial Materials Report. Bi-monthly Updates. Van Nostrand Reinhold Company, Inc. New York. November/December 1980; Vol. 1, No. 2, pp. 45-47. March/April 1988; Vol. 8, No. 2, pp. 51-62.

[052] Midwest Research Institute. MRI Report for Methylene chloride. Kansas City, MO. June 26, 1974.

[055] Verschueren, K. Handbook of Environmental Data on Organic Chemicals. 2nd Ed. Van Nostrand Reinhold. New York. 1983. pp. 848-849.

[058] Information Handling Services. Material Safety Data Sheets Service. Microfiche Ed. Bimonthly Updates. October/November 1989. #2202-002, A-08; #9106-121, D-02.

[062] Sax, N.I. and R.J. Lewis Sr., Eds. Hawley's Condensed Chemical Dictionary. 11th Ed. Van Nostrand Reinhold. New York. 1987. p. 768.

[066] Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd Ed. Butterworths. London. 1985. pp. 140-141.

[082] U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substance Inventory: 1985 Edition. 5 Vols. U.S. Environmental Protection Agency. Washington, D.C. January 1986. Listed.

[099] Grant, W. Morton, M.D. Toxicology of the Eye. 3rd Ed. Charles C. Thomas, Publisher. Springfield, IL. 1986. pp. 616-617.

[102] U.S. Department of Health and Human Services and U.S. Department of Labor. NIOSH/OSHA Occupational Health Guidelines for Chemical Hazards. 3 Vols. DHHS (NIOSH) Publication No. 81-123. January, 1981. Vol. 2.

[107] Occupational Health Services, Inc. Hazardline. Occupational Health Services, Inc. New York. Listed.

[110] Oak Ridge National Laboratory. Environmental Mutagen Information Center (EMIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed.

[120] Oak Ridge National Laboratory. Environmental Teratogen Information Center (ETIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed.

[151] Gosselin, R.E., H.C. Hodge, and R.P. Smith. Clinical Toxicology of Commercial Products. 5th Ed. Williams and Wilkins, Co. Baltimore. 1984. p. II-161, #359.

[165] Wiswesser, W.J., Ed. Pesticide Index. Entomological Society of America. College Park, MD. 1976. p. 153.

[173] Hayes, W.J., Jr. Pesticides Studied in Man. Williams and Wilkins. Baltimore. 1982. pp. 142-144.

[195] Estrin, F.E., P.A. Crosley and C.R. Haynes, Eds. CFTA Cosmetic Ingredient Dictionary. 3rd Ed. The Cosmetic, Toiletry and Fragrance Assn. Inc. Washington. 1982. p. 168.

[205] Dean, John A., Ed. Lange's Handbook of Chemistry. 13th Ed. McGraw-Hill Book Company. New York. 1985. p. 7-290, #d372.

[269] Lenga, Robert E. The Sigma-Aldrich Library of Chemical Safety Data. Edition 1. Sigma-Aldrich Corporation. Milwaukee, WI. 1985. p. 621, #C.

[275] Aldrich Chemical Company. Aldrich Catalog/Handbook of Fine Chemical. Aldrich Chemical Co., Inc. Milwaukee, WI. 1988. p. 500, #27,056-3.

[295] Reynolds, James E.F., Ed. Martindale The Extra Pharmacopoeia. 28th Ed. The Pharmaceutical Press. London. 1982. p. 1455, #6521-a.

[301] Dreisbach, R.H. Handbook of Poisoning: Prevention, Diagnosis and Treatment. 11th Ed. Lange Medical Publications. Los Altos, CA. 1983. pp. 168-170.

[327] Office of the Federal Register National Archives and Records Administration. Code of Federal Regulations, Title 29, Labor, Parts 1900 to 1910. U.S. Government Printing Office. Washington. 1988. p. 710.

[346] Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens. 2nd Ed. Noyes, Publications. Park Ridge, NJ. 1985. pp. 598-601.

[371] U.S. Coast Guard, Department of Transportation. CHRIS Hazardous Chemical Data. U.S. Coast Guard. Washington, D.C. 1985. Vol. 1.

[395] International Agency for Research on Cancer, World Health Organization. IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man. International Agency for Research on Cancer. Geneva. Vol. 41, pp. 43-85; Supplement 7, pp. 194-195.

[401] Nutt, A. R. Toxic Hazards of Rubber Chemicals. Elsevier Applied Science Publishers. New York. 1984. p. 122.

[406] Goodman, L.S., A. Gilman, F. Murad and T.W. Rall, Eds. The Pharmacological Basis of Therapeutics. 7th Ed. Macmillan Publishing Co. New York. 1985. p. 1636.

[415] American Conference of Governmental Industrial Hygienists. Threshold Limit Values and Biological Exposure Indices for 1988-1989. American Conference of Governmental Industrial Hygienists. Cincinnati, OH. 1988. p. 26.

[421] American Conference of Governmental Industrial Hygienists. Documentation of the Threshold Limit Values. 5th Ed. American Conference of Governmental Industrial Hygienists. Cincinnati, OH. 1986. pp. 391-392.4.

[430] Clayton, G.D. and F.E. Clayton, Eds. Patty's Industrial Hygiene and Toxicology. Vol. 2. Third Revised Edition. John Wiley and Sons. New York. 1981. Vol. IIB, pp. 3449-3455.

[451] National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th Ed. National Fire Protection Association. Quincy, MA. 1986. pp. 325-68, 49-39, 491M-77, 491M-131.

[545] Office of the Federal Register National Archives and Records Administration. Federal Register, Dept. of Labor, Part III. U.S. Government Printing Office. Washington. January 19, 1989. p. 2959.

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Update, p. xx.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. November 6, 1990. Listed.

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties: MW, BP, SOL, Fl.P, IP, Sp, Gr, flammability	Chemical and physical properties: VP, FRZ, UEL, LEL	Incompatibilities and reactivities	Measurement method (See Table 1)
1,1,1,2-Tetrachloroethane CCl_3CH_2Cl 630-20-6 KI8450000 1702 151	None	NIOSH Handle with caution in the workplace See Appendix C (Chloroethanes) OSHA none	N.D.	Yellowish-red liquid.	MW: 167.9 BP: 267°F Sol: 0.1% Fl.P: ? IP: ? Sp.Gr: 1.54	VP(77°F): 14 mm FRZ: -94°F UEL: ? LEL: ?	Potassium; sodium; dinitrogen tetraoxide; potassium hydroxide; nitrogen tetroxide; sodium potassium alloy; 2,4-dinitrophenyl disulfide	None available
1,1,2,2-Tetrachloroethane $CHCl_2CHCl_2$ 79-34-5 KI8575000 1702 151	Acetylene tetrachloride, Symmetrical tetrachloroethane 1 ppm = 6.87 mg/m³	NIOSH Ca See Appendix A See Appendix C (Chloroethanes) 1 ppm (7 mg/m³) [skin] OSHA† 5 ppm (35 mg/m³) [skin]	Ca [100 ppm]	Colorless to pale-yellow liquid with a pungent, chloroform-like odor.	MW: 167.9 BP: 296°F Sol: 0.3% Fl.P: NA IP: 11.10 eV Sp.Gr(77°F): 1.59 Noncombustible Liquid	VP: 5 mm FRZ: -33°F UEL: NA LEL: NA	Chemically-active metals, strong caustics, fuming sulfuric acid [Note: Degrades slowly when exposed to air.]	Char(pet); CS_2; GC/FID; IV [#1019]
Tetrachloroethylene $Cl_2C=CCl_2$ 127-18-4 KX3850000 1897 160	Perchlorethylene, Perchloroethylene, Perk, Tetrachlorethylene 1 ppm = 6.78 mg/m³	NIOSH Ca See Appendix A Minimize workplace exposure concentrations; limit number of workers exposed. OSHA† 100 ppm C 200 ppm 300 ppm (5-min max peak in any 3 hrs)	Ca [150 ppm]	Colorless liquid with a mild, chloroform-like odor.	MW: 165.8 BP: 250°F Sol: 0.02% Fl.P: NA IP: 9.32 eV Sp.Gr: 1.62 Noncombustible Liquid, but decomposes in a fire to hydrogen chloride and phosgene.	VP: 14 mm FRZ: 2°F UEL: NA LEL: NA	Strong oxidizers, chemically-active metals such as lithium, beryllium & barium; caustic soda; sodium hydroxide; potash	Char; CS_2; GC/FID; IV [#1003, Halogenated Hydrocarbons]
Tetrachloronaphthalene $C_{10}H_4Cl_4$ 1335-88-2 QK3700000	Halowax®, Nibren wax, Seekay wax	NIOSH/OSHA 2 mg/m³ [skin]	Unknown	Colorless to pale-yellow solid with an aromatic odor.	MW: 265.9 BP: 599-680°F Sol: Insoluble Fl.P(oc): 410°F IP: ? Sp.Gr: 1.59-1.65 Combustible Solid	VP: <1 mm MLT: 360°F UEL: ? LEL: ?	Strong oxidizers	Filter/Bub; none; GC/FID; II(2) [#S130]

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards: Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. Provide: Eyewash, Quick drench	TBAL	Inh Ing Con	Irrit eyes, skin; weak, restless, irreg respiration; musc inco; in animals: liver changes	Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed	Eyes, skin, CNS, liver
[1,1,1,2-Tetrachlorpethane]					
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. Provide: Eyewash, Quick drench	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Nau, vomit, abdom pain; tremor fingers; jaun, hepatitis, liver tend; derm; monocy; kidney damage; [carc]	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Skin, liver, kidneys, CNS, GI tract [in animals: liver tumors]
[1,1,2,2-Tetrachloroethane]					
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. Provide: Eyewash, Quick drench	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, throat; nau; flush face, neck; verti, dizz, inco; head som; skin eryt; liver damage; [carc]	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Eyes, skin, resp sys, liver, kidneys, CNS [in animals: liver tumors]
[Tetrachloroethylene]					
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily	NIOSH/OSHA 20 mg/m³: SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHiE/SCBAE	Inh Abs Ing Con	Acne-form derm; head, ftg, anor, verti; jaun, liver inj	Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed	Liver, skin, CNS
[Tetrachloronaphthalene]					

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties: MW, BP, SOL, FI.P, IP, Sp, Gr, flammability	Chemical and physical properties: VP, FRZ, UEL, LEL	Incompatibilities and reactivities	Measurement method (See Table 1)
Vinyl bromide CH_2=CHBr 593-60-2 KU8400000 1085 116P	Bromoethene, Bromoethylene 1 ppm = 4.38 mg/m³	NIOSH Ca See Appendix A OSHA† none	Ca [N.D.]	Colorless gas or liquid (below 60°F) with a pleasant odor. [Note: Shipped as a liquefied compressed gas with 0.1% phenol added to prevent polymerization.]	MW: 107.0 BP: 60°F Sol: Insoluble FI.P: NA (Gas) IP: 9.80 eV RGasD: 3.79 Sp.Gr: 1.49 (Liquid at 60°F) Flammable Gas Class IA Flammable Liquid	VP: 1.4 atm FRZ: -219°F UEL: 15% LEL: 9%	Strong oxidizers [Note: May polymerize in sunlight.]	Char; Ethanol; GC/FID; IV [#1009]
Vinyl chloride CH_2=CHCl 75-01-4 KU9625000 1086 116P	Chloroethene, Chloroethylene, Ethylene monochloride, Monochloroethene, Monochloroethylene, VC, Vinyl chloride monomer (VCM) 1 ppm = 2.56 mg/m³	NIOSH Ca See Appendix A [Use 1910.1017] OSHA [1910.1017] 1 ppm C 5 ppm [15-min]	Ca [N.D.]	Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations. [Note: Shipped as a liquefied compressed gas.]	MW: 62.5 BP: 7°F Sol(77°F): 0.1% FI.P: NA (Gas) IP: 9.99 eV RGasD: 2.21 Flammable Gas	VP: 3.3 atm FRZ: -256°F UEL: 33.0% LEL: 3.6%	Copper, oxidizers, aluminum, peroxides, iron, steel [Note: Polymerizes in air, sunlight, or heat unless stabilized by inhibitors such as phenol. Attacks iron & steel in presence of moisture.]	Char(2); CS_2; GC/FID; IV [#1007]
Vinyl cyclohexene dioxide $C_8H_{12}O_2$ 106-87-6 RN8640000	1-Epoxyethyl-3,4-epoxycyclohexane; 4-Vinylcyclohexene diepoxide; 4-Vinyl-1-cyclohexene dioxide 1 ppm = 5.73 mg/m³	NIOSH Ca Appendix A 10 ppm (60 mg/m³) [skin] OSHA† none	Ca [N.D.]	Colorless liquid.	MW: 140.2 BP: 441°F Sol: High FI.P(oc): 230°F IP: ? Sp.Gr: 1.10 Class IIIB Combustible Liquid	VP: 0.1 mm FRZ: -164°F UEL: ? LEL: ?	Alcohols, amines, water [Note: Slowly hydrolyzes in water.]	None available
Vinyl fluoride CH_2=CHF 75-02-5 YZ7351000 1860 116P	Fluoroethene, Fluoroethylene, Monofluoroethylene, Vinyl fluoride monomer 1 ppm = 1.89 mg/m³	NIOSH 1 ppm C 5 ppm [use 1910.1017] OSHA none	N.D.	Colorless gas with a faint, ethereal odor. [Note: Shipped as a liquefied compressed gas.]	MW: 46.1 BP: -98°F Sol: Insoluble FI.P: NA (Gas) IP: 10.37 eV RGasD: 1.60 Flammable Gas	VP: 25.2 atm FRZ: -257°F UEL: 21.7% LEL: 2.6%	None reported [Note: Inhibited with 0.2% terpenes to prevent polymerization.]	None available

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards: Route	Health hazards: Symptoms (See Table 5)	Health hazards: First aid (See Table 6)	Health hazards: Target organs (See Table 5)
Skin: Prevent skin contact (liq) Eyes: Prevent eye contact (liq) Wash skin: When contam (liq) Remove: When wet (flamm) Change: N.R. [Vinyl bromide]	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing (liq) Con (liq)	Irrit eyes, skin; dizz, conf, inco, narco, nau, vomit; liq: frostbite; [carc]	Eye: Skin: Breath: Swallow: Irr immed (liq) Water flush immed (liq) Resp support Medical attention immed (liq)	Eyes, skin, CNS, liver [in animals: liver & lymph node tumors]
Skin: Frostbite Eyes: Frostbite Wash skin: N.R. Remove: When wet (flamm) Change: N.R. Provide: Frostbite [Vinyl chloride]	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE	Inh Con (liq)	Weak; abdom pain, GI bleeding; enlarged liver; pallor or cyan of extremities; liq: frostbite; [carc]	Eye: Skin: Breath: Frostbite Frostbite Resp support	Liver, CNS, blood, resp sys, lymphatic sys [liver cancer]
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. Provide: Eyewash, Quick drench [Vinyl cyclohexene dioxide]	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	In animals: irrit eyes, skin, resp sys; testicular atrophy; leupen; nec thymus; skin sens; [carc]	Eye: Skin: Breath: Swallow: Irr immed Water wash immed Resp support Medical attention immed	Eyes, skin, resp sys, blood, thymus, repro sys [in animals: skin tumors]
Skin: Frostbite Eyes: Frostbite Wash skin: N.R. Remove: When wet (flamm) Change: N.R. Provide: Frostbite [Vinyl fluoride]	NIOSH 10 ppm: CCROV/SA 25 ppm: SA:CF/PAPROV 50 ppm: CCRFOV/GMFOV/PAPRTOV/SCBAF/SAF 200 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Con (liq)	Head, dizz, conf, inco, narco, nau, vomit; liq: frostbite	Eye: Skin: Breath: Frostbite Frostbite Resp support	CNS

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties: MW, BP, SOL, FI.P, IP, Sp, Gr, flammability	Chemical and physical properties: VP, FRZ, UEL, LEL	Incompatibilities and reactivities	Measurement method (See Table 1)
Trichloroethylene ClCH=CCl_2 79-01-6 KX4550000 1710 160	Ethylene trichloride, TCE, Trichloroethene, Trilene 1 ppm = 5.37 mg/m^3	NIOSH Ca See Appendix A See Appendix C OSHA† 100 ppm C 200 ppm 300 ppm (5-min max peak in any 2 hrs)	Ca [1000 ppm]	Colorless liquid (unless dyed blue) with a chloroform-like odor.	MW: 131.4 BP: 189°F Sol: 0.1% Fl.P: ? IP: 9.45 eV Sp.Gr: 1.46 Combustible Liquid, but burns with difficulty.	VP: 58 mm FRZ: -99°F UEL(77°F): 10.5% LEL(77°F): 8%	Strong caustics & alkalis; chemically-active metals (such as barium, lithium, sodium, magnesium, titanium & beryllium)	Char; CS_2; GC/FID; IV [#1022]
Trichloronaphthalene $C_{10}H_5Cl_3$ 1321-65-9 QK4025000	Halowax®, Nibren wax, Seekay wax	NIOSH/OSHA 5 mg/m^3 [skin]	Unknown	Colorless to pale-yellow solid with an aromatic odor.	MW: 231.5 BP: 579-669°F Sol: Insoluble Fl.P(oc): 392°F IP: ? Sp.Gr: 1.58 Combustible Solid	VP: <1 mm MLT: 199°F UEL: ? LEL: ?	Strong oxidizers	Filter/Bub; none; GC/FID; II(2) [#S128]
1,2,3-Trichloropropane $CH_2ClCHClCH_2Cl$ 96-18-4 TZ9275000	Allyl trichloride, Glycerol trichlorohydrin, Glyceryl trichlorohydrin, Trichlorohydrin 1 ppm = 6.03 mg/m^3	NIOSH Ca See Appendix A 10 ppm (60 mg/m^3) [skin] OSHA† 50 ppm (300 mg/m^3)	Ca [100 ppm]	Colorless liquid with a chloroform-like odor.	MW: 147.4 BP: 314°F Sol: 0.1% Fl.P: 160°F IP: ? Sp.Gr: 1.33 Class IIIA Combustible Liquid	VP: 3 mm FRZ: 6°F UEL(302°F): 12.6% LEL(248°F): 3.2%	Chemically-active metals, strong caustics & oxidizers	Char; CS_2; GC/FID; IV [#1003, Halogenated Hydrocarbons]
1,1,2-Trichloro-1,2,2-trifluoroethane CCl_2FCClF_2 76-13-1 KJ4000000	Chlorofluorocarbon-113, CFC-113, Freon® 113, Genetron® 113, Halocarbon 113, Refrigerant 113, TTE 1 ppm = 7.67 mg/m^3	NIOSH 1000 ppm (7600 mg/m^3) ST 1250 ppm (9500 mg/m^3) OSHA† 1000 ppm (7600 mg/m^3)	2000 ppm	Colorless to water-white liquid with an odor like carbon tetrachloride at high concentrations. [Note: A gas above 118°F.]	MW: 187.4 BP: 118°F Sol(77°F): 0.02% Fl.P: ? IP: 11.99 eV Sp.Gr(77°F): 1.56 Noncombustible Liquid at ordinary temperatures, but the gas will ignite and burn weakly at 1256°F.	VP: 285 mm FRZ: -31°F UEL: ? LEL: ?	Chemically-active metals such as calcium, powdered aluminum, zinc, magnesium & beryllium [Note: Decomposes if in contact with alloys containing >2% magnesium.]	Char; CS_2; GC/FID; IV [#1020]

316

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards: Route	Health hazards: Symptoms (See Table 5)	Health hazards: First aid (See Table 6)	Health hazards: Target organs (See Table 5)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. Provide: Eyewash, Quick drench [Trichloroethylene]	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, skin; head, verti; vis dist, ftg, gidd, tremor, som, nau, vomit; derm; card arrhy, pares; liver inj; [carc]	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Eyes, skin, resp sys, heart, liver, CNS [in animals: liver & kidney cancer]
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily [Trichloronaphthalene]	NIOSH/OSHA 50 mg/m^3: SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHiE/SCBAE	Inh Abs Ing Con	Anor, nau; verti; jaun, liver inj	Eye: Skin: Breath: Swallow: Irr immed Soap wash Resp support Medical attention immed	Liver
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. Provide: Eyewash, Quick drench [1,2,3-Trichloropropane]	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, throat; CNS depres; in animals: liver, kidney inj; [carc]	Eye: Skin: Breath: Swallow: Irr immed Soap wash Resp support Medical attention immed	Eyes, skin; resp sys, CNS, liver, kidneys [in animals: forestomach, liver & mammary gland cancer]
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. [1,1,2-Trichloro-1,2,2-trifluoroethane]	NIOSH/OSHA 2000 ppm: SA/SCBAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit skin, throat; drow; derm; CNS depres; in animals: card arrhy, narco	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Skin, heart, CNS, CVS

317

NTP CHEMICAL REPOSITORY
2-METHYLNAPHTHALENE

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 002198

*CAS NUMBER: 91-57-6

*BASE CHEMICAL NAME: METHYLNAPHTHALENE,2-

*PRIMARY NAME: 2-METHYLNAPHTHALENE

*CHEMICAL FORMULA: C11H10

*STRUCTURAL FORMULA: C10H7CH3

*WLN: L66J C1

*SYNONYMS:
BETA-METHYLNAPHTHALENE

-PHYSICAL CHEMICAL DATA
======================

*PHYSICAL DESCRIPTION: LITERATURE: Crystals
REPOSITORY: White crystalline solid

*MOLECULAR WEIGHT: 142.20

*SPECIFIC GRAVITY: 1.0058 @ 20/4 C [017,043]

*DENSITY: Not available

*MP (DEG C): 34.6 C [017,205]

*BP (DEG C): 241-242 C [055,062,269,275]

*SOLUBILITIES:
WATER : <1 mg/mL @ 21 C (RAD)

DMSO : >=100 mg/mL @ 21 C (RAD)

95% ETHANOL : >=100 mg/mL @ 21 C (RAD)

METHANOL : Not available

ACETONE : >=100 mg/mL @ 21 C (RAD)

TOLUENE : Not available

OTHER SOLVENTS:
Alcohol: Soluble [043]
Benzene: Soluble [017,047]
Ether: Soluble [017,043,062,205]

*VOLATILITY:
Vapor pressure: Not available
Vapor density : Not available

*FLAMMABILITY(FLASH POINT):
This chemical has a flash point of 97 C (208 F) [269,275,900]. It is combustible. Fires involving this material can be controlled with a dry chemical, carbon dioxide or Halon extinguisher. A water spray may also be used

[900].

*UEL: Not available LEL: Not available

*REACTIVITY:
This chemical is incompatible with strong oxidizing agents [107,269,900]. It is also incompatible with peroxides and oxygen [107].

*STABILITY:
This chemical is stable under normal laboratory conditions. Solutions of this chemical in water, DMSO, 95% ethanol or acetone should be stable for 24 hours under normal lab conditions (RAD).

*OTHER PHYSICAL DATA:
Specific gravity: 0.994 @ 40/4 C [062]
Boiling point: 104.7 C @ 10 mm Hg [017,047]; 110-112 C @ 16 mm Hg [025]
Refractive index: 1.6015 @ 25 C [062]; 1.6026 @ 40 C [205]

-TOXICITY

*NIOSH REGISTRY NUMBER: QJ9635000

*TOXICITY: (abbreviations)

typ. dose	mode	specie	amount	units	other
LDLo	ipr	mus	1000	mg/kg	
LD50	orl	rat	1630	mg/kg	

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION:
THR: Moderately toxic by ingestion and intraperitoneal routes.

*CARCINOGENICITY: Not available

*MUTATION DATA:

test	lowest dose	test	lowest dose
cyt-hmn:lym	4 mmol/L	sce-hmn:lym	250 umol/L

*TERATOGENICITY: Not available

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
OSHA: None
ACGIH: None
NIOSH Criteria Document: None
NFPA Hazard Rating: Health (H): None
Flammability (F): None
Reactivity (R): None

*OTHER TOXICITY DATA:
Status: EPA TSCA Chemical Inventory, 1986
EPA TSCA Test Submission (TSCATS) Data Base, January 1989

-OTHER DATA (Regulatory)

*PROPER SHIPPING NAME (IATA): Not restricted

*UN/ID NUMBER:

*HAZARD CLASS: SUBSIDIARY RISK: PACKING GROUP:

*LABELS REQUIRED:

*PACKAGING: PASSENGER: PKG. INSTR.: MAXIMUM QUANTITY:

CARGO : PKG. INSTR.: MAXIMUM QUANTITY:

*SPECIAL PROVISIONS:

*USES:
This compound is used in organic synthesis and insectides.

*COMMENTS:
This compound is derived from coal tar [025,062].

-HANDLING PROCEDURES
==========

*ACUTE/CHRONIC HAZARDS:
This compound may be harmful by inhalation, ingestion or skin absorption [900]. It is an irritant of the skin, eyes, mucous membranes and upper respiratory tract [269,900]. When heated to decomposition it emits acrid smoke, irritating fumes and toxic fumes of carbon monoxide and carbon dioxide [043, 269,900].

*MINIMUM PROTECTIVE CLOTHING: Not available

*RECOMMENDED GLOVE MATERIALS:
GlovES+ Expert System Glove Types For The Neat (Undiluted) Chemical:
This chemical has not been tested for permeation by Radian Corporation; however, the GlovES+ expert system was used to extrapolate permeation test information from compounds in the same chemical class. The GlovES+ system uses permeation data from literature sources; therefore, extra safety margins should be used with the estimated protection time(s). If this chemical makes direct contact with your glove, or if a tear, puncture or hole develops, replace them at once.
The GlovES+ expert system is a tool that can help people better manage protection from chemicals, however this tool cannot replace sound judgment nor make technical decisions. Our GlovES+ expert system is designed to offer initial advice and assistance in glove selection while the final glove selection should be made by knowledgeable individuals based on the specific circumstances involved.

Glove Type	Model Number	Thickness	Estimated Protection Time
PE/EVOH/PE	Safety 4 4H	0.07 mm	240 min
Viton	North F-091	0.23 mm	240 min
Nitrile	Edmont 37-155	0.38 mm	240 min
PVA	Edmont 25-595	Unknown	240 min

*RECOMMENDED RESPIRATOR:
Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with an organic vapor/acid gas cartridge (specific for organic vapors, HCl, acid gas and SO2) with a dust/mist filter.

*OTHER: Not available

*STORAGE PRECAUTIONS:
You should store this material under ambient temperatures.

*SPILLS AND LEAKAGE:
Should a spill occur while you are handling this chemical, FIRST REMOVE ALL SOURCES OF IGNITION, then you should dampen the solid spill material with 60-70% ethanol and transfer the dampened material to a suitable container. Use absorbent paper dampened with 60-70% ethanol to pick up any remaining material. Seal the absorbent paper, and any of your clothes, which may be contaminated, in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with 60-70% ethanol followed by washing with a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT: Not available

-EMERGENCY PROCEDURES
==========

*SKIN CONTACT:
IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.
If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

*INHALATION:
IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital.
Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:
First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.
Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.
IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:
DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.
If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS:
Symptoms of exposure to this compound may include irritation of the skin, eyes, mucous membranes and upper respiratory tract [269,900]. It may also cause headaches, nausea, vomiting, diarrhea, anemia, jaundice, euphoria, dermatitis, visual disturbances, convulsions and comatose [107].

-SOURCES
=======

*SOURCES:
[015] Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. On-line Ed. National Institute for Occupational Safety and Health. Cincinnati, OH. QJ9635000. June 6, 1989.

[017] Weast, R.C., M.J. Astle, and W.H. Beyer, Eds. CRC Handbook of Chemistry and Physics. 67th Ed. CRC Press, Inc. Boca Raton, FL. 1986. p. C-361, #9400.

[025] Buckingham, J., Ed. Dictionary of Organic Compounds. 5th Ed. Chapman and Hall. New York. 1982. Vol. 4, p. 3921, #M-02310.

[039] Boublik, T., V. Fried and E. Hala. The Vapor Pressures of Pure Substances. p. 519.

[043] Sax, N.I. and Richard J. Lewis, Sr. Dangerous Properties of Industrial

Materials. 7th Ed. Van Nostrand Reinhold. New York. 1989. Vol. III, pp. 2341-2342, #MMC000.

[047] Weast, R.C. and M.J. Astle, Eds. CRC Handbook of Data on Organic Compounds. CRC Press, Inc. Boca Raton, FL. 1985. Vol. I, p. 872, #N00231.

[055] Verschueren, K. Handbook of Environmental Data on Organic Chemicals. 2nd Ed. Van Nostrand Reinhold. New York. 1983. pp. 863-865.

[062] Sax, N.I. and R.J. Lewis Sr., Eds. Hawley's Condensed Chemical Dictionary. 11th Ed. Van Nostrand Reinhold. New York. 1987. p. 775.

[082] U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substance Inventory: 1985 Edition. 5 Vols. U.S. Environmental Protection Agency. Washington, D.C. January 1986. Listed.

[107] Occupational Health Services, Inc. Hazardline. Occupational Health Services, Inc. New York. Listed.

[110] Oak Ridge National Laboratory. Environmental Mutagen Information Center (EMIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed.

[120] Oak Ridge National Laboratory. Environmental Teratogen Information Center (ETIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Not listed.

[205] Dean, John A., Ed. Lange's Handbook of Chemistry. 13th Ed. McGraw-Hill Book Company. New York. 1985. p. 7-520, #567.

[269] Lenga, Robert E. The Sigma-Aldrich Library of Chemical Safety Data. Edition 1. Sigma-Aldrich Corporation. Milwaukee, WI. 1985. p. 1273, #C.

[275] Aldrich Chemical Company. Aldrich Catalog/Handbook of Fine Chemical. Aldrich Chemical Co., Inc. Milwaukee, WI. 1988. p. 1031, #M5,700-6.

[430] Clayton, G.D. and F.E. Clayton, Eds. Patty's Industrial Hygiene and Toxicology. Vol. 2. Third Revised Edition. John Wiley and Sons. New York. 1981. Vol. IIB, p. 3258.

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Section 3, p. 27.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. November 6, 1990. Not listed.

[900] Aldrich Chemical Co. Material Safety Data Sheet. Milwaukee, WI. February 17, 1987.

NTP CHEMICAL REPOSITORY
ACENAPHTHENE

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 000475

*CAS NUMBER: 83-32-9

*BASE CHEMICAL NAME: ACENAPHTHENE

*PRIMARY NAME: ACENAPHTHENE

*CHEMICAL FORMULA: C12H10

*STRUCTURAL FORMULA: C10H6(CH2)2

*WLN: L566 1A LT&&J

*SYNONYMS:
ETHYLENENAPHTHALENE
1,2-DIHYDROACENAPHTHYLENE
1,8-DIHYDROACENAPHTHYLENE
PERIETHYLENENAPHTHALENE
1,8-ETHYLENENAPHTHALENE
NAPHTHYLENEETHYLENE

-PHYSICAL CHEMICAL DATA
======================

*PHYSICAL DESCRIPTION: LITERATURE: White crystals
REPOSITORY: Cream-colored needles

*MOLECULAR WEIGHT: 154.21

*SPECIFIC GRAVITY: 1.024 @ 99/4 C [041,062,071]

*DENSITY: 1.02 g/mL @ 25 C [430]

*MP (DEG C): 95 C [031,038,041]

*BP (DEG C): 279 C [017,031,058,205,274]

*SOLUBILITIES:
WATER : <1 mg/mL @ 20 C (RAD)

DMSO : 10-50 mg/mL @ 20 C (RAD)

95% ETHANOL : 1-5 mg/mL @ 20 C (RAD)

P METHANOL : 1 g/56 mL [031]

ACETONE : 50-100 mg/mL @ 20 C (RAD)

P TOLUENE : 1 g/5 mL [031]

OTHER SOLVENTS:
Chloroform: 1 g/2.5 mL [031]
Ether: Soluble [430]
Benzene: 1 g/5 mL [031]
Propanol: 1 g/25 mL [031]
Glacial acetic acid: 1 g/100 mL [031]

*VOLATILITY:

Vapor pressure: 0.001-0.01 mm Hg @ 20 C [051,071]; 5 mm Hg @ 114.8 C [038]
Vapor density : 5.32

*FLAMMABILITY(FLASH POINT):
Flash point data for this chemical are not available. It is probably combustible. Fires involving this material can be controlled with a dry chemical, carbon dioxide or Halon extinguisher. A water spray may also be used [058,269].

*UEL: Not available LEL: 0.6% [430]

*REACTIVITY:
This chemical is incompatible with strong oxidizing agents [058,071,269]. It is also incompatible with ozone and chlorinating agents [071]. It forms crystalline complexes with desoxycholic acid [031].

*STABILITY:
This chemical is stable under normal laboratory conditions. Solutions of this chemical in water, DMSO, 95% ethanol or acetone should be stable for 24 hours under normal lab conditions (RAD).

*OTHER PHYSICAL DATA:
Specific gravity: 1.069 @ 95/95 C [205]; 1.0242 @ 90/4 C [017]
Odor threshold: 0.02-0.22 ppm
Refractive index: 1.6048 @ 95 C

-TOXICITY

*NIOSH REGISTRY NUMBER: AB1000000

*TOXICITY: (abbreviations)

typ. dose	mode	specie	amount	units	other
Not available					

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION:
THR: An irritant to the skin and mucous membranes. An experimental neoplastigen.

*CARCINOGENICITY: Not available

*MUTATION DATA:

test	lowest dose	test	lowest dose
mmo-omi	3 mg		

*TERATOGENICITY: Not available

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
OSHA: None
ACGIH: None
NIOSH Criteria Document: None
NFPA Hazard Rating: Health (H): None
Flammability (F): None
Reactivity (R): None

*OTHER TOXICITY DATA:
Status: EPA Genetox Program 1986, Inconclusive: D melanogaster-nondisjunction
EPA TSCA Chemical Inventory, 1986
EPA TSCA Test Submission (TSCATS) Data Base, December 1986
NIOSH Analytical Methods: see Polynuclear Aromatic Hydrocarbons (HPLC), 5506; (GC), 5515

-OTHER DATA (Regulatory)

==========

*PROPER SHIPPING NAME (IATA): Not restricted

*UN/ID NUMBER:

*HAZARD CLASS: SUBSIDIARY RISK: PACKING GROUP:

*LABELS REQUIRED:

*PACKAGING: PASSENGER: PKG. INSTR.: MAXIMUM QUANTITY:
CARGO : PKG. INSTR.: MAXIMUM QUANTITY:

*SPECIAL PROVISIONS:

*USES:
Dye intermediate; pharmaceuticals; insecticide; fungicide; herbicide and manufacture of plastics.

*COMMENTS:
Found in coal tar and petroleum.

-HANDLING PROCEDURES
==========

*ACUTE/CHRONIC HAZARDS:
This compound is harmful by inhalation, ingestion or skin absorption. It is an irritant of the skin, eyes, mucous membranes and upper respiratory tract. When heated to decomposition it emits toxic fumes of carbon monoxide and carbon dioxide [058,269].

*MINIMUM PROTECTIVE CLOTHING: Not available

*RECOMMENDED GLOVE MATERIALS:
GlovES Expert System Recommended Gloves For Use With Neat (Undiluted) Chemical:
This chemical has not been tested for permeation by Radian Corporation; however, the GlovES expert system was used to extrapolate permeation test information from compounds in the same chemical class and the following recommendation(s) are provided. The GlovES system uses permeation data from literature sources; therefore, extra safety margins should be used with the recommended exposure times. If this chemical comes into contact with your glove, or if a tear, puncture or hole develops, remove them at once.

Suggested Glove Type	Model Number	Thickness	Estimated Breakthrough
Viton	North F-121	0.33 mm	360 min.
Nitrile	Edmont 37-155	0.38 mm	360 min.
Polyvinyl alcohol	Edmont 25-545	Unknown	360 min.

*RECOMMENDED RESPIRATOR:
Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with an organic vapor/acid gas cartridge (specific for organic vapors, HCl, acid gas and SO2) with a dust/mist filter.

*OTHER: Not available

*STORAGE PRECAUTIONS:
You should store this chemical under ambient temperatures, and keep it away from oxidizing materials.

*SPILLS AND LEAKAGE:
If a spill of this chemical occurs, FIRST REMOVE ALL SOURCES OF IGNITION, then you should dampen the solid spill material with acetone and transfer the dampened material to a suitable container. Use absorbent paper dampened with acetone to pick up any remaining material. Seal your contaminated clothing and the absorbent paper in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with acetone followed by washing with

a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT: Not available

-EMERGENCY PROCEDURES
==========

*SKIN CONTACT:
IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.
If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

*INHALATION:
IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital.
Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:
First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.
Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.
IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:
DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.
If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS:
Symptoms of exposure to this compound may include irritation of the skin, eyes, mucous membranes and upper respiratory tract [058,269]. If ingested, it can cause vomiting [041,051,071,346]. Chronic exposure may result in kidney and liver damage [301].

-SOURCES
=======

*SOURCES:
[015] Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. Microfiche Ed. National Institute for Occupational Safety and Health. Cincinnati, OH. Quarterly Updates. AB1000000.

[017] Weast, R.C., M.J. Astle, and W.H. Beyer, Eds. CRC Handbook of Chemistry and Physics. 67th Ed. CRC Press, Inc. Boca Raton, FL. 1986. p. C-42, #4.

[025] Buckingham, J., Ed. Dictionary of Organic Compounds. 5th Ed. Chapman and Hall. New York. 1982. Vol. 1, p. 8, #A-00060.

[031] Windholz, M., Ed. The Merck Index. 10th Ed. Merck and Co. Rahway, NJ. 1983. pp. 4-5, #22.

[038] Stull, D.R. Vapor pressure of pure substances: Organic Compounds. Industrial and Engineering Chem. 39(4):517-550. 1947. p. 532.

[039] Boublik, T., V. Fried and E. Hala. The Vapor Pressures of Pure Substances. p. 591.

[041] Sax, N.I. Dangerous Properties of Industrial Materials. 5th Ed. Van Nostrand Reinhold. New York. 1979. p. 331.

[047] Weast, R.C. and M.J. Astle, Eds. CRC Handbook of Data on Organic Compounds. CRC Press, Inc. Boca Raton, FL. 1985. Vol. I, p. 3, #A00012.

[051] Sax, N. Irving, Ed. Dangerous Properties of Industrial Materials Report. Bi-monthly Updates. Van Nostrand Reinhold Company, Inc. New York. January/February 1984; Vol. 4, No. 1, pp. 38-41.

[055] Verschueren, K. Handbook of Environmental Data on Organic Chemicals. 2nd Ed. Van Nostrand Reinhold. New York. 1983. pp. 138-139.

[058] Information Handling Services. Material Safety Data Sheets Service. Microfiche Ed. Bimonthly Updates. October/ November 1987; #5846-006 B-11.

[062] Sax, N.I. and R.J. Lewis Sr., Eds. Hawley's Condensed Chemical Dictionary. 11th Ed. Van Nostrand Reinhold. New York. 1987. p. 4.

[071] Sax, N. Irving, Ed. Hazardous Chemicals Information Annual, No. 1. Van Nostrand Reinhold Information Services. New York. 1986. pp. 2-5.

[082] U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substance Inventory: 1985 Edition. 5 Vols. U.S. Environmental Protection Agency. Washington, D.C. January 1986. Listed.

[090] Steere, N.V., Ed. Handbook of Laboratory Safety. 2nd Ed. CRC Press, Inc. Cleveland, OH. 1971. p. 720, #1.

[107] Occupational Health Services, Inc. Hazardline. Occupational Health Services, Inc. New York. Listed.

[110] Oak Ridge National Laboratory. Environmental Mutagen Information Center (EMIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed.

[120] Oak Ridge National Laboratory. Environmental Teratogen Information Center (ETIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Not listed.

[165] Wiswesser, W.J., Ed. Pesticide Index. Entomological Society of America. College Park, MD. 1976. p. 4.

[205] Dean, John A., Ed. Lange's Handbook of Chemistry. 13th Ed. McGraw-Hill Book Company. New York. 1985. p. 7-82, #a2.

[269] Lenga, Robert E. The Sigma-Aldrich Library of Chemical Safety Data. Edition 1. Sigma-Aldrich Corporation. Milwaukee, WI. 1985. p. 1, #D.

[274] Aldrich Chemical Company. Aldrich Catalog/Handbook of Fine Chemical. Aldrich Chemical Co., Inc. Milwaukee, WI.

1986. p. 1, #21,537-6.

[301] Dreisbach, R.H. Handbook of Poisoning: Prevention, Diagnosis and Treatment. 11th Ed. Lange Medical Publications. Los Altos, CA. 1983. p. 212.

[346] Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens. 2nd Ed. Noyes, Publications. Park Ridge, NJ. 1985. pp. 20-21.

[430] Clayton, G.D. and F.E. Clayton, Eds. Patty's Industrial Hygiene and Toxicology. Vol. 2. Third Revised Edition. John Wiley and Sons. New York. 1981. Vol. IIB, pp. 3346, 3353.

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlıngame, CA. 1990. Section 3, p. 24.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. October 3, 1990. Not listed.

NTP CHEMICAL REPOSITORY
ANTHRACENE

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 000401

*CAS NUMBER: 120-12-7

*BASE CHEMICAL NAME: ANTHRACENE

*PRIMARY NAME: ANTHRACENE

*CHEMICAL FORMULA: C14H10

*STRUCTURAL FORMULA:

*WLN: L C666J

*SYNONYMS:
ANTHRACIN
GREEN OIL
PARANAPTHALENE
TETRA OLIVE N2G
P-NAPHTHALENE
ANTHRACENE OIL

-PHYSICAL CHEMICAL DATA
==========

*PHYSICAL DESCRIPTIONS: White crystalline flakes

*MOLECULAR WEIGHT: 178.23

*SPECIFIC GRAVITY: 1.283 @ 25/4 C

*DENSITY: 1.28 g/mL

*MP (DEG C): 216-218 C

*BP (DEG C): 340 C (corrected); 226.5 @ 53 mm Hg, sublimes

*SOLUBILITIES:
WATER : <1 mg/mL @ 20 C (RAD)

DMSO : <1 mg/mL @ 20 C (RAD)

95% ETHANOL : <1 mg/mL @ 20 C (RAD)

METHANOL : Not available

ACETONE : <1 mg/mL @ 20 C (RAD)

TOLUENE : Not available

OTHER SOLVENTS:
Toluene: 1 g/125 mL
Chloroform: 1 g/85 mL
Carbon tetrachloride: 1 g/86 mL
Carbon disulfide: 1 g/31 mL
ETHER : 1 g/200 mL
BENZENE: 1g/62 mL

*VOLATILITY : Vapor pressure: 1 mm @ 145 C (sublimes); Vapor density: 6.15

*FLAMMABILITY(FLASH POINT):
The flash point for this chemical is 121 C (250 F); it is combustible. Fires involving this compound should be controlled using a dry chemical, carbo dioxide, foam or Halon extinguisher. The autoignition temperature is 538 C (1004 F).

*UEL: Not available LEL: 0.6%

*REACTIVITY:
This compound darkens in sunlight and reacts with oxidizers. It reacts explosively with flame, Ca(OCl)2 and chromic acid.

*STABILITY: This compound is sensitive to prolonged exposure to air and light.

*OTHER PHYSICAL DATA: Not available

-TOXICITY
========

*NIOSH REGISTRY NUMBER: CA9350000

*TOXICITY: (abbreviations)
Not available

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION:
THR: Allergen and mild irritant. A recognized carcinogen of the skin, hands, forearms and scrotum. An expermental carcinogen of the bladder.

*CARCINOGENICITY:
Tumorigenic Data:
TDLo: orl-rat 20 gm/kg/79W-I
TDLo: scu-rat 3300 mg/kg/33W-I
TD : scu-rat 660 mg/kg/33W-I
Review: IARC Cancer Review: Animal Inadequate Evidence
IARC: Not classifiable as a human carcinogen (Group 3) [610]

*MUTATION DATA:
dns-hmn:fbr 10 mg/L hma-mus:sat 125 mg/kg
dnd-mam:lym 100 umol mma-sat 100 ug/plate

*TERATOGENICITY: Not available

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
OSHA: None
ACGIH: None
NIOSH Criteria Document: None
NFPA Hazard Rating: Health (H): 0
Flammability (F): 1
Reactivity (R): None
H0: Materials which on exposure under fire conditions would offer no hazard beyond that of ordinary combustible material (see NFPA for details).
F1: Materials that must be preheated before ignition can occur (see NFPA for details).

*OTHER TOXICITY DATA:
Skin and Eye Irritation Data:
skn-mus 118 ug MLD
Status: "NIOSH Manual of Analytical Methods" Vol 1 206
Reported in EPA TSCA Inventory, 1980
Meets criteria for proposed OSHA Medical Records Rule

-OTHER DATA (Regulatory)
==========

*PROPER SHIPPING NAME (IATA): Not restricted

*UN/ID NUMBER:

*HAZARD CLASS: SUBSIDIARY RISK: PACKING GROUP:

*LABELS REQUIRED:

*PACKAGING: PASSENGER: PKG. INSTR.: MAXIMUM QUANTITY:
CARGO : PKG. INSTR.: MAXIMUM QUANTITY:

*SPECIAL PROVISIONS:

*USES:
Important source of dyestuffs. Used in the manufacture of anthraquinone, alizarin dyes, insecticides and wood preservatives.

*COMMENTS: Not available

-HANDLING PROCEDURES
==========

*ACUTE/CHRONIC HAZARDS:
This compound may cause irritation of the eyes and respiratory tract. It may also irritate the gastrointestinal tract if swallowed.

*MINIMUM PROTECTIVE CLOTHING: Not available

*RECOMMENDED GLOVE MATERIALS: Not available

*RECOMMENDED RESPIRATOR:
Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with an organic vapor/acid gas cartridge (specific for organic vapors, HCl, acid gas and SO2) with a dust/mist filter.

*OTHER: Not available

*STORAGE PRECAUTIONS:
You should protect this chemical from exposure to light. Keep the container tightly closed under an inert atmosphere, and store under refrigerated temperatures.

*SPILLS AND LEAKAGE:
You should dampen the solid spill material with acetone, then transfer the dampened material to a suitable container. Use absorbent paper dampened with acetone to pick up any remaining material. Seal your contaminated clothing and the adsorbent paper in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with acetone followed by washing with a strong soap and water solution. Do not reenter the contaminate area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT:
You should dispose of all waste and contaminated materials associated with this chemical as specified by existing local, state and federal regulations concerning hazardous waste disposal. It is suggested that your contaminated materials should be destroyed by incineration in a special, high temperature (>2000 degrees F), chemical incinerator facility.

-EMERGENCY PROCEDURES

*SKIN CONTACT:
IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.
If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

*INHALATION:
IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital.
Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:
First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.
Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.
IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:
DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.
If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS:
Exposure to this chemical may cause irritation of the eyes and respiratory tract and gastrointestinal irritation if swallowed. Long-range contact may result in pigmentation or carcinogenesis on the skin.

*FIREFIGHTING: Not available

-SOURCES

*SOURCES:
Clayton, G.D. and F.E. Clayton, Eds. Patty's Industrial Hygiene and Toxicology. Vol. 2. Third Revised Edition. John Wiley and Sons. New York. 1981. Vol.2, pp. 3344-54.

Weiss, G., Ed. Hazardous Chemicals Data Book. Noyes Data Corporation. Park Ridge, NJ. 1980. p. 119.

Occupational Safety and Health Administration. Tentative OSHA Listing of Confirmed and Suspected Carcinogens by Category. Occupational Safety and Health Administration. Washington, DC. 1979. Not listed.

Aldrich Chemical Company. Aldrich Catalog/Handbook of Fine Chemical. Aldrich Chemical Co., Inc. Milwaukee, WI. 1982. p. 103, no. 14,106-2.

Gosselin, R.E., H.C. Hodge, R.P. Smith and M.N. Gleason. Clinical Toxicology of Commercial Products. 4th Ed. Williams and Wilkins, Co. Baltimore. 1976. p. 108.

Oak Ridge National Laboratory. Environmental Teratogen Information Center (ETIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed.

Oak Ridge National Laboratory. Environmental Mutagen Information Center (EMIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed.

U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substances Inventory, Initial Inventory. 6 Vols. U.S. Environmental Protection Agency. Washington, D.C. 1979. Listed.

Hawley, G.G., Ed. The Condensed Chemical Dictionary. 10th Ed. Van Nostrand Reinhold. New York. 1981. p. 75.

Sax, N.I. Dangerous Properties of Industrial Materials. 5th Ed. Van Nostrand Reinhold. New York. 1979. p. 382.

Windholz, M., Ed. The Merck Index. 9th Ed. Merck and Co. Rahway, NJ. 1976. p. 93, no. 718.

Buckingham, J., Ed. Dictionary of Organic Compounds. 5th Ed. Chapman and Hall. New York. 1982. Vol.1, p. 381, no. A-03061.

Weast, R.C. and M.A. Astle, Eds. CRC Handbook of Chemistry and Physics. 63rd Ed. CRC Press, Inc. Boca Raton, FL. 1982. p. C-100, no. 1096.

Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. Microfiche Ed. National Institute for Occupational Safety and Health. Cincinnati, OH. Quarterly Updates. CA9350000.

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Section 3, p. 50.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. October 3, 1990. Not listed.

NTP CHEMICAL REPOSITORY
BENZ(A)ANTHRACENE

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 000556

*CAS NUMBER: 56-55-3

*BASE CHEMICAL NAME: BENZANTHRACENE,(A)

*PRIMARY NAME: BENZ(A)ANTHRACENE

*CHEMICAL FORMULA: C18H12

*STRUCTURAL FORMULA:

*WLN: L D6 B666J

*SYNONYMS:
BA
2,3-BENZOPHENANTHRENE
1,2-BENZANTHRACENE
1,2-BENZ(A)ANTHRACENE
2,3-BENZPHENANTHRENE
TETRAPHENE
BENZANTHRENE
1,2-BENZANTHRENE
NAPHTHANTHRACENE
BENZO(A)ANTHRACENE
BENZO(A)PHENANTHRENE
B(A)A
BAA
NAPHTHANTHRACENE
RCRA WASTE NUMBER U018

-PHYSICAL CHEMICAL DATA
==========

*PHYSICAL DESCRIPTIONS: LITERATURE: Colorless leaflets or plates
REPOSITORY: Gold coarse powder

*MOLECULAR WEIGHT: 228.28

*SPECIFIC GRAVITY: Not available

*DENSITY: Not available

*MP (DEG C): 157-159 C

*BP (DEG C): 435 C (sublimes)

*SOLUBILITIES:
WATER : <1 mg/mL @ 20 C (RAD)

DMSO : 10-50 mg/mL @ 20 C (RAD)

95% ETHANOL : <1 mg/mL @ 20 C (RAD)

METHANOL : Not available

ACETONE : 10-50 mg/mL @ 20 C (RAD)

TOLUENE : Not available

OTHER SOLVENTS:
Acetic acid: Slightly soluble
Toluene: Soluble
Organic solvents: Soluble
Hot ethanol: Soluble
ETHER : Soluble
BENZENE: Very soluble

*VOLATILITY:
Vapor pressure: Not available
Vapor density : Not available

*FLAMMABILITY(FLASH POINT):
Flash point data for this chemical are not available. It is probably combustible. Fires involving this chemical can be controlled using a dry chemical, carbon dioxide or Halon extinguisher.

*UEL: Not available LEL: Not available

*REACTIVITY: Not available

*STABILITY:
This compound is stable under normal laboratory conditions. Solutions of this chemical should be stable for 24 hours under normal lab conditions (RAD).

*OTHER PHYSICAL DATA:
Plates from glacial acetic acid or alcohol; greenish-yellow fluorescence.

-TOXICITY
========

*NIOSH REGISTRY NUMBER: CV9275000

*TOXICITY: (abbreviations)

typ. dose	mode	specie	amount	unit	other
LDLo	ivn	mus	10	mg/kg	

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION:
THR: MUTATION data. Experimental neoplastigen, equivocal tumorigenic agent, carcinogen. It is found in oils, waxes, smoke, food, drugs. HIGH acute intravenous.

*CARCINOGENICITY:
Tumorigenic Data:
TDLo: skn-mus 18 mg/kg
TDLo: scu-mus 2 mg/kg
TDLo: imp-mus 80 mg/kg
TD : skn-mus 18 mg/kg
TD : skn-mus 360 mg/kg/56W-I
TD : skn-mus 240 mg/kg/1W-I
Review: IARC Cancer Review: Animal Sufficient Evidence
IARC probable human carcinogen (Group 2A) [610]
Status: NTP Third Annual Report on Carcinogens, 1982
EPA Carcinogen Assessment Group [610]
NTP anticipated human carcinogen [610]

*MUTATION DATA:

test	lowest dose	test	lowest dose
mma-sat	4 ug/plate	dnd-esc	10 umol/L
pic-esc	50 mg/L	dni-omi	200 ug/L
slt-dmg-par	5 mmol/L	sln-dmg-par	5 mmol/L
dnd-sal:tes	5 ug/1H-C	dns-hmn:hla	100 umol/L
dni-hmn:oth	10 umol/L	msc-hmn:lym	9 umol/L

otr-rat-orl	180	mg/kg	otr-rat:emb	3	mg/L
dns-rat:lvr	100	umol/L	sce-rat:lvr	10	umol/L
otr-mus:fbr	4	mg/L	otr-mus:emb	12500	ug/L
dnd-mus:lvr	60	umol/L	dnd-mus:oth	1	mg/L
dnd-mus-skn	192	umol/kg	dni-mus:oth	10	umol/L
msc-mus:lym	10	mg/L	hma-mus/sat	1600	mg/kg
mnt-ham-ipr	1800	mg/kg/24H	mma-ham:lng	109	umol/L
otr-ham:emb	6	mg/L/7D-C	otr-ham:kdy	80	ug/L
otr-ham:lng	100	ug/L	dnd-ham:fbr	5	mg/L
dnd-ham:kdy	5	mg/L	dnd-ham:lng	1	mg/L
oms-ham:lng	1	mg/L	cyt-ham-ipr	1800	mg/kg/24H
sce-ham-ipr	900	mg/kg/24H	sce-ham:ovr	100	umol/L
msc-ham:lng	1	mg/L/3H	spm-ham-orl	900	mg/kg/24H
dnd-mam:lym	100	umol			

*TERATOGENICITY: Not available

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
OSHA: None
ACGIH: None
NIOSH Criteria Document: None
NFPA Hazard Rating: Health (H): None
Flammability (F): None
Reactivity (R): None

*OTHER TOXICITY DATA:
Review: Toxicology Review-3
Status: Reported in EPA TSCA Inventory, 1983
EPA Genetic Toxicology Program, January 1984
Meets criteria for proposed OSHA medical records rule

-OTHER DATA (Regulatory)
==========

*PROPER SHIPPING NAME (IATA): Not restricted

*UN/ID NUMBER:

*HAZARD CLASS: SUBSIDIARY RISK: PACKING GROUP:

*LABELS REQUIRED:

*PACKAGING: PASSENGER: PKG. INSTR.: MAXIMUM QUANTITY:
CARGO : PKG. INSTR.: MAXIMUM QUANTITY:

*SPECIAL PROVISIONS:

*USES: Not available

*COMMENTS:
Found in oil, wax, smoke, food and drugs.

-HANDLING PROCEDURES
==========

*ACUTE/CHRONIC HAZARDS:
When heated to decomposition this compound emits acrid smoke and irritating fumes.

*MINIMUM PROTECTIVE CLOTHING:
If Tyvek-type disposable protective clothing is not worn during handling of this chemical, wear disposable Tyvek-type sleeves taped to your gloves.

*RECOMMENDED GLOVE MATERIALS:
Permeation Test Results For The Neat (Undiluted) Chemical:

The permeation test results for the neat (undiluted) chemical are given below. The breakthrough times of this chemical are given for each glove type tested. The table is a presentation of actual test results, not specific recommendations or suggestions. Avoid glove types which exhibit breakthrough times of less than the anticipated task time plus an adequate safety factor. If this chemical makes direct contact with your glove, or if a tear, puncture or hole develops, replace them at once.

Glove Type	Model Number	Thickness	Breakthrough Time
No information available			

*RECOMMENDED RESPIRATOR:

Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with a combination filter cartridge, i.e. organic vapor/acid gas/HEPA (specific for organic vapors, HCl, acid gas, SO2 and a high efficiency particulate filter).

*OTHER:

Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure.

*STORAGE PRECAUTIONS:

You should store this material in a refrigerator.

*SPILLS AND LEAKAGE:

If a spill of this chemical occurs, FIRST REMOVE ALL SOURCES OF IGNITION, then you should dampen the solid spill material with acetone and transfer the dampened material to a suitable container. Use absorbent paper dampened with acetone to pick up any remaining material. Seal your contaminated clothing and the absorbent paper in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with acetone followed by washing with a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT: Not available

-EMERGENCY PROCEDURES

*SKIN CONTACT:

IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.

IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop.

IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas.

*INHALATION:

IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop.

Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:

First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.

Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.

IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:

DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.

If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS:

Information concerning symptoms of exposure to this chemical is not available.

-SOURCES

=======

*SOURCES:

Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. Microfiche Ed. National Institute for Occupational Safety and Health. Cincinnati, OH. Quarterly Updates. CV9275000.

Weast, R.C. and M.A. Astle, Eds. CRC Handbook of Chemistry and Physics. 63rd Ed. CRC Press, Inc. Boca Raton, FL. 1982. p. C-128; #1858.

Buckingham, J., Ed. Dictionary of Organic Compounds. 5th Ed. Chapman and Hall. New York. 1982. Vol. 1, p. 528; #B-00146.

Windholz, M., Ed. The Merck Index. 10th Ed. Merck and Co. Rahway, NJ. 1983. p. 1055.

Sax, N.I. Dangerous Properties of Industrial Materials. 6th Ed. Van Nostrand Reinhold. New York. 1984. pp. 355-356.

Aldrich Chemical Company. Aldrich Catalog/Handbook of Fine Chemical. Aldrich Chemical Co., Inc. Milwaukee, WI. 1984. p. 109; #B220-9.

International Agency for Research on Cancer, World Health Organization. IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man. International Agency for Research on Cancer. Geneva. 1971-1982. Vol. 3, p. 45.

Clayton, G.D. and F.E. Clayton, Eds. Patty's Industrial Hygiene and Toxicology. Vol. 2. Third Revised Edition. John Wiley and Sons. New York. 1981. Vol. IIB, p. 3347.

Oak Ridge National Laboratory. Environmental Mutagen Information Center (EMIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed.

U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substances Inventory, Initial Inventory. 6 Vols. U.S. Environmental Protection Agency. Washington, D.C. 1979. Listed.

Steere, N.V., Ed. Handbook of Laboratory Safety. 2nd Ed. CRC Press, Inc. Cleveland, OH. 1971. p. 728, #91.

Oak Ridge National Laboratory. Environmental Teratogen Information Center (ETIC), Bibliographic Data Base. Oak Ridge National

Laboratory. Oak Ridge, TN. Listed.

Occupational Safety and Health Administration. Tentative OSHA Listing of Confirmed and Suspected Carcinogens by Category. Occupational Safety and Health Administration. Washington, DC. 1979. Listed.

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Section 3, p. 8.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. October 3, 1990. Not listed.

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL Fl.P, IP, Sp, Gr, flammability	VP, FRZ UEL, LEL		
Coal tar pitch volatiles 65996-93-2 GF8655000	Synonyms vary depending upon the specific compound (e.g., pyrene, phenanthrene, acridine, chrysene, anthracene & benzo(a)pyrene). [Note: NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.]	NIOSH Ca [80 mg/m³] 0.1 mg/m³ (cyclohexane-extractable fraction) See Appendix A See Appendix C OSHA [1910.1002] 0.2 mg/m³ (benzene-soluble fraction) See Appendix C	Ca [80 mg/m³]	Black or dark-brown amorphous residue.	Properties vary depending upon the specific compound. Combustible Solids		Strong oxidizers	Filter; Benzene; Grav; OSHA [#58]
Cobalt metal dust & fume (as Co) Co 7440-48-4 GF8750000	Cobalt metal dust, Cobalt metal fume	NIOSH 0.05 mg/m³ OSHA† 0.1 mg/m³	20 mg/m³ (as Co)	Odorless, silver-gray to black solid.	MW: 58.9 BP: 5612°F Sol: Insoluble Fl.P: NA IP: NA Sp.Gr: 8.92 Noncombustible Solid in bulk form, but finely divided dust will burn at high temperatures.	VP: 0 mm (approx) MLT: 2719°F UEL: NA LEL: NA	Strong oxidizers, ammonium nitrate	Filter; Acid; FAAS; IV [#7027]
Cobalt carbonyl (as Co) $C_8Co_2O_8$ 10210-68-1 GG0300000	di-mu-Carbonythexa-carbonyldicobalt, Cobalt octacarbonyl, Cobalt tetracarbonyl dimer, Dicobalt carbonyl, Dicobalt octacarbonyl, Octacarbonyldicobalt	NIOSH 0.1 mg/m³ OSHA† none	N.D.	Orange to dark-brown, crystalline solid. [Note: The pure substance is white.]	MW: 341.9 BP: 126°F (Decomposes) Sol: Insoluble Fl.P: NA IP: ? Sp.Gr: 1.87 Noncombustible Solid, but flammable carbon monoxide is emitted during decomposition.	VP: 0.7 mm MLT: 124°F UEL: NA LEL: NA	Air [Note: Decomposes on exposure to air or heat; stable in atmosphere of hydrogen & carbon monoxide.]	None available
Cobalt hydrocarbonyl (as Co) $HCo(CO)_4$ 16842-03-8 GG0900000	Hydrocobalt tetracarbonyl, Tetracarbonylhydridocobalt, Tetracarbonylhydrocobalt	NIOSH 0.1 mg/m³ OSHA† none	N.D.	Gas with an offensive odor.	MW: 172.0 BP: ? Sol: 0.05% Fl.P: NA (Gas) IP: ? RGasD: 5.93 Flammable Gas	VP: >1 atm FRZ: -15°F UEL: ? LEL: ?	Air [Note: Unstable gas that decomposes rapidly in air at room temperature to cobalt carbonyl & hydrogen.]	None available

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: N.R. Change: Daily [Coal tar pitch volatiles]	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHiE/SCBAE	Inh Con	Derm, bron, [carc]	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Resp sys, skin, bladder, kidneys [lung, kidney & skin cancer]
Skin: Prevent skin contact Eyes: N.R. Wash skin: When contam Remove: When wet or contam Change: Daily [Cobalt (dust and fume)]	NIOSH 0.25 mg/m³: DM^ 0.5 mg/m³: DMXSQ*^/DMFu*/SA* 1.25 mg/m³: SA:CF*/PAPRDM*^/PAPRDMFu* 2.5 mg/m³: HiEF/SCBAF/SAF 20 mg/m³: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE	Inh Ing Con	Cough, dysp, wheez, decr pulm func; low-wgt; derm; diffuse nodular fib; resp hypersensitivity, asthma	Eye: Skin: Breath: Swallow:	Skin, resp sys
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily [Cobalt carbonyl (as Co)]	TBAL	Inh Abs Ing Con	Irrit eyes, skin, muc memb; cough, decr pulm func, wheez, dysp; in animals: liver, kidney inj; pulm edema	Eye: Skin: Breath: Swallow:	Irr immed Soap wash Resp support Medical attention immed	Eyes, skin, resp sys, blood, CNS
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily [Cobalt hydrocarbonyl (as Co)]	TBAL	Inh Con	In animals: irrit resp sys; dysp, cough, decr pulm func, pulm edema	Eye: Skin: Breath:	Irr immed Soap wash Resp support	Eyes, skin, resp sys

NTP CHEMICAL REPOSITORY
BENZO (B) FLUORANTHENE

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 000507

*CAS NUMBER: 205-99-2

*BASE CHEMICAL NAME: BENZOFLUORANTHENE,(B)

*PRIMARY NAME: BENZO (B) FLUORANTHENE

*CHEMICAL FORMULA: C20H12

*STRUCTURAL FORMULA: Not printable

*WLN: L C65 K666 1A TJ

*SYNONYMS:
3,4-BENZ(E)ACEPHENANTHRYLENE
2,3-BENZFLUORANTHENE
2,3-BENZOFLUORANTHENE
2,3-BENZOFLUORANTHENE
BENZO(B)FLUORANTHENE
BENZO(B) FLUORANTHENE
3,4-BENZOFLUORANTHENE
BENZ(E)ACEPHENANTHRYLENE
B (B) F
BENZO(E)FLUORANTHENE
B(B)F
B B F
BBF
B(E)F
B E F
BEF

-PHYSICAL CHEMICAL DATA
======================

*PHYSICAL DESCRIPTION: LITERATURE: Needles
REPOSITORY: Yellow fluffy powder

*MOLECULAR WEIGHT: 252.32

*SPECIFIC GRAVITY: Not available

*DENSITY: Not available

*MP (DEG C): 163-165 C [275]

*BP (DEG C): Not available

*SOLUBILITIES:
WATER : <1 mg/mL @ 19 C (RAD)

DMSO : 10-50 mg/mL @ 19 C (RAD)

95% ETHANOL : <1 mg/mL @ 19 C (RAD)

METHANOL : Not available

ACETONE : 10-50 mg/mL @ 19 C (RAD)

TOLUENE : Not available

OTHER SOLVENTS:
Benzene: Slightly soluble [395]

*VOLATILITY:
Vapor pressure: Not available
Vapor density : Not available

*FLAMMABILITY(FLASH POINT):
Flash point data for this chemical are not available; however, it is probably combustible. Fires involving this chemical can be controlled with a dry chemical, carbon dioxide or Halon extinguisher.

*UEL: Not available LEL: Not available

*REACTIVITY:
This compound can react with strong oxidizers [107]. Ozone and chlorinating agents oxidize this type of compound [071]. It may also react with various electrophiles, peroxides, nitrogen oxides and sulfur oxides [051,071].

*STABILITY:
This compound is stable under normal laboratory conditions. Solutions of this chemical in water, DMSO, 95% ethanol or acetone should be stable for 24 hours under normal lab conditions (RAD).

*OTHER PHYSICAL DATA: Not available

-TOXICITY

*NIOSH REGISTRY NUMBER: CU1400000

*TOXICITY: (abbreviations)

typ. dose	mode	specie	amount	units	other
Not available					

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION:
THR: MUTATION Data. An experimental carcinogen and equivocal tumorigenic agent.

*CARCINOGENICITY:
Tumorigenic Data:
TDLo: imp-rat 5 mg/kg
TD : imp-rat 5 mg/kg
TDLo: ipr-mus 5046 ug/kg/15D-I
TDLo: scu-mus 72 mg/kg/9W-I
TDLo: skn-mus 88 ng/kg/120W-I
TD : skn-mus 72 mg/kg/60W-I
TD : skn-mus 4037 ug/kg/20D-I
Review: IARC Cancer Review: Animal Sufficient Evidence
IARC possible human carcinogen (Group 2B) [610]
Status: EPA Carcinogen Assessment Group [610]
NTP Fourth Annual Report on Carcinogens, 1984
NTP anticipated human carcinogen [610]

*MUTATION DATA:

test	lowest dose	test	lowest dose
mma-sat	31 nmol/plate	otr-ham:lng	100 ug/L
sce-ham-ipr	900 mg/kg/24H		

*TERATOGENICITY: Not available

*STANDARDS, REGULATIONS & RECOMMENDATIONS:

OSHA: None
ACGIH: None
NIOSH Criteria Document: None
NFPA Hazard Rating: Health (H): None
Flammability (F): None
Reactivity (R): None

*OTHER TOXICITY DATA:
Review: Toxicology Review-2
Status: EPA Genetox Program 1986, Positive: Carcinogenicity-mouse/rat
EPA Genetox Program 1986, Inconclusive: In vivo SCE-nonhuman
EPA TSCA Test Submission (TSCATS) Data Base, June 1987
NIOSH Analytical Methods: see Polynuclear aromatic hydrocarbons
Meets criteria for proposed OSHA Medical Records Rule

-OTHER DATA (Regulatory)
==========

*PROPER SHIPPING NAME (IATA): Not restricted

*UN/ID NUMBER:

*HAZARD CLASS: SUBSIDIARY RISK: PACKING GROUP:

*LABELS REQUIRED:

*PACKAGING: PASSENGER: PKG. INSTR.: MAXIMUM QUANTITY:
CARGO : PKG. INSTR.: MAXIMUM QUANTITY:

*SPECIAL PROVISIONS:

*USES: Not available

*COMMENTS: Not available

-HANDLING PROCEDURES
==========

*ACUTE/CHRONIC HAZARDS:
When heated to decomposition, this compound emits acrid smoke and irritating fumes [042].

*MINIMUM PROTECTIVE CLOTHING:
If Tyvek-type disposable protective clothing is not worn during handling of this chemical, wear disposable Tyvek-type sleeves taped to your gloves.

*RECOMMENDED GLOVE MATERIALS:
GlovES+ Expert System Glove Types For The Neat (Undiluted) Chemical:
This chemical has not been tested for permeation by Radian Corporation; however, the GlovES+ expert system was used to extrapolate permeation test information from compounds in the same chemical class. The GlovES+ system uses permeation data from literature sources; therefore, extra safety margins should be used with the estimated protection time(s). If this chemical makes direct contact with your glove, or if a tear, puncture or hole develops, replace them at once.
The GlovES+ expert system is a tool that can help people better manage protection from chemicals, however this tool cannot replace sound judgment nor make technical decisions. Our GlovES+ expert system is designed to offer initial advice and assistance in glove selection while the final glove selection should be made by knowledgeable individuals based on the specific circumstances involved.

Glove Type	Model Number	Thickness	Estimated Protection Time
PE/EVOH/PE	Safety 4 4H	0.07 mm	240 min.
PVA	Edmont 25-545	0.20 mm	240 min.

Viton	North F-091	0.23 mm	240 min.
Nitrile	Edmont 35-155	0.38 mm	240 min.

*RECOMMENDED RESPIRATOR:
Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with a combination filter cartridge, i.e. organic vapor/acid gas/HEPA (specific for organic vapors, HCl, acid gas, SO2 and a high efficiency particulate filter).

*OTHER:
Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure.

*STORAGE PRECAUTIONS:
You should store this material under ambient temperatures.

*SPILLS AND LEAKAGE:
If a spill of this chemical occurs, FIRST REMOVE ALL SOURCES OF IGNITION, then you should dampen the solid spill material with acetone and transfer the dampened material to a suitable container. Use absorbent paper dampened with acetone to pick up any remaining material. Seal your contaminated clothing and the absorbent paper in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with acetone followed by washing with a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT: Not available

-EMERGENCY PROCEDURES

*SKIN CONTACT:
IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.
IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop.
IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas.

*INHALATION:
IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop.
Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:
First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.
Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.
IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:
DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a

hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.

If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS:
Symptoms of exposure to this chemical include skin tumors in laboratory animals [107].

-SOURCES
=======

*SOURCES:

[015] Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. Microfiche Ed. National Institute for Occupational Safety and Health. Cincinnati, OH. Quarterly Updates. CU1400000.

[017] Weast, R.C., M.J. Astle, and W.H. Beyer, Eds. CRC Handbook of Chemistry and Physics. 67th Ed. CRC Press, Inc. Boca Raton, FL. 1986. p. C-126, #2515.

[025] Buckingham, J., Ed. Dictionary of Organic Compounds. 5th Ed. Chapman and Hall. New York. 1982. Vol. 1, p. 526, #B-00138.

[026] Buckingham, J., Ed. Dictionary of Organic Compounds. 5th Ed. Chapman and Hall. New York. Supplement 2, p. 44, #B20011.

[042] Sax, N.I. Dangerous Properties of Industrial Materials. 6th Ed. Van Nostrand Reinhold. New York. 1984. p. 353.

[047] Weast, R.C. and M.J. Astle, Eds. CRC Handbook of Data on Organic Compounds. CRC Press, Inc. Boca Raton, FL. 1985. Vol. 1, p. 208, #B01412.

[055] Verschueren, K. Handbook of Environmental Data on Organic Chemicals. 2nd Ed. Van Nostrand Reinhold. New York. 1983. pp. 249-251.

[082] U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substance Inventory: 1985 Edition. 5 Vols. U.S. Environmental Protection Agency. Washington, D.C. January 1986. Not listed.

[107] Occupational Health Services, Inc. Hazardline. Occupational Health Services, Inc. New York. Listed.

[110] Oak Ridge National Laboratory. Environmental Mutagen Information Center (EMIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Not listed.

[120] Oak Ridge National Laboratory. Environmental Teratogen Information Center (ETIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed.

[275] Aldrich Chemical Company. Aldrich Catalog/Handbook of Fine Chemical. Aldrich Chemical Co., Inc. Milwaukee, WI. 1988. p. 141, #27,533-6.

[346] Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens. 2nd Ed. Noyes, Publications. Park Ridge, NJ. 1985. p. 117.

[395] International Agency for Research on Cancer, World Health Organization. IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man. International

Agency for Research on Cancer. Geneva. Vol. 3, pp. 69-81; Vol. 32, pp. 147-153.

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Section 3, p. 61.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. October 3, 1990. Not listed.

NTP CHEMICAL REPOSITORY
BENZO (K) FLUORANTHENE

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 000508

*CAS NUMBER: 207-08-9

*BASE CHEMICAL NAME: BENZOFLUORANTHENE,(K)

*PRIMARY NAME: BENZO (K) FLUORANTHENE

*CHEMICAL FORMULA: C20H12

*STRUCTURAL FORMULA: Not available

*WLN: L E6 C6566 1A TJ

*SYNONYMS:
8,9-BENZOFLUORANTHENE
11,12-BENZOFLURANTHENE
11,12-BENZO(K)FLUORANTHENE
2,3,1',8'-BINAPTHYLENE
BENZO(K)FLUORANTHENE
BENZO(K) FLUORANTHENE
DIBENZO(B,JK)FLUORENE
B (K) F
B(K)F
B K F
BKF

-PHYSICAL CHEMICAL DATA
======================

*PHYSICAL DESCRIPTION: LITERATURE: Pale yellow needles
REPOSITORY: Yellow, crystalline solid

*MOLECULAR WEIGHT: 252.32

*SPECIFIC GRAVITY: Not available

*DENSITY: Not available

*MP (DEG C): 217 C [017,026,051,395]

*BP (DEG C): 480 C [017,026,047,395]

*SOLUBILITIES:
WATER : <1 mg/mL @ 20 C (RAD)

DMSO : <1 mg/mL @ 20 C (RAD)

95% ETHANOL : <1 mg/mL @ 20 C (RAD)

METHANOL : <1 mg/mL @ 20 C (RAD)

ACETONE : 1-10 mg/mL @ 20 C (RAD)

TOLUENE : 5-10 mg/mL @ 20 C (RAD)

OTHER SOLVENTS:
Benzene: Soluble [017,047,395]
Acetic acid: Soluble [017,047,395]

*VOLATILITY:
Vapor pressure: 0.0000000000959 mm Hg @ 25 C [051]
Vapor density : Not available

*FLAMMABILITY(FLASH POINT):
Flash point data for this chemical are not available; however, it is probably combustible. Fires involving this material can be controlled with a dry chemical, carbon dioxide or Halon extinguisher.

*UEL: Not available LEL: Not available

*REACTIVITY:
Ozone and chlorinating agents oxidize this type of compound. It may also react with various electrophiles, peroxides, nitrogen oxides and sulfur oxides [051,071]. This chemical can react with strong oxidizers [107].

*STABILITY:
This compound is stable under normal laboratory conditions. Solutions of this chemical in water, DMSO, 95% ethanol or acetone should be stable for 24 hours under normal lab conditions (RAD).

*OTHER PHYSICAL DATA:
Log octanol/water partition coefficient: 6.06

TOXICITY

*NIOSH REGISTRY NUMBER: DF6350000

*TOXICITY: (abbreviations)

typ. dose	mode	specie	amount	units	other
Not available					

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION:
THR: An experimental equivocal tumorigenic agent.

*CARCINOGENICITY:
Tumorigenic Data:
TDLo: imp-rat 5 mg/kg
TDLo: scu-mus 72 mg/kg/9W-I
TDLo: skn-mus 2820 mg/kg/47W-I
Review: IARC Cancer Review: Animal Sufficient Evidence
IARC possible human carcinogen (Group 2B) [610]
Status: NTP anticipated human carcinogen [610]

*MUTATION DATA:

test	lowest dose	test	lowest dose
mma-sat	10 ug/plate		

*TERATOGENICITY: Not available

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
OSHA: None
ACGIH: None
NIOSH Criteria Document: None
NFPA Hazard Rating: Health (H): None
Flammability (F): None
Reactivity (R): None

*OTHER TOXICITY DATA:
Status: EPA TSCA Test Submission (TSCATS) Data Base, June 1987
NIOSH Analytical Methods: see Polynuclear Aromatic Hydrocarbons
Meets criteria for proposed OSHA Medical Records Rule

EPA Genetox Program 1986, Positive: Carcinogenicity-mouse/rat

-OTHER DATA (Regulatory)

*PROPER SHIPPING NAME (IATA): Not restricted

*UN/ID NUMBER:

*HAZARD CLASS: SUBSIDIARY RISK: PACKING GROUP:

*LABELS REQUIRED:

*PACKAGING: PASSENGER: PKG. INSTR.: MAXIMUM QUANTITY:
CARGO : PKG. INSTR.: MAXIMUM QUANTITY:

*SPECIAL PROVISIONS:

*USES: Not available

*COMMENTS:
Occurs in coal tar pitch.

-HANDLING PROCEDURES

*ACUTE/CHRONIC HAZARDS:
When heated to decomposition this compound emits acrid smoke and irritating fumes [042].

*MINIMUM PROTECTIVE CLOTHING:
If Tyvek-type disposable protective clothing is not worn during handling of this chemical, wear disposable Tyvek-type sleeves taped to your gloves.

*RECOMMENDED GLOVE MATERIALS:
GlovES+ Expert System Glove Types For The Neat (Undiluted) Chemical:
This chemical has not been tested for permeation by Radian Corporation; however, the GlovES+ expert system was used to extrapolate permeation test information from compounds in the same chemical class. The GlovES+ system uses permeation data from literature sources; therefore, extra safety margins should be used with the estimated protection time(s). If this chemical makes direct contact with your glove, or if a tear, puncture or hole develops, replace them at once.
The GlovES+ expert system is a tool that can help people better manage protection from chemicals, however this tool cannot replace sound judgment nor make technical decisions. Our GlovES+ expert system is designed to offer initial advice and assistance in glove selection while the final glove selection should be made by knowledgeable individuals based on the specific circumstances involved.

Glove Type	Model Number	Thickness	Estimated Protection Time
PE/EVOH/PE	Safety4 4H	0.07 mm	240 min.
PVA	Edmont 25-545	0.20 mm	240 min.
Viton	North F-091	0.23 mm	240 min.
Nitrile	Edmont 35-155	0.38 mm	240 min.

*RECOMMENDED RESPIRATOR:
Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with a combination filter cartridge, i.e. organic vapor/acid gas/HEPA (specific for organic vapors, HCl, acid gas, SO2 and a high efficiency particulate filter).

*OTHER:
Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and

potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure.

*STORAGE PRECAUTIONS:
You should store this material under ambient temperatures.

*SPILLS AND LEAKAGE:
If a spill of this chemical occurs, FIRST REMOVE ALL SOURCES OF IGNITION, then you should dampen the solid spill material with acetone and transfer the dampened material to a suitable container. Use absorbent paper dampened with acetone to pick up any remaining material. Seal your contaminated clothing and the absorbent paper in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with acetone followed by washing with a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT: Not available

-EMERGENCY PROCEDURES

*SKIN CONTACT:
IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.
IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop.
IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas.

*INHALATION:
IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop.
Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:
First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.
Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.
IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:
DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.
If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS:
Information concerning symptoms of exposure to this chemical is not available.

-SOURCES
=======

*SOURCES:

[015] Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. Microfiche Ed. National Institute for Occupational Safety and Health. Cincinnati, OH. Quarterly Updates. DF6350000.

[017] Weast, R.C., M.J. Astle, and W.H. Beyer, Eds. CRC Handbook of Chemistry and Physics. 67th Ed. CRC Press, Inc. Boca Raton, FL. 1986. p. C-126; #2517.

[025] Buckingham, J., Ed. Dictionary of Organic Compounds. 5th Ed. Chapman and Hall. New York. 1982. Vol. 1, p. 556; #B-00349.

[026] Buckingham, J., Ed. Dictionary of Organic Compounds. 5th Ed. Chapman and Hall. New York. Supplement 3. p. 44; #B-30053.

[042] Sax, N.I. Dangerous Properties of Industrial Materials. 6th Ed. Van Nostrand Reinhold. New York. 1984. p. 377.

[051] Sax, N. Irving, Ed. Dangerous Properties of Industrial Materials Report. Bi-monthly Updates. Van Nostrand Reinhold Company, Inc. New York. January/February 1985. Vol. 5, #1, pp. 37-39.

[055] Verschueren, K. Handbook of Environmental Data on Organic Chemicals. 2nd Ed. Van Nostrand Reinhold. New York. 1983. pp. 252-254.

[071] Sax, N. Irving, Ed. Hazardous Chemicals Information Annual, No. 1. Van Nostrand Reinhold Information Services. New York. 1986. pp. 396-398.

[082] U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substance Inventory: 1985 Edition. 5 Vols. U.S. Environmental Protection Agency. Washington, D.C. January 1986. Not listed.

[107] Occupational Health Services, Inc. Hazardline. Occupational Health Services, Inc. New York. Listed.

[110] Oak Ridge National Laboratory. Environmental Mutagen Information Center (EMIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed.

[120] Oak Ridge National Laboratory. Environmental Teratogen Information Center (ETIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Not listed.

[395] International Agency for Research on Cancer, World Health Organization. IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man. International Agency for Research on Cancer. Geneva. Vol. 32, pp. 163-170.

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Section 3, p. 62.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. October 3, 1990. Not listed.

NTP CHEMICAL REPOSITORY
CARBAZOLE

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 001234

*CAS NUMBER: 86-74-8

*BASE CHEMICAL NAME: CARBAZOLE

*PRIMARY NAME: CARBAZOLE

*CHEMICAL FORMULA: C12H9N

*STRUCTURAL FORMULA: Not printable

*WLN: T B656 HMJ

*SYNONYMS:
9-AZAFLUORENE
9H-CARBAZOLE
DIBENZOPYRROLE
DIBENZO(B,D)PYRROLE
DIPHENYLENEIMINE
DIPHENYLENIMIDE
DIPHENYLENIMINE
USAF EK-600

-PHYSICAL CHEMICAL DATA
==========

*PHYSICAL DESCRIPTION: LITERATURE: White crystals, plates or leaflets
REPOSITORY: Light tan powder

*MOLECULAR WEIGHT: 167.21

*SPECIFIC GRAVITY: 1.10 @ 18/4 C [031,043,055,205]

*DENSITY: Not available

*MP (DEG C): 245-246 C [055,269,275]

*BP (DEG C): 355 C [017,031,058,275]

*SOLUBILITIES:
WATER : <1 mg/mL @ 19 C (RAD)

DMSO : >=100 mg/mL @ 19 C (RAD)

95% ETHANOL : <1 mg/mL @ 19 C (RAD)

METHANOL : Not available

ACETONE : 50-100 mg/mL @ 19 C (RAD)

TOLUENE : Not available

OTHER SOLVENTS:
Benzene: 1 g/120 mL [031,395]
Ether: 1 g/35 mL [031,395]
Acid: >10% [047]
Quinoline: 1 g/3 mL [031,395]
Pyridine: 1 g/6 mL [031,395]

Absolute alcohol: 1 g/135 mL [031,395]
Petroleum ether: Slightly soluble [031,395]
Chlorinated hydrocarbons: Slightly soluble [031,395]
Acetic acid: Slightly soluble [031,395]
Sulfuric acid: Soluble [026,031]
Most organic solvents: Sparingly soluble [026]

*VOLATILITY:
Vapor pressure: 400 mm Hg @ 323 C [038,055,058,395]
Vapor density : Not available

*FLAMMABILITY(FLASH POINT):
Flash point data for this chemical are not available; however, it is probably combustible. Fires involving this material can be controlled with a dry chemical, carbon dioxide or Halon extinguisher. A water spray may also be used [058,269].

*UEL: Not available LEL: Not available

*REACTIVITY:
This chemical is an extremely weak base [031,395]. It is incompatible with strong oxidizing agents [058,107,269]. It reacts with nitrogen oxides [395]. Potassium hydroxide fusion yields a salt [031,395].

*STABILITY:
This chemical is stable under normal laboratory conditions. Solutions of this chemical in water, DMSO, 95% ethanol or acetone should be stable for 24 hours under normal lab conditions (RAD).

*OTHER PHYSICAL DATA:
Boiling point: 200 C @ 147 mm Hg [017,026,031,047]
Vapor pressure: 60 mm Hg @ 248.2 C; 100 mm Hg @ 265.0 C [038]
Vapor pressure: 200 mm Hg @ 292.5 C; 760 mm Hg @ 354.8 C [038]
Sublimes readily [026,031,058]
Exhibits strong fluorescence and long phosphorescence on exposure to ultraviolet light [031]
log P octanol: 3.29 [055]
Exhibits practically no basic properties [026]
Spectroscopy data: Lambda max (in ethanol): 233 nm, 245 nm, 256 nm, 292 nm, 323 nm, 337 nm [395]

-TOXICITY

*NIOSH REGISTRY NUMBER: FE3150000

*TOXICITY: (abbreviations)

typ. dose	mode	specie	amount	units	other
LDLo	orl	rat	500	mg/kg	
LD50	ipr	mus	200	mg/kg	

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION:
THR: Poison by intraperitoneal route. Moderately toxic by ingestion. A suspected carcinogen.

*CARCINOGENICITY:
Review: IARC Cancer Review: Animal Limited Evidence
IARC: Not classifiable as a human carcinogen (Group 3) [015,395,610]

*MUTATION DATA:

test	lowest dose	test	lowest dose
otr-rat-orl	504 mg/kg/6W		

*TERATOGENICITY: Not available

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
OSHA: None
ACGIH: None
NIOSH Criteria Document: None
NFPA Hazard Rating: Health (H): None
Flammability (F): None
Reactivity (R): None

*OTHER TOXICITY DATA:
Status: EPA TSCA Chemical Inventory, 1986
EPA TSCA Test Submission (TSCATS) Data Base, January 1989

-OTHER DATA (Regulatory)

*PROPER SHIPPING NAME (IATA): Not restricted

*UN/ID NUMBER:

*HAZARD CLASS: SUBSIDIARY RISK: PACKING GROUP:

*LABELS REQUIRED:

*PACKAGING: PASSENGER: PKG. INSTR.: MAXIMUM QUANTITY:
CARGO : PKG. INSTR.: MAXIMUM QUANTITY:

*SPECIAL PROVISIONS:

*USES:
This compound is an important dye intermediate. It is used in making photographic plates sensitive to ultraviolet light. It is a reagent for lignin, carbohydrates and formaldehyde. It is also used in the manufacture of reagents, explosives, insecticides, lubricants and rubber antioxidants. It is an odor inhibitor in detergents.

*COMMENTS:
This compound occurs in the products of incomplete combustion of nitrogen-containing organic matter. It has been identified in mainstream cigarette smoke (100 ug/100 cigarettes), crude oils and coal tar [395].

-HANDLING PROCEDURES

*ACUTE/CHRONIC HAZARDS:
This compound may be harmful by ingestion, inhalation and skin absorption. It may cause irritation [058,269]. When heated to decomposition it emits toxic fumes of carbon monoxide, carbon dioxide and nitrogen oxides [043,058,269].

*MINIMUM PROTECTIVE CLOTHING: Not available

*RECOMMENDED GLOVE MATERIALS:
GlovES+ Expert System Glove Types For The Neat (Undiluted) Chemical:
This chemical has not been tested for permeation by Radian Corporation; however, the GlovES+ expert system was used to extrapolate permeation test information from compounds in the same chemical class. The GlovES+ system uses permeation data from literature sources; therefore, extra safety margins should be used with the estimated protection time(s). If this chemical makes direct contact with your glove, or if a tear, puncture or hole develops, replace them at once.
The GlovES+ expert system is a tool that can help people better manage protection from chemicals, however this tool cannot replace sound judgment nor make technical decisions. Our GlovES+ expert system is designed to offer initial advice and assistance in glove selection while the final glove selection should be made by knowledgeable individuals based on the specific circumstances involved.

Glove Type	Model Number	Thickness	Estimated Protection Time
PE/EVOH/PE	Safety 4 4H	0.07 mm	240 min
Viton	North F-091	0.24 mm	240 min
PVA	Edmont 25-950	0.30 mm	240 min
Nitrile	Edmont 37-155	0.38 mm	240 min

*RECOMMENDED RESPIRATOR:
Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with a combination filter cartridge, i.e. organic vapor/acid gas/HEPA (specific for organic vapors, HCl, acid gas, SO2 and a high efficiency particulate filter).

*OTHER:
Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure.

*STORAGE PRECAUTIONS:
You should store this material under ambient temperatures.

*SPILLS AND LEAKAGE:
If a spill of this chemical occurs, FIRST REMOVE ALL SOURCES OF IGNITION, then you should dampen the solid spill material with acetone and transfer the dampened material to a suitable container. Use absorbent paper dampened with acetone to pick up any remaining material. Seal your contaminated clothing and the absorbent paper in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with acetone followed by washing with a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT: Not available

-EMERGENCY PROCEDURES

*SKIN CONTACT:
IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.
If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

*INHALATION:
IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop.
Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:
First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.
Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.
IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:

DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.

If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS:

Symptoms of exposure to this compound may include irritation [269]. It may cause allergic reactions [026]. It may also cause dermatitis, bronchitis, coughing, dyspnea and respiratory distress [107].

-SOURCES

*SOURCES:

[015] Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. On-line Ed. National Institute for Occupational Safety and Health. Cincinnati, OH. FE3150000. June 6, 1989.

[017] Weast, R.C., M.J. Astle, and W.H. Beyer, Eds. CRC Handbook of Chemistry and Physics. 67th Ed. CRC Press, Inc. Boca Raton, FL. 1986. p. C-196, #4697.

[026] Buckingham, J., Ed. Dictionary of Organic Compounds. 5th Ed. Chapman and Hall. New York. Supplement 1, p. 93, #C-10022.

[031] Windholz, M., Ed. The Merck Index. 10th Ed. Merck and Co. Rahway, NJ. 1983. p. 247, #1769.

[038] Stull, D.R. Vapor pressure of pure substances: Organic Compounds. Industrial and Engineering Chem. 39(4):517-550. 1947. p. 532.

[039] Boublik, T., V. Fried and E. Hala. The Vapor Pressures of Pure Substances. p. 529.

[043] Sax, N.I. and Richard J. Lewis, Sr. Dangerous Properties of Industrial Materials. 7th Ed. Van Nostrand Reinhold. New York. 1989. Vol. II, p. 702, #CBN000.

[047] Weast, R.C. and M.J. Astle, Eds. CRC Handbook of Data on Organic Compounds. CRC Press, Inc. Boca Raton, FL. 1985. Vol. I, p. 399, #C00356.

[055] Verschueren, K. Handbook of Environmental Data on Organic Chemicals. 2nd Ed. Van Nostrand Reinhold. New York. 1983. p. 338.

[058] Information Handling Services. Material Safety Data Sheets Service. Microfiche Ed. Bimonthly Updates. June/July 1989. #5846-067, G-01.

[062] Sax, N.I. and R.J. Lewis Sr., Eds. Hawley's Condensed Chemical Dictionary. 11th Ed. Van Nostrand Reinhold. New York. 1987. p. 216.

[082] U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substance Inventory: 1985 Edition. 5 Vols. U.S. Environmental Protection Agency. Washington, D.C. January 1986. Not listed.

[107] Occupational Health Services, Inc. Hazardline. Occupational Health Services, Inc. New York. Listed.

[110] Oak Ridge National Laboratory. Environmental Mutagen Information Center (EMIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed.

[120] Oak Ridge National Laboratory. Environmental Teratogen Information Center (ETIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Not listed.

[205] Dean, John A., Ed. Lange's Handbook of Chemistry. 13th Ed. McGraw-Hill Book Company. New York. 1985. p. 7-366, #d1287.

[269] Lenga, Robert E. The Sigma-Aldrich Library of Chemical Safety Data. Edition 1. Sigma-Aldrich Corporation. Milwaukee, WI. 1985. p. 348, #C.

[275] Aldrich Chemical Company. Aldrich Catalog/Handbook of Fine Chemical. Aldrich Chemical Co., Inc. Milwaukee, WI. 1988. p. 299, #C308-1.

[395] International Agency for Research on Cancer, World Health Organization. IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man. International Agency for Research on Cancer. Geneva. Vol. 32, pp. 239-245; Supplement 7, p. 59.

[401] Nutt, A. R. Toxic Hazards of Rubber Chemicals. Elsevier Applied Science Publishers. New York. 1984. p. 44.

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Section 3, p. 25.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. October 3, 1990. Not listed.

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties: MW, BP, SOL, Fl.P, IP, Sp, Gr, flammability	Chemical and physical properties: VP, FRZ, UEL, LEL	Incompatibilities and reactivities	Measurement method (See Table 1)
Coal tar pitch volatiles 65996-93-2 GF8655000	Synonyms vary depending upon the specific compound (e.g., pyrene, phenanthrene, acridine, chrysene, anthracene & benzo(a)pyrene). [Note: NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.]	NIOSH Ca 0.1 mg/m³ (cyclohexane-extractable fraction) See Appendix A See Appendix C OSHA [1910.1002] 0.2 mg/m³ (benzene-soluble fraction) See Appendix C	Ca [80 mg/m³]	Black or dark-brown amorphous residue	Properties vary depending upon the specific compound. Combustible Solids		Strong oxidizers	Filter; Benzene; Grav; OSHA [#58]
Cobalt metal dust & fume (as Co) Co 7440-48-4 GF8750000	Cobalt metal dust, Cobalt metal fume	NIOSH 0.05 mg/m³ OSHA† 0.1 mg/m³	20 mg/m³ (as Co)	Odorless, silver-gray to black solid.	MW: 58.9 BP: 5612°F Sol: Insoluble Fl.P: NA IP: NA Sp.Gr: 8.92 Noncombustible Solid in bulk form, but finely divided dust will burn at high temperatures.	VP: 0 mm (approx) MLT: 2719°F UEL: NA LEL: NA	Strong oxidizers, ammonium nitrate	Filter; Acid; FAAS; IV [#7027]
Cobalt carbonyl (as Co) $C_8Co_2O_8$ 10210-68-1 GG0300000	di-mu-Carbonythexa-carbonyldicobalt, Cobalt octacarbonyl, Cobalt tetracarbonyl dimer, Dicobalt carbonyl, Dicobalt octacarbonyl, Octacarbonyldicobalt	NIOSH 0.1 mg/m³ OSHA† none	N.D.	Orange to dark-brown, crystalline solid. [Note: The pure substance is white.]	MW: 341.9 BP: 126°F (Decomposes) Sol: Insoluble Fl.P: NA IP: ? Sp.Gr: 1.87 Noncombustible Solid, but flammable carbon monoxide is emitted during decomposition.	VP: 0.7 mm MLT: 124°F UEL: NA LEL: NA	Air [Note: Decomposes on exposure to air or heat; stable in atmosphere of hydrogen & carbon monoxide.]	None available
Cobalt hydrocarbonyl (as Co) $HCo(CO)_4$ 16842-03-8 GG0900000	Hydrocobalt tetracarbonyl, Tetracarbonylhydridocobalt, Tetracarbonylhydrocobalt	NIOSH 0.1 mg/m³ OSHA† none	N.D.	Gas with an offensive odor.	MW: 172.0 BP: ? Sol: 0.05% Fl.P: NA (Gas) IP: ? RGasD: 5.93 Flammable Gas	VP: >1 atm FRZ: -15°F UEL: ? LEL: ?	Air [Note: Unstable gas that decomposes rapidly in air at room temperature to cobalt carbonyl & hydrogen.]	None available

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards: Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: N.R. Change: Daily [Coal tar pitch volatiles]	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHiE/SCBAE	Inh Con	Derm, bron, [carc]	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Resp sys, skin, bladder, kidneys [lung, kidney & skin cancer]
Skin: Prevent skin contact Eyes: N.R. Wash skin: When contam Remove: When wet or contam Change: Daily [Cobalt (dust and fume)]	NIOSH 0.25 mg/m³: DM^ 0.5 mg/m³: DMXSQ*^/DMFu*/SA* 1.25 mg/m³: SA:CF*/PAPRDM*^/PAPRDMFu* 2.5 mg/m³: HiEF/SCBAF/SAF 20 mg/m³: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE	Inh Ing Con	Cough, dysp, wheez, decr pulm func; low-wgt; derm; diffuse nodular fib; resp hypersensitivity, asthma	Eye: Skin: Breath: Resp support Swallow: Medical attention immed	Skin, resp sys
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily [Cobalt carbonyl (as Co)]	TBAL	Inh Abs Ing Con	Irrit eyes, skin, muc memb; cough, decr pulm func, wheez, dysp; in animals: liver, kidney inj; pulm edema	Eye: Skin: Breath: Swallow: Medical attention immed	Eyes, skin, resp sys, blood, CNS
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily [Cobalt hydrocarbonyl (as Co)]	TBAL	Inh Con	In animals: irrit resp sys; dysp, cough, decr pulm func, pulm edema	Eye: Skin: Breath: Resp support	Eyes, skin, resp sys

NTP CHEMICAL REPOSITORY
DIBENZ(A,H)ANTHRACENE

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 000429

*CAS NUMBER: 53-70-3

*BASE CHEMICAL NAME: DIBENZANTHRACENE(A,H)-

*PRIMARY NAME: DIBENZ(A,H)ANTHRACENE

*CHEMICAL FORMULA: C22H14

*STRUCTURAL FORMULA: Not printable

*WLN: L G6 D6 B666J

*SYNONYMS:
1,2:5,6-BENZANTHRACENE
DBA
1,2:5,6-DIBENZANTHRACENE
1,2:5,6-DIBENZ(A)ANTHRACENE
DIBENZO(A,H)ANTHRACENE
1,2:5,6-DIBENZOANTHRACENE
DB(A,H)A
1,2,5,6-DBA
RCRA WASTE NUMBER U063

-PHYSICAL CHEMICAL DATA
======================

*PHYSICAL DESCRIPTION: LITERATURE: White crystals
REPOSITORY: Pale yellow solid

*MOLECULAR WEIGHT: 278.35

*SPECIFIC GRAVITY: 1.282 [395]

*DENSITY: Not available

*MP (DEG C): 266-267 C [029,055,269,275]

*BP (DEG C): 524 C [055,205,269,275]

*SOLUBILITIES:
WATER : <1 mg/mL @ 19 C (RAD)

DMSO : 1-10 mg/mL @ 19 C (RAD)

95% ETHANOL : <1 mg/mL @ 19 C (RAD)

METHANOL : <1 mg/mL @ 18 C (RAD)

ACETONE : 1-10 mg/mL @ 19 C (RAD)

TOLUENE : <1 mg/mL @ 18 C (RAD)

OTHER SOLVENTS:
Benzene: Soluble [016,033,047,205]
Ether: Soluble [033,205,395]
Acetic acid: Soluble [016,047]
Petroleum ether: Soluble [033,205]

Xylene: Soluble [033]
Oils: Soluble [033]
Tributyrin: 8 mg/mL [051,071]
Organic solvents: Soluble [033,395]
Alcohol: Slightly soluble [033,205,395]

*VOLATILITY:
Vapor pressure: 0.0000000001 mm Hg @ 20 C (estimated) [051,071]
Vapor density : Not available

*FLAMMABILITY(FLASH POINT):
Flash point data for this chemical are not available; however, it is probably combustible. Fires involving this material can be controlled with a dry chemical, carbon dioxide or Halon extinguisher. A water spray may also be used [269].

*UEL: Not available LEL: Not available

*REACTIVITY:
This chemical is incompatible with strong oxidizers [269,346]. It is oxidized by chromic acid and by osmium tetraoxide [395].

*STABILITY:
This chemical is stable under normal laboratory conditions. Solutions of this chemical undergo photo-oxidation under sunlight [395]. Solutions of this chemical in water, DMSO, 95% ethanol or acetone should be stable for 24 hours if protected from UV light (RAD).

*OTHER PHYSICAL DATA:
Sublimes [033,051,071]
Red solution in concentrated sulfuric acid [395]
Lambda max (in heptane): 402.5 nm, 393.5 nm, 382.5 nm, 372.5 nm, 363 nm, 348.5 nm, 345 nm (shoulder), 333 nm, 320 nm, 307 nm (shoulder), 297.5 nm, 288 nm (shoulder), 286 nm, 278 nm, 273.5 nm, 264 nm (shoulder), 242 nm (shoulder), 231.5 nm, 221.5 nm (epsilon = 640, 1320, 930, 1300, 1110, 14900, 9100, 16900, 16900, 23900, 168000, 87500, 90600, 43000, 43000, 18800, 7700, 28400, 62500) [052]

-TOXICITY
========

*NIOSH REGISTRY NUMBER: HN2625000

*TOXICITY: (abbreviations)

typ. dose	mode	specie	amount	units	other
LDLo	ivn	mus	10	mg/kg	

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION:
THR: Poison by intravenous route. An experimental carcinogen, tumorigen and neoplastigen by most routes. Human mutagenic data. A priority pollutant.

*CARCINOGENICITY:
Tumorigenic Data:
TDLo: imp-mus 80 mg/kg
TD : imp-mus 14 mg/kg
TD : imp-mus 200 mg/kg
TD : imp-mus 100 mg/kg
TDLo: ims-pgn 6 mg/kg
TDLo: irn-frg 12 mg/kg
TDLo: ivn-gpg 30 mg/kg
TDLo: ivn-mus 40 mg/kg
TDLo: mul-mus 40 mg/kg/12D-I
TDLo: orl-mus 4160 mg/kg/26W-I
TD : orl-mus 4520 mg/kg/36W-C

```
    TDLo: scu-gpg    250 mg/kg/24D-I
    TDLo: scu-mus      6 mg/kg
    TD  : scu-mus     78 ug/kg
    TD  : scu-mus      6 mg/kg
    TD  : scu-mus    400 mg/kg/10W-I
    TDLo: scu-rat   2400 ug/kg/50D-I
    TD  : scu-rat    135 mg/kg/9W-I
    TDLo: skn-mus   1200 mg/kg/50W-I
    TD  : skn-mus      6 ug/kg
    TD  : skn-mus    400 mg/kg/40W-I
  Review: IARC Cancer Review: Animal Sufficient Evidence
          IARC probable human carcinogen (Group 2A) [015,395,610]
          ACGIH confirmed human carcinogen [415,421,610]
  Status: NTP Fifth Annual Report on Carcinogens, 1989: anticipated to be
           carcinogen
          EPA Carcinogen Assessment Group [610]

*MUTATION DATA: See RTECS printout for data

*TERATOGENICITY: Not available

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
  OSHA: Federal Register (1/19/89) and 29 CFR 1910.1000 Subpart Z
        Transitional Limit: PEL-TWA 0.2 mg/m3 [610]
        Final Limit: PEL-TWA 0.2 mg/m3 [610]
  ACGIH: TLV-TWA 0.2 mg/m3 [610]
  NIOSH Criteria Document: None
  NFPA Hazard Rating: Health (H): None
                      Flammability (F): None
                      Reactivity (R): None

*OTHER TOXICITY DATA:
  Review: Toxicology Review-3
  Status: EPA Genetox Program 1988, Positive: Carcinogenicity-mouse/rat; Cell
           transform.-SA7/F344 rat
          EPA Genetox Program 1988, Positive: Cell transform.-BALB/c-3T3; SHE-
           focus assay
          EPA Genetox Program 1988, Positive: Cell transform.-C3H/10T1/2; Cell
           transform.-mouse embryo
          EPA Genetox Program 1988, Positive: Cell transform.-RLV F344 rat
           embryo
          EPA Genetox Program 1988, Positive: Cell transform.-SA7/SHE; N crassa-
           forward mutation
          EPA Genetox Program 1988, Positive: Histidine reversion-Ames test
          EPA Genetox Program 1988, Positive: D melanogaster Sex-linked lethal
          EPA Genetox Program 1988, Positive: V79 cell culture-gene mutation
          EPA Genetox Program 1988, Positive/dose response: SHE-clonal assay
          EPA Genetox Program 1988, Inconclusive: Cell transform.-mouse pros-
           tate; In vivo SCE-nonhuman
          EPA Genetox Program 1988, Inconclusive: In vitro UDS-human fibroblast
          EPA TSCA Chemical Inventory, 1986
          EPA TSCA Test Submission (TSCATS) Data Base, January 1990
          NIOSH Analytical Methods: see Polynuclear Aromatic Hydrocarbons
           (HPLC), 5506; (GC), 5515


-OTHER DATA (Regulatory)
 ======================

*PROPER SHIPPING NAME (IATA): Not restricted

*UN/ID NUMBER:

*HAZARD CLASS:              SUBSIDIARY RISK:         PACKING GROUP:

*LABELS REQUIRED:

*PACKAGING: PASSENGER: PKG. INSTR.:                  MAXIMUM QUANTITY:
```

CARGO : PKG. INSTR.: MAXIMUM QUANTITY:

*SPECIAL PROVISIONS:

*USES: Not available

*COMMENTS:
This compound is isolated from coal tar pitch. It occurs in coke-oven effluents, in wood preservative sludge, in gasoline, in coal tar, in cigarette smoke, in fossil fuels, in marijuana smoke, in urban air, in coal-heating exhaust, in used engine oil, in charcoal-broiled steaks, in vegetables, in edible oils and in wastewater. It occurs as a product of incomplete combustion.

-HANDLING PROCEDURES

*ACUTE/CHRONIC HAZARDS:
This compound is harmful if swallowed or inhaled. It may cause irritation [269]. When heated to decomposition it emits acrid smoke, irritating fumes and toxic fumes of carbon monoxide and carbon dioxide [043,269].

*MINIMUM PROTECTIVE CLOTHING: Not available

*RECOMMENDED GLOVE MATERIALS:
GlovES+ Expert System Glove Types For The Neat (Undiluted) Chemical:
This chemical has not been tested for permeation by Radian Corporation; however, the GlovES+ expert system was used to extrapolate permeation test information from compounds in the same chemical class. The GlovES+ system uses permeation data from literature sources; therefore, extra safety margins should be used with the estimated protection time(s). If this chemical makes direct contact with your glove, or if a tear, puncture or hole develops, replace them at once.
The GlovES+ expert system is a tool that can help people better manage protection from chemicals, however this tool cannot replace sound judgment nor make technical decisions. Our GlovES+ expert system is designed to offer initial advice and assistance in glove selection while the final glove selection should be made by knowledgeable individuals based on the specific circumstances involved.

Glove Type	Model Number	Thickness	Estimated Protection Time
PVA	Edmont 25-545	Unknown	360 min
Nitrile	Edmont 37-155	0.38 mm	360 min
Unknown	North Silvershield	0.10 mm	360 min
Viton	North F-121	0.33 mm	420 min

*RECOMMENDED RESPIRATOR:
Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with a combination filter cartridge, i.e. organic vapor/acid gas/HEPA (specific for organic vapors, HCl, acid gas, SO2 and a high efficiency particulate filter).

*OTHER:
Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure.

*STORAGE PRECAUTIONS:
You should protect this material from exposure to light. Keep it away from oxidizing materials and store it under ambient temperatures.

*SPILLS AND LEAKAGE:
If a spill of this chemical occurs, FIRST REMOVE ALL SOURCES OF IGNITION, then you should dampen the solid spill material with acetone and transfer the

dampened material to a suitable container. Use absorbent paper dampened with acetone to pick up any remaining material. Seal your contaminated clothing and the absorbent paper in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with acetone followed by washing with a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT: Not available

-EMERGENCY PROCEDURES
==========

*SKIN CONTACT:
IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.
If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

*INHALATION:
IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop.
Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:
First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.
Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.
IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:
DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.
If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS:
Symptoms of exposure to this compound may include irritation [269].

-SOURCES
=======

*SOURCES:
[015] Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. On-line Ed. National Institute for Occupational Safety and Health. Cincinnati, OH. HN2625000. April 10, 1990.

[016] Weast, R.C., D.R. Lide, M.J. Astle, and W.H. Beyer, Eds. CRC Handbook of Chemistry and Physics. 70th Ed. CRC Press, Inc. Boca Raton, FL. 1989. p. C-241, #5983.

[029] Buckingham, J., Ed. Dictionary of Organic Compounds. 5th Ed. and

Supplements. Chapman and Hall. New York. 1988. Vol. 2, p. 1591, #D-1197.

[033] Budavari, Susan, Ed. The Merck Index. 11th Ed. Merck and Co., Inc. Rahway, NJ. 1989. p. 474, #2989.

[043] Sax, N.I. and Richard J. Lewis, Sr. Dangerous Properties of Industrial Materials. 7th Ed. Van Nostrand Reinhold. New York. 1989. Vol. II, p. 1096, #DCT400.

[047] Weast, R.C. and M.J. Astle, Eds. CRC Handbook of Data on Organic Compounds. CRC Press, Inc. Boca Raton, FL. 1985. Vol. I, p. 545, #D00182.

[051] Sax, N. Irving, Ed. Dangerous Properties of Industrial Materials Report. Bi-monthly Updates. Van Nostrand Reinhold Company, Inc. New York. November/December 1984; Vol. 4, No. 6, pp. 94-104.

[052] Midwest Research Institute. MRI Report for Dibenz(a,h)anthracene. Kansas City, MO. April 7, 1976.

[055] Verschueren, K. Handbook of Environmental Data on Organic Chemicals. 2nd Ed. Van Nostrand Reinhold. New York. 1983. pp. 460-461.

[071] Sax, N. Irving, Ed. Hazardous Chemicals Information Annual, No. 1. Van Nostrand Reinhold Information Services. New York. 1986. pp. 374-384.

[082] U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substance Inventory: 1985 Edition. 5 Vols. U.S. Environmental Protection Agency. Washington, D.C. January 1986. Listed.

[107] Occupational Health Services, Inc. Hazardline. Occupational Health Services, Inc. New York. Listed.

[110] Oak Ridge National Laboratory. Environmental Mutagen Information Center (EMIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed.

[120] Oak Ridge National Laboratory. Environmental Teratogen Information Center (ETIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed.

[205] Dean, John A., Ed. Lange's Handbook of Chemistry. 13th Ed. McGraw-Hill Book Company. New York. 1985. p. 7-267, #d101.

[269] Lenga, Robert E. The Sigma-Aldrich Library of Chemical Safety Data. Edition 1. Sigma-Aldrich Corporation. Milwaukee, WI. 1985. p. 573, #C.

[275] Aldrich Chemical Company. Aldrich Catalog/Handbook of Fine Chemical. Aldrich Chemical Co., Inc. Milwaukee, WI. 1988. p. 468, #D3,140-0.

[327] Office of the Federal Register National Archives and Records Administration. Code of Federal Regulations, Title 29, Labor, Parts 1900 to 1910. U.S. Government Printing Office. Washington. 1988. p. 707.

[346] Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens. 2nd Ed. Noyes, Publications. Park Ridge, NJ. 1985. pp. 739-742.

[395] International Agency for Research on Cancer, World Health Organization. IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man. International Agency for Research on Cancer. Geneva. Vol. 3, pp. 178-

196; Vol. 32, pp. 299-308; Supplement 7, p. 61.

[401] Nutt, A. R. Toxic Hazards of Rubber Chemicals. Elsevier Applied Science Publishers. New York. 1984. pp. 35-44.

[415] American Conference of Governmental Industrial Hygienists. Threshold Limit Values and Biological Exposure Indices for 1988-1989. American Conference of Governmental Industrial Hygienists. Cincinnati, OH. 1988. pp. 16, 40-41.

[421] American Conference of Governmental Industrial Hygienists. Documentation of the Threshold Limit Values. 5th Ed. American Conference of Governmental Industrial Hygienists. Cincinnati, OH. 1986. p. 143.

[430] Clayton, G.D. and F.E. Clayton, Eds. Patty's Industrial Hygiene and Toxicology. Vol. 2. Third Revised Edition. John Wiley and Sons. New York. 1981. Vol. IIB, pp. 3347-3350.

[545] Office of the Federal Register National Archives and Records Administration. Federal Register, Dept. of Labor, Part III. U.S. Government Printing Office. Washington. January 19, 1989. p. 2930.

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Update, p. lv; Section 3, p. 7.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. November 6, 1990. Not listed.

NTP CHEMICAL REPOSITORY
DIBENZOFURAN

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 000155

*CAS NUMBER: 132-64-9

*BASE CHEMICAL NAME: DIBENZOFURAN

*PRIMARY NAME: DIBENZOFURAN

*CHEMICAL FORMULA: C12H8O

*STRUCTURAL FORMULA: Not printable

*WLN: T B656 HOJ

*SYNONYMS:
DIPHENYLENE OXIDE

-PHYSICAL CHEMICAL DATA
======================

*PHYSICAL DESCRIPTION: LITERATURE: Colorless crystals
REPOSITORY: White crystalline solid

*MOLECULAR WEIGHT: 168.19

*SPECIFIC GRAVITY: 1.0886 @ 99/4 C

*DENSITY: Not available

*MP (DEG C): 86-87 C

*BP (DEG C): 287 C

*SOLUBILITIES:
WATER : <1 mg/mL @ 20 C (RAD)

DMSO : >=100 mg/mL @ 20 C (RAD)

95% ETHANOL : 10-50 mg/mL @ 20 C (RAD)

METHANOL : Not available

ACETONE : >=100 mg/mL @ 20 C (RAD)

TOLUENE : Not available

OTHER SOLVENTS:
Acetic acid: Soluble
Ether: Soluble
Benzene: Slightly soluble

*VOLATILITY:
Vapor pressure: Not available
Vapor density : 5.8

*FLAMMABILITY(FLASH POINT):
Flash point data for this chemical are not available. It is probably combustible. Fires involving this material can be controlled with a dry chemical, carbon dioxide or Halon extinguisher.

*UEL: Not available LEL: Not available

*REACTIVITY: Not available

*STABILITY:
This compound is sensitive to prolonged exposure to light.

*OTHER PHYSICAL DATA:
Refractive index: 1.6079 @ 99 C

-TOXICITY
========

*NIOSH REGISTRY NUMBER: Not available

*TOXICITY: (abbreviations)

typ. dose	mode	specie	amount	units	other
Not available					

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION:
THR: Details unknown. An insecticide.

*CARCINOGENICITY: Not available

*MUTATION DATA:

test	lowest dose	test	lowest dose
Not available			

*TERATOGENICITY:
Reproductive Effects Data: Not available

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
OSHA: None
ACGIH: None
NIOSH Criteria Document: None
NFPA Hazard Rating: Health (H): None
Flammability (F): None
Reactivity (R): None

*OTHER TOXICITY DATA: Not available

-OTHER DATA (Regulatory)
========================

*PROPER SHIPPING NAME (IATA): Not available

*UN/ID NUMBER:

*HAZARD CLASS: SUBSIDIARY RISK: PACKING GROUP:

*LABELS REQUIRED:

*PACKAGING: PASSENGER: PKG. INSTR.: MAXIMUM QUANTITY:
CARGO : PKG. INSTR.: MAXIMUM QUANTITY:

*SPECIAL PROVISIONS:

*USES:
An insecticide.

*COMMENTS: Not available

-HANDLING PROCEDURES

*ACUTE/CHRONIC HAZARDS:
Information concerning acute hazards of this chemical is not available.

*MINIMUM PROTECTIVE CLOTHING: Not available

*RECOMMENDED GLOVE MATERIALS:
Recommended Glove Type For Use With Neat (Undiluted) Chemical:
Recommendations based on permeation test results are made for handling the neat (undiluted) chemical. If this chemical makes direct contact with your glove, or if a tear, puncture or hole develops, replace them at once.

Suggested Glove Type(s) (RAD): No information available

*RECOMMENDED RESPIRATOR:
Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with an organic vapor/acid gas cartridge (specific for organic vapors, HCl, acid gas and SO2) with a dust/mist filter.

*OTHER: Not available

*STORAGE PRECAUTIONS:
You should protect this material from exposure to light, and store it in a refrigerator.

*SPILLS AND LEAKAGE:
Should a spill occur while you are handling this chemical, FIRST REMOVE ALL SOURCES OF IGNITION, then you should dampen the solid spill material with 60-70% ethanol and transfer the dampened material to a suitable container. Use absorbent paper dampened with 60-70% ethanol to pick up any remaining material. Seal the absorbent paper, and any of your clothes, which may be contaminated, in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with 60-70% ethanol followed by washing with a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT:
Not available

-EMERGENCY PROCEDURES

*SKIN CONTACT:
IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.
If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

*INHALATION:
IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital.
Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:
First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.

Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.

IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:

DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.

If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS:

Information concerning symptoms of exposure to this chemical is not available.

-SOURCES

*SOURCES:

Buckingham, J., Ed. Dictionary of Organic Compounds. 5th Ed. Chapman and Hall. New York. 1982. Vol. 2, p. 1601, #D-01268.

Sax, N.I. Dangerous Properties of Industrial Materials. 5th Ed. Van Nostrand Reinhold. New York. 1979. p. 623.

Aldrich Chemical Company. Aldrich Catalog/Handbook of Fine Chemical. Aldrich Chemical Co., Inc. Milwaukee, WI. 1984. p. 349, #13,568-2.

Oak Ridge National Laboratory. Environmental Teratogen Information Center (ETIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Not listed.

Oak Ridge National Laboratory. Environmental Mutagen Information Center (EMIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Not listed.

U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substances Inventory, Initial Inventory. 6 Vols. U.S. Environmental Protection Agency. Washington, D.C. 1979. Listed.

Hawley, G.G., Ed. The Condensed Chemical Dictionary. 10th Ed. Van Nostrand Reinhold. New York. 1981. p. 380.

Weast, R.C. and M.A. Astle, Eds. CRC Handbook of Chemistry and Physics. 63rd Ed. CRC Press, Inc. Boca Raton, FL. 1982. p. C-264, #5992.

Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. Microfiche Ed. National Institute for Occupational Safety and Health. Cincinnati, OH. Quarterly Updates. Not listed.

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Update, p. xxxii.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. November 6, 1990. Not listed.

NTP CHEMICAL REPOSITORY
FLUORANTHENE

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 000487

*CAS NUMBER: 206-44-0

*BASE CHEMICAL NAME: FLUORANTHENE

*PRIMARY NAME: FLUORANTHENE

*CHEMICAL FORMULA: C16H10

*STRUCTURAL FORMULA:

*WLN: L C65 66 1A PJ

*SYNONYMS:
1,2-BENZACENAPHTHENE
IDRYL
BENZO (J,K) FLUORENE
1,2-(1,8-NAPHTHALENEDIYL)BENZENE
1,2-(1,8-NAPHTHALENE)BENZENE
RCRA WASTE NUMBER U120

-PHYSICAL CHEMICAL DATA
=====================

*PHYSICAL DESCRIPTIONS: LITERATURE: Colored needles
REPOSITORY: Light yellow, fine crystals

*MOLECULAR WEIGHT: 202.26

*SPECIFIC GRAVITY: 1.252 @ 0/4 C

*DENSITY: Not available

*MP (DEG C): 110 C

*BP (DEG C): 250 C at 60 mm Hg

*SOLUBILITIES:
WATER : <1 mg/mL @ 18 C (RAD)

DMSO : >=100 mg/mL @ 22 C (RAD)

95% ETHANOL : 5-10 mg/mL @ 22 C (RAD)

METHANOL : Not available

ACETONE : >=100 mg/mL @ 22 C (RAD)

TOLUENE : Not available

OTHER SOLVENTS:
Chloroform: Soluble
Carbon disulfide: Soluble
ETHER : Soluble
BENZENE: Soluble

*VOLATILITY :
Vapor pressure: 0.01 mm Hg @ 20.0 C

Vapor density : Not available

*FLAMMABILITY(FLASH POINT):
Flash point data for this chemical are not available. It is probably combustible. Fires involving this chemical can be controlled using a dry chemical, carbon dioxide, or Halon extinguisher.

*UEL: Not available LEL: Not available

*REACTIVITY: Not available

*STABILITY:
This chemical may be sensitive to prolonged exposure to light. Solutions of this chemical should be stable for 24 hours under normal lab conditions (RAD).

*OTHER PHYSICAL DATA:
A tetracyclic hydrocarbon.

-TOXICITY
========

*NIOSH REGISTRY NUMBER: LL4025000

*TOXICITY: (abbreviations)

typ. dose	mode	specie	amount	unit	other
LD50	orl	rat	2000	mg/kg	
LD50	ivn	mus	100	mg/kg	
LD50	skn	rbt	3180	mg/kg	

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION:
THR: An experimental equivocal tumorigenic agent; HIGH intravenous. MODERATE oral and skin; MUTATION Data.

*CARCINOGENICITY:
Tumorigenic Data:
TDLo: skn-mus 280 mg/kg/58W-I
Review: IARC Cancer Review: Animal Inadequate Evidence
IARC: Not classifiable as a human carcinogen (Group 3) [610]

MUTATION DATA:

test	lowest dose	test	lowest dose
mma-sat	100 mg/L/72H	msc-hmn:lym	2 umol/L
msc-ham:ovr	20 mg/L		

*TERATOGENICITY: (Reproductive Effects Data): Not available

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
OSHA: None
ACGIH: None
NIOSH Criteria Document: None
NFPA Hazard Rating: Health (H): None
Flammability (F): None
Reactivity (R): None

*OTHER TOXICITY DATA:
Status: Reported in EPA TSCA Inventory, 1983
EPA Genetic Toxicology Program, January 1984
Meets criteria for proposed OSHA Medical Records Rule

-OTHER DATA (Regulatory)
========================

*PROPER SHIPPING NAME (IATA): Not restricted

*UN/ID NUMBER:

*HAZARD CLASS: SUBSIDIARY RISK: PACKING GROUP:

*LABELS REQUIRED:

*PACKAGING: PASSENGER: PKG. INSTR.: MAXIMUM QUANTITY:
CARGO : PKG. INSTR.: MAXIMUM QUANTITY:

*SPECIAL PROVISIONS:

*USES:
This compound is an air pollutant.

-HANDLING PROCEDURES
==========

*ACUTE/CHRONIC HAZARDS:
When heated to decomposition this compound emits acrid smoke and fumes.

*MINIMUM PROTECTIVE CLOTHING: Not available

*RECOMMENDED GLOVE MATERIALS: Not available

*RECOMMENDED RESPIRATOR:
Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with an organic vapor/acid gas cartridge (specific for organic vapors, HCl, acid gas and SO2) with a dust/mist filter.

*OTHER: Not available

*STORAGE PRECAUTIONS:
You should protect this material from exposure to light, and store it in a refrigerator.

*SPILLS AND LEAKAGE:
If a spill of this chemical occurs, FIRST REMOVE ALL SOURCES OF IGNITION, then you should dampen the solid spill material with acetone and transfer the dampened material to a suitable container. Use absorbent paper dampened with acetone to pick up any remaining material. Seal your contaminated clothing and the absorbent paper in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with acetone followed by washing with a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT:
You should dispose of all waste and contaminated materials associated with this chemical as specified by existing local, state and federal regulations concerning hazardous waste disposal. It is suggested that your contaminated materials should be destroyed by incineration in a special, high temperature (>2000 degrees F), chemical incinerator facility.

-EMERGENCY PROCEDURES
==========

*SKIN CONTACT:
IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.
If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

*INHALATION:
IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital.
Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:
First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.
Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.
IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:
DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.
If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS:
Information concerning symptoms of exposure to this chemical is not available.

-SOURCES
=======

*SOURCES:
Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. Microfiche Ed. National Institute for Occupational Safety and Health. Cincinnati, OH. Quarterly Updates. LL4025000.

Weast, R.C. and M.A. Astle, Eds. CRC Handbook of Chemistry and Physics. 63rd Ed. CRC Press, Inc. Boca Raton, FL. 1982. p. C-299; #6986.

Buckingham, J., Ed. Dictionary of Organic Compounds. 5th Ed. Chapman and Hall. New York. 1982. Vol. 3, p. 2633; #F-00250.

Sax, N.I. Dangerous Properties of Industrial Materials. 6th Ed. Van Nostrand Reinhold. New York. 1984. p. 1421.

Verschueren, K. Handbook of Environmental Data on Organic Chemicals. 2nd Ed. Van Nostrand Reinhold. New York. p. 671.

Occupational Safety and Health Administration. Tentative OSHA Listing of Confirmed and Suspected Carcinogens by Category. Occupational Safety and Health Administration. Washington, DC. 1979. Not listed.

Aldrich Chemical Company. Aldrich Catalog/Handbook of Fine Chemical. Aldrich Chemical Co., Inc. Milwaukee, WI. 1984. p. 550, #F80-7.

Oak Ridge National Laboratory. Environmental Teratogen Information Center (ETIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Not listed.

Oak Ridge National Laboratory. Environmental Mutagen Information Center (EMIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed.

U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substances Inventory, Initial Inventory. 6 Vols. U.S. Environmental Protection Agency. Washington, D.C. 1979. Listed.

Hawley, G.G., Ed. The Condensed Chemical Dictionary. 10th Ed. Van Nostrand Reinhold. New York. 1981. p. 469.

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Section 3, p. 62.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. November 6, 1990. Not listed.

NTP CHEMICAL REPOSITORY
FLUORENE

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 000512

*CAS NUMBER: 86-73-7

*BASE CHEMICAL NAME: FLUORENE

*PRIMARY NAME: FLUORENE

*CHEMICAL FORMULA: C13H10

*STRUCTURAL FORMULA:

*WLN: L B656 HHJ

*SYNONYMS:
O-BIPHENYLMETHANE
DIPHENYLENEMETHANE
2,2'-METHYLENEBIPHENYL
2,3-BENZINDENE
ALPHA-DIPHENYLENEMETHANE-9H-FLUORENE

-PHYSICAL CHEMICAL DATA
==========

*PHYSICAL DESCRIPTIONS: White leaflets.

*MOLECULAR WEIGHT: 166.21

*SPECIFIC GRAVITY: 1.203 (0/4)

*DENSITY:Not available

*MP (DEG C): 116-117

*BP (DEG C): 295

*SOLUBILITIES:
WATER : Insoluble. (1.7mg/kg)

DMSO : Not available

95% ETHANOL : Soluble in hot.

METHANOL : Not available

ACETONE : Soluble.

TOLUENE : Not available

OTHER SOLVENTS:
Carbon desulfide: Soluble.
Carbon tetrachloride: Soluble.
Toluene: Soluble.
Pyridine: Soluble.
ETHER : Soluble.
BENZENE: Soluble.

*VOLATILITY : Vapor pressure: 10 mm @ 146.0 C degrees.

*FLAMMABILITY(FLASH POINT): Not available

*UEL: Not available LEL: Not available

*REACTIVITY: Not available

*STABILITY: This compound is very stable under normal labortory conditions.

*OTHER PHYSICAL DATA: Sublimes easily under a vacuum. Flourescent when impure.

-TOXICITY
========

*NIOSH REGISTRY NUMBER: Not available

*TOXICITY: (abbreviations)
Not available

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION: Not available

*CARCINOGENICITY:
Review: IARC Cancer Review: Animal Inadequate Evidence
IARC: Not classifiable as a human carcinogen (Group 3) [610]

*MUTAGENICITY: Not available

*TERATOGENICITY: Not available

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
OSHA: None
ACGIH: None
NIOSH Criteria Document: None
NFPA Hazard Rating: Health (H): None
Flammability (F): None
Reactivity (R): None

*OTHER TOXICITY DATA: Not available

-OTHER DATA (Regulatory)
========================

*PROPER SHIPPING NAME (IATA): Not available

*UN/ID NUMBER:

*HAZARD CLASS: SUBSIDIARY RISK: PACKING GROUP:

*LABELS REQUIRED:

*PACKAGING: PASSENGER: PKG. INSTR.: MAXIMUM QUANTITY:
CARGO : PKG. INSTR.: MAXIMUM QUANTITY:

*SPECIAL PROVISIONS:

*USES: Resinous products; dyestuffs.

*COMMENTS: Not available

-HANDLING PROCEDURES
====================

*ACUTE/CHRONIC HAZARDS:
Fire hazards: Slight, when exposed to heat or flame.

*MINIMUM PROTECTIVE CLOTHING: Not available

*RECOMMENDED GLOVE MATERIALS:
Permeation data indicate that neoprene gloves may provide protection to contact with this compound. Neoprene over latex gloves is recommended. However, if this chemical makes direct contact with your gloves, or if a tear, puncture or hole develops, remove them at once.

*RECOMMENDED RESPIRATOR:
Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with an organic vapor/acid gas cartridge (specific for organic vapors, HCl, acid gas and SO2) with a dust/mist filter.

*OTHER: Not available

*STORAGE PRECAUTIONS:
You should protect this material from exposure to light, and store it in a refrigerator.

*SPILLS AND LEAKAGE:
You should dampen the solid spill material with acetone, then transfer the dampened material to a suitable container. Use absorbent paper dampened with acetone to pick up any remaining material. Seal your contaminated clothing and the adsorbent paper in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with acetone followed by washing with a strong soap and water solution. Do not reenter the contaminate area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT:
You should dispose of all waste and contaminated materials associated with this chemical as specified by existing local, state and federal regulations concerning hazardous waste disposal. It is suggested that your contaminated materials should be destroyed by incineration in a special, high temperature (>2000 degrees F), chemical incinerator facility.

-EMERGENCY PROCEDURES

*SKIN CONTACT:
IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.
If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

*INHALATION:
IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital.
Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:
First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.

Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.

IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:

DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.

If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS: Not available

*FIREFIGHTING:

This compound is not very flammable but any fire involving this compound may produce dangerous vapors. You should evacuate the area. All firefighters should wear full-body protective clothing and use self-contained breathing apparatuses.

You should extinguish any fires involving this chemical with a dry chemical, carbon dioxide, foam, or halon extinguisher.

-SOURCES

*SOURCES:

Occupational Safety and Health Administration. Tentative OSHA Listing of Confirmed and Suspected Carcinogens by Category. Occupational Safety and Health Administration. Washington, DC. 1979. Not listed

Aldrich Chemical Company. Aldrich Catalog/Handbook of Fine Chemicals. Aldrich Chemical Co., Inc. Milwaukee, WI. 1980. p. 476

Oak Ridge National Laboratory. Environmental Teratogen Information Center (ETIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Not listed

Oak Ridge National Laboratory. Environmental Mutagen Information Center (EMIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. p. 80

Steere, N.V., Ed. Handbook of Laboratory Safety. 2nd Ed. CRC Press, Inc. Cleveland, OH. 1971. Not listed

U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substances Inventory, Initial Inventory. 6 Vols. U.S. Environmental Protection Agency. Washington, D.C. 1979. Listed

Proctor, N.H. and J.P. Hughes. Chemical Hazards of the Workplace. J.B. Lippincott. Philadelphia. 1978. Not listed

Hawley, G.G., Ed. The Condensed Chemical Dictionary. 10th Ed. Van Nostrand Reinhold. New York. 1981. p. 469

International Technical Information Institute. Toxic and Hazardous Industrial Chemicals Safety Manual for Handling and Disposal with Toxicity and Hazard Data. International Technical Information Institute. 1978. Not listed

Sax, N.I. Dangerous Properties of Industrial Materials. 5th Ed.

Van Nostrand Reinhold. New York. 1979. p. 688

Windholz, M., Ed. The Merck Index. 9th Ed. Merck and Co. Rahway, NJ. 1976. p. 537, 4037

Weast, R.C. and M.A. Astle, Eds. CRC Handbook of Chemistry and Physics. 60th Ed. CRC Press, Inc. Boca Raton, FL. 1982. p. c-306

Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. DHEW (NIOSH) Publication No. 79-100. National Institute for Occupational Safety and Health. Cincinnati, OH. 1979. Not listed

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Section 3, p. 25.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. November 6, 1990. Not listed.

NTP CHEMICAL REPOSITORY
HEXACHLOROBENZENE

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 000106

*CAS NUMBER: 118-74-1

*BASE CHEMICAL NAME: HEXACHLOROBENZENE

*PRIMARY NAME: HEXACHLOROBENZENE

*CHEMICAL FORMULA: C6Cl6

*STRUCTURAL FORMULA: Not printable

*WLN: GR BG CG DG EG FG

*SYNONYMS:
BENZENE, HEXACHLORO-
PENTACHLOROPHENYL CHLORIDE
PERCHLOROBENZENE
PHENYL PERCHLORYL
NO BUNT
ANTICARIE
BUNT-CURE
BUNT-NO-MORE
HCB
HEXA C.B.
NO BUNT 40
JULIAN'S CARBON CHLORIDE
NO BUNT 80
NO BUNT LIQUID
SANOCIDE
SMUT-GO
AMATIN
CO-OP HEXA
GRANOX NM
RCRA WASTE NUMBER U127
UN 2729

-PHYSICAL CHEMICAL DATA
======================

*PHYSICAL DESCRIPTION: LITERATURE: White needles
REPOSITORY: Gray powder

*MOLECULAR WEIGHT: 284.76

*SPECIFIC GRAVITY: Not available

*DENSITY: 2.044 g/mL @ 23 C [031]

*MP (DEG C): 227-229 C [274]

*BP (DEG C): 322 C (sublimes) [018]

*SOLUBILITIES:
WATER : <1 mg/mL @ 20 C (RAD)

DMSO : <1 mg/mL @ 20 C (RAD)

95% ETHANOL : <1 mg/mL @ 20 C (RAD)

METHANOL : Not available

ACETONE : 1-5 mg/mL @ 23 C (RAD)

TOLUENE : Not available

OTHER SOLVENTS:
Chloroform: Soluble
Carbon disulfide: Soluble
Carbon tetrachloride: Sparingly soluble
Ether: Soluble
Benzene: Soluble

*VOLATILITY:
Vapor pressure: 1 mm Hg @ 114.4 C; 0.0000109 mm Hg @ 20 C
Vapor density : 9.8

*FLAMMABILITY(FLASH POINT):
This chemical has a flash point of 242 C (468 F). It is combustible. Fires involving this material can be controlled with a dry chemical, carbon dioxide or Halon extinguisher.

*UEL: Not available LEL: Not available

*REACTIVITY:
This chemical reacts violently with dimethylformamide.

*STABILITY:
This chemical is sensitive to moisture. Solutions of this chemical in water, DMSO, 95% ethanol or acetone should be stable for 24 hours under normal lab conditions (RAD).

*OTHER PHYSICAL DATA:
Easily sublimable

-TOXICITY
========

*NIOSH REGISTRY NUMBER: DA2975000

*TOXICITY: (abbreviations)

typ. dose	mode	specie	amount	units	other
LDLo	unr	man	220	mg/kg	
LD50	orl	rat	10000	mg/kg	
LC50	ihl	rat	3600	mg/m3	
LD50	orl	mus	4	gm/kg	
LC50	ihl	mus	4	gm/m3	
LD50	orl	cat	1700	mg/kg	
LC50	ihl	cat	1600	mg/m3	
LD50	orl	rbt	2600	mg/kg	
LC50	ihl	rbt	1800	mg/m3	

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION:
THR: An experimental neoplastigen, carcinogen, equivocal tumorigenic agent and teratogen. A suspected human carcinogen. Moderate via oral route.

*CARCINOGENICITY:
Tumorigenic Data:
TD : orl-rat 1050 mg/kg/30W-C
TDLo: orl-mus 6972 mg/kg/83W-C
TDLo: orl-ham 1000 mg/kg/18W-C
TD : orl-ham 3360 mg/kg/80W-C
TD : orl-ham 3360 mg/kg/80W-C
TDLo: orl-rat 2738 mg/kg/2Y-C

TD : orl-rat 5475 mg/kg/2Y-C
TD : orl-rat 6300 mg/kg/90W-C
Review: IARC Cancer Review: Human Inadequate Evidence
IARC Cancer Review: Animal Sufficient Evidence
IARC possible human carcinogen (Group 2B) [015,395,610]
Status: NTP Fourth Annual Report on Carcinogens, 1984
NTP anticipated human carcinogen [610]
EPA Carcinogen Assessment Group [610]

*MUTATION DATA:

test	lowest dose	test	lowest dose
dnd-esc	20 umol/L	mmo-smc	100 ppm

*TERATOGENICITY:
Reproductive Effects Data:
TDLo: orl-rat 40 mg/kg (10-13D preg)
TDLo: orl-rat 6450 mg/kg (1-22D preg/21D post)
TDLo: orl-rat 88 mg/kg (70D male/70D pre-22D preg)
TDLo: orl-rat 812 mg/kg (MGN)
TDLo: orl-mus 1 gm/kg (7-16D preg)
TDLo: orl-rat 556 mg/kg (96D pre-21D post)
TDLo: orl-rat 212 mg/kg (14D pre-17D post)
TDLo: orl-mam 27562 ug/kg (66D pre-28D post)

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
OSHA: None
ACGIH: None
NIOSH Criteria Document: None
NFPA Hazard Rating: Health (H): None
Flammability (F): None
Reactivity (R): None

*OTHER TOXICITY DATA:
Review: Toxicology Review-2
Standards and Regulations: DOT-IMO: Poison B; Label: St. Andrews Cross
Status: "NIOSH Manual of Analytical Methods" Vol 7 343
"NIOSH Manual of Analytical Methods" to be revised by June, 1985
Reported in EPA TSCA Inventory, 1983
EPA Genetic Toxicology Program, January 1984
Meets criteria for proposed OSHA Medical Records Rule

-OTHER DATA (Regulatory)
==========

*PROPER SHIPPING NAME (IATA): Hexachlorobenzene

*UN/ID NUMBER: UN2729

*HAZARD CLASS: 6.1 SUBSIDIARY RISK: None PACKING GROUP: III

*LABELS REQUIRED: Keep away from food

*PACKAGING: PASSENGER: PKG. INSTR.: 611, Y611 MAXIMUM QUANTITY: 60 L, 2 L
CARGO : PKG. INSTR.: 618 MAXIMUM QUANTITY: 220 L

*SPECIAL PROVISIONS: None

*USES:
This compound is used in organic synthesis, as a fungicide for seeds, as a wood preservative, in the manufacture of pentachlorophenol, in the production of aromatic fluorocarbons and in the impregnation of paper.

*COMMENTS: Not available

-HANDLING PROCEDURES

==========

*ACUTE/CHRONIC HAZARDS:
This compound is a irritant of the skin, eyes, mucous membranes and upper respiratory tract. When heated to decomposition this it emits toxic fumes of chlorides, carbon monoxide and carbon dioxide.

*MINIMUM PROTECTIVE CLOTHING: Not available

*RECOMMENDED GLOVE MATERIALS:
Permeation Test Results For The Neat (Undiluted) Chemical:
The permeation test results for the neat (undiluted) chemical are given below. The breakthrough times of this chemical are given for each glove type tested. The table is a presentation of actual test results, not specific recommendations or suggestions. Avoid glove types which exhibit breakthrough times of less than the anticipated task time plus an adequate safety factor. If this chemical makes direct contact with your glove, or if a tear, puncture or hole develops, replace them at once.

Glove Type	Model Number	Thickness	Breakthrough Time
No information available			

*RECOMMENDED RESPIRATOR:
Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with a combination filter cartridge, i.e. organic vapor/acid gas/HEPA (specific for organic vapors, HCl, acid gas, SO2 and a high efficiency particulate filter).

*OTHER:
Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure.

*STORAGE PRECAUTIONS:
You should store this material at ambient temperatures and protect it from moisture. If possible, it would be prudent to store this compound under inert atmosphere.

*SPILLS AND LEAKAGE:
If a spill of this chemical occurs, FIRST REMOVE ALL SOURCES OF IGNITION, then you should dampen the solid spill material with acetone and transfer the dampened material to a suitable container. Use absorbent paper dampened with acetone to pick up any remaining material. Seal your contaminated clothing and the absorbent paper in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with acetone followed by washing with a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT: Not available

-EMERGENCY PROCEDURES
==========

*SKIN CONTACT:
IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.
If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

*INHALATION:
IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a

hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop.

Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:

First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.

Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.

IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:

DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.

If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS:

Symptoms of exposure to this compound may include irritation of the eyes, skin, mucous membranes and upper respiratory tract, corneal opacity, focal alopecia, atrophic hands, hypertrichosis, hepatomegaly, porphyria, anorexia, weight loss, enlargement of thyroid and lymph nodes, skin photosensitization and abnormal growth of hair.

-SOURCES

*SOURCES:

[015] Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. Microfiche Ed. National Institute for Occupational Safety and Health. Cincinnati, OH. DA2975000. April 1986.

[018] Weast, R.C., M.J. Astle, and W.H. Beyer, Eds. CRC Handbook of Chemistry and Physics. 65th Ed. CRC Press, Inc. Boca Raton, FL. 1984. p. C-137, #2161.

[025] Buckingham, J., Ed. Dictionary of Organic Compounds. 5th Ed. Chapman and Hall. New York. 1982. Vol. 3, p. 2887, #H-00457.

[031] Windholz, M., Ed. The Merck Index. 10th Ed. Merck and Co. Rahway, NJ. 1983. p. 677, #4573.

[038] Stull, D.R. Vapor pressure of pure substances: Organic Compounds. Industrial and Engineering Chem. 39(4):517-550. 1947. p. 523.

[042] Sax, N.I. Dangerous Properties of Industrial Materials. 6th Ed. Van Nostrand Reinhold. New York. 1984. pp. 1505-1506.

[047] Weast, R.C. and M.J. Astle, Eds. CRC Handbook of Data on Organic Compounds. CRC Press, Inc. Boca Raton, FL. 1985. Vol. I, p. 176, #B00841.

[051] Sax, N. Irving, Ed. Dangerous Properties of Industrial Materials Report. Bi-monthly Updates. Van Nostrand Reinhold Company, Inc. New York. January/February 1984; Vol. 4, #1, pp. 88-92.

[053] Arthur D. Little, Inc. Health and Safety Package for Hexachlorobenzene.

Arthur D. Little, Inc. Cambridge, MA. February 14, 1984.

[055] Verschueren, K. Handbook of Environmental Data on Organic Chemicals. 2nd Ed. Van Nostrand Reinhold. New York. 1983. pp. 712-717.

[061] Hawley, G.G., Ed. The Condensed Chemical Dictionary. 10th Ed. Van Nostrand Reinhold. New York. 1981. p. 526.

[082] U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substance Inventory: 1985 Edition. 5 Vols. U.S. Environmental Protection Agency. Washington, D.C. January 1986. Listed.

[107] Occupational Health Services, Inc. Hazardline. Occupational Health Services, Inc. New York. Listed.

[110] Oak Ridge National Laboratory. Environmental Mutagen Information Center (EMIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed.

[120] Oak Ridge National Laboratory. Environmental Teratogen Information Center (ETIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed.

[151] Gosselin, R.E., H.C. Hodge, and R.P. Smith. Clinical Toxicology of Commercial Products. 5th Ed. Williams and Wilkins, Co. Baltimore. 1984. pp. II-170 to II-171, #397.

[165] Wiswesser, W.J., Ed. Pesticide Index. Entomological Society of America. College Park, MD. 1976. p. 128.

[168] Hartley, Douglas B.Sc., Ph.D., M.I.Inf.Sc. and Hamish Kidd B.Sc., Eds. The Agrochemicals Handbook. The Royal Society of Chemistry. Nottingham, England. 1983. Listed.

[171] Worthing, C.R., Ed. The Pesticide Manual, A World Compendium. 7th Ed. British Crop Protection Council. London, England. 1983. p. 309, #7070.

[173] Hayes, W.J., Jr. Pesticides Studied in Man. Williams and Wilkins. Baltimore. 1982. pp. 588-596.

[205] Dean, John A., Ed. Lange's Handbook of Chemistry. 13th Ed. McGraw-Hill Book Company. New York. 1985. p. 7-430, #h47.

[269] Lenga, Robert E. The Sigma-Aldrich Library of Chemical Safety Data. Edition 1. Sigma-Aldrich Corporation. Milwaukee, WI. 1985. p. 1013-C.

[274] Aldrich Chemical Company. Aldrich Catalog/Handbook of Fine Chemical. Aldrich Chemical Co., Inc. Milwaukee, WI. 1986. p. 715, #17,105-0.

[346] Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens. 2nd Ed. Noyes, Publications. Park Ridge, NJ. 1985. pp. 484-486.

[395] International Agency for Research on Cancer, World Health Organization. IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man. International Agency for Research on Cancer. Geneva. Vol. 20, pp. 155-178.

[430] Clayton, G.D. and F.E. Clayton, Eds. Patty's Industrial Hygiene and Toxicology. Vol. 2. Third Revised Edition. John Wiley and Sons. New York. 1981. Vol. IIB, pp. 3626-3645.

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to

Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Update, p. xxx.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. November 6, 1990. Listed.

NTP CHEMICAL REPOSITORY

INDENO (1,2,3-C,D) PYRENE

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 000513

*CAS NUMBER: 193-39-5

*BASE CHEMICAL NAME: INDENOPYRENE,(1,2,3-C,D)

*PRIMARY NAME: INDENO (1,2,3-C,D) PYRENE

*CHEMICAL FORMULA: C22H12

*STRUCTURAL FORMULA:

*WLN: L E6 C5666 B6 3ABC VJ

*SYNONYMS:
2,3-O-PHENYLENEPYRENE
O-PHENYLENEPYRENE
INDENO(1,2,3-C,D)PYRENE
INDENO(1,2,3-C,D) PYRENE
ORTHO-PHENYLENEPYRENE
2,3-ORTHO-PHENYLENEPYRENE

-PHYSICAL CHEMICAL DATA
==========

*PHYSICAL DESCRIPTIONS: Not available

*MOLECULAR WEIGHT: 276.34

*SPECIFIC GRAVITY: Not available

*DENSITY:Not available

*MP (DEG C): 160-163

*BP (DEG C): 536

*SOLUBILITIES:
WATER : Not available

DMSO : Not available

95% ETHANOL : Not available

METHANOL : Not available

ACETONE : Not available

TOLUENE : Not available

OTHER SOLVENTS: Not available

*VOLATILITY : Not available

*FLAMMABILITY(FLASH POINT): Not available

*UEL: Not available LEL: Not available

*REACTIVITY: Not available

*STABILITY: This compound is very stable under normal laboratory conditions.

*OTHER PHYSICAL DATA: Not available

-TOXICITY
========

*NIOSH REGISTRY NUMBER: UR2625000

*TOXICITY: (abbreviations)
Not available

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION: THR: An experimental (+) carcinogen.

*CARCINOGENICITY:
Tumorigenic Data:
TDLo: scu-mus 72 mg/kg/9W-I
Review: IARC Cancer Review: Animal Sufficient Evidence
IARC possible human carcinogen (Group 2B) [610]
Status: EPA Carcinogen Assessment Group [610]
NTP anticipated human carcinogen [610]

*MUTAGENICITY: mma-sat 3 ug/plate/48H

*TERATOGENICITY: Not available

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
OSHA: None
ACGIH: None
NIOSH Criteria Document: None
NFPA Hazard Rating: Health (H): None
Flammability (F): None
Reactivity (R): None

*OTHER TOXICITY DATA:
Review: Toxicology Review
Status: Reported in EPA TSCA Inventory, 1980
EPA TSCA 8(a) Preliminary Assessment Information Proposed Rule

-OTHER DATA (Regulatory)
========================

*PROPER SHIPPING NAME (IATA): Not available

*UN/ID NUMBER:

*HAZARD CLASS: SUBSIDIARY RISK: PACKING GROUP:

*LABELS REQUIRED:

*PACKAGING: PASSENGER: PKG. INSTR.: MAXIMUM QUANTITY:
CARGO : PKG. INSTR.: MAXIMUM QUANTITY:

*SPECIAL PROVISIONS:

*USES: Not available

*COMMENTS: Toxic. Carcinogen.

-HANDLING PROCEDURES

==========

*ACUTE/CHRONIC HAZARDS:
Toxic.

*MINIMUM PROTECTIVE CLOTHING: Not available

*RECOMMENDED GLOVE MATERIALS:
Permeation data indicate that butyl rubber gloves may provide protection to contact with this compound. Butyl rubber over latex gloves is recommended. However, if this chemical makes direct contact with your gloves, or if a tear, hole or puncture develops, remove them at once.

*RECOMMENDED RESPIRATOR:
Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with a combination filter cartridge, i.e. organic vapor/acid gas/HEPA (specific for organic vapors, HCl, acid gas, SO2 and a high efficiency particulate filter).

*OTHER:
Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure.

*STORAGE PRECAUTIONS:
You should protect this chemical from exposure to light, and store it in a freezer.

*SPILLS AND LEAKAGE:
If you spill this chemical, use absorbent paper to pick up all liquid spill material. Your contaminated clothing and absorbent paper should be sealed in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with alcohol followed by washing with a strong soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT:
You should dispose of all waste and contaminated materials associated with this chemical as specified by existing local, state and federal regulations concerning hazardous waste disposal. It is suggested that your contaminated materials should be destroyed by incineration in a special, high temperature (>2000 degrees F), chemical incinerator facility.

-EMERGENCY PROCEDURES
==========

*SKIN CONTACT:
IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.
If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

*INHALATION:
IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop.
Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA)

should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:
First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.
Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.
IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:
DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.
If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS: Not available

*FIREFIGHTING:
A fire in your laboratory involving this chemical should be extinguished with a dry chemical, carbon dioxide or halon extinguisher.

-SOURCES
=======

*SOURCES:
Occupational Safety and Health Administration. Tentative OSHA Listing of Confirmed and Suspected Carcinogens by Category. Occupational Safety and Health Administration. Washington, DC. 1979. Listed.

Aldrich Chemical Company. Aldrich Catalog/Handbook of Fine Chemical. Aldrich Chemical Co., Inc. Milwaukee, WI. 1982. Not listed.

Oak Ridge National Laboratory. Environmental Teratogen Information Center (ETIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Not listed.

Oak Ridge National Laboratory. Environmental Mutagen Information Center (EMIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Not listed.

Steere, N.V., Ed. Handbook of Laboratory Safety. 2nd Ed. CRC Press, Inc. Cleveland, OH. 1971. Not listed.

U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substances Inventory, Initial Inventory. 6 Vols. U.S. Environmental Protection Agency. Washington, D.C. 1979. Listed.

Proctor, N.H. and J.P. Hughes. Chemical Hazards of the Workplace. J.B. Lippincott. Philadelphia. 1978. Not listed.

Hawley, G.G., Ed. The Condensed Chemical Dictionary. 10th Ed. Van Nostrand Reinhold. New York. 1981. Not listed.

International Technical Information Institute. Toxic and Hazardous Industrial Chemicals Safety Manual for Handling and Disposal with Toxicity and Hazard Data. International

Technical Information Institute. 1978. Not listed.

Sax, N.I. Dangerous Properties of Industrial Materials. 5th Ed. Van Nostrand Reinhold. New York. 1979. Not listed.

Windholz, M., Ed. The Merck Index. 9th Ed. Merck and Co. Rahway, NJ. 1976. Not listed.

Weast, R.C. and M.A. Astle, Eds. CRC Handbook of Chemistry and Physics. 63rd Ed. CRC Press, Inc. Boca Raton, FL. 1982. Not listed.

Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. DHEW (NIOSH) Publication No. 79-100. National Institute for Occupational Safety and Health. Cincinnati, OH. 1979. UR2625000

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Section 3, p. 61.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. November 6, 1990. Not listed.

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties: MW, BP, SOL, Fl.P, IP, Sp, Gr, flammability	Chemical and physical properties: VP, FRZ, UEL, LEL	Incompatibilities and reactivities	Measurement method (See Table 1)
Morpholine C_4H_9ON 110-91-8 QD6475000 1760 154 (aqueous) 2054 132	Diethylene imidoxide; Diethylene oximide; Tetrahydro-1,4-oxazine; Tetrahydro-p-oxazine 1 ppm = 3.56 mg/m³	NIOSH 20 ppm (70 mg/m³) ST 30 ppm (105 mg/m³) [skin] OSHA† 20 ppm (70 mg/m³) [skin]	1400 ppm [10%LEL]	Colorless liquid with a weak, ammonia- or fish-like odor [Note: A solid below 23°F.]	MW: 87.1 BP: 264°F Sol: Miscible Fl.P(oc): 98°F IP: 8.88 eV Sp.Gr: 1.007 Class IC Flammable Liquid	VP: 6 mm FRZ: 23°F UEL: 11.2% LEL: 1.4%	Strong acids, strong oxidizers, metals, nitro compounds [Note: Corrosive to metals.]	Si gel; H_2SO_4/NaOH; GC/FID; II(3) [#S150]
Naphtha (coal tar) 8030-30-6 DE3030000 1256 128 (solvent) 2553 128	Crude solvent coal tar naphtha, High solvent naphtha, Naphtha 1 ppm = 4.50 mg/m³ (approx)	NIOSH/OSHA 100 ppm (400 mg/m³)	1000 ppm [10%LEL]	Reddish-brown, mobile liquid with an aromatic odor.	MW: 110 (approx) BP: 320-428°F Sol: Insoluble Fl.P: 100-109°F IP: ? Sp.Gr: 0.89-0.97 Class II Combustible Liquid	VP: <5 mm FRZ: ? UEL: ? LEL: 1%	Strong oxidizers	Char; CS_2; GC/FID; IV [#1550]
Naphthalene $C_{10}H_8$ 91-20-3 QJ0525000 1334 133 (crude or refined) 2304 133 (molten)	Naphthalin, Tar camphor, White tar 1 ppm = 5.24 mg/m³	NIOSH 10 ppm (50 mg/m³) ST 15 ppm (75 mg/m³) OSHA† 10 ppm (50 mg/m³)	250 ppm	Colorless to brown solid with an odor of mothballs. [Note: Shipped as a molten solid.]	MW: 128.2 BP: 424°F Sol: 0.003% Fl.P: 174°F IP: 8.12 eV Sp.Gr: 1.15 Combustible Solid, but will take some effort to ignite.	VP: 0.08 mm MLT: 176°F UEL: 5.9% LEL: 0.9%	Strong oxidizers, chromic anhydride	Char; CS_2; GC/FID; IV [#1501, Aromatic Hydrocarbons]
Naphthalene diisocyanate $C_{10}H_6(NCO)_2$ 3173-72-6 NQ9600000	1,5-Diisocyanatonaphthalene; 1,5-Naphthalene diisocyanate; 1,5-Naphthalene ester of isocyanic acid; NDI 1 ppm = 8.60 mg/m³	NIOSH 0.040 mg/m³ (0.005 ppm) C 0.170 mg/m³ (0.020 ppm) [10-min] OSHA none	N.D.	White to light-yellow, crystalline flakes.	MW: 210.2 BP: 505°F Sol: ? Fl.P(oc): 311°F IP: ? Sp.Gr: ? Combustible Solid	VP(75°F): 0.003 mm MLT: 261°F UEL: ? LEL: ?	None reported	None available

220

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards: Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet (flamm) Change: N.R. Provide: Eyewash (>15%), Quick drench (>25%) [Morpholine]	NIOSH/OSHA 500 ppm: SA:CF[§]/PAPROV* 1000 ppm: CCRFOV/GMFOV/PAPRTOV[§]/SCBAF/SAF 1400 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, skin, nose; resp sys; vis dist; cough; in animals: liver, kidney damage	Eye: Skin: Breath: Swallow:	Irr immed Water flush immed Resp support Medical attention immed	Eyes, skin, resp sys, liver, kidneys
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. [Naphtha (coal tar)]	NIOSH/OSHA 1000 ppm: SA:CF[§]/CCRFOV/GMFOV/PAPROV[§]/SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, skin, nose; li-head, drow; derm; in animals: liver, kidney damage	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Eyes, skin, resp sys, CNS, liver, kidneys
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily [Naphthalene]	NIOSH/OSHA 100 ppm: CCROVDM*/SA* 250 ppm: SA:CF*/CCRFOVHiE/PAPROVDM*/SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHiE/SCBAE	Inh Abs Ing Con	Irrit eyes; head, conf, excitement, mal; nau, vomit, abdom pain, irrit bladder; profuse sweat; jaun; hema, hemog; renal shutdown; derm; optical neuritis, corn damage	Eye: Skin: Breath: Swallow:	Irr immed Molten flush immed/sol-liq soap wash prompt Resp support Medical attention immed	Eyes, skin, blood, liver, kidneys, CNS
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily [Naphthalene diisocyanate]	NIOSH 0.05 ppm: SA* 0.125 ppm: SA:CF* 0.25 ppm: SCBAF/SAF 1 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, nose, throat; resp sens, cough, pulm secretions, chest pain, dysp; asthma	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Eyes, resp sys

221

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties: MW, BP, SOL, Fl.P, IP, Sp, Gr, flammability	Chemical and physical properties: VP, FRZ, UEL, LEL	Incompatibilities and reactivities	Measurement method (See Table 1)
Coal tar pitch volatiles 65996-93-2 GF8655000	Synonyms vary depending upon the specific compound (e.g., pyrene, phenanthrene, acridine, chrysene, anthracene & benzo(a)pyrene). [Note: NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.]	NIOSH Ca 0.1 mg/m³ (cyclohexane-extractable fraction) See Appendix A See Appendix C OSHA [1910.1002] 0.2 mg/m³ (benzene-soluble fraction) See Appendix C	Ca [80 mg/m³]	Black or dark-brown amorphous residue.	Properties vary depending upon the specific compound. Combustible Solids		Strong oxidizers	Filter; Benzene; Grav; OSHA [#58]
Cobalt metal dust & fume (as Co) Co 7440-48-4 GF8750000	Cobalt metal dust, Cobalt metal fume	NIOSH 0.05 mg/m³ OSHA† 0.1 mg/m³	20 mg/m³ (as Co)	Odorless, silver-gray to black solid.	MW: 58.9 BP: 5612°F Sol: Insoluble Fl.P: NA IP: NA Sp.Gr: 8.92 Noncombustible Solid in bulk form, but finely divided dust will burn at high temperatures.	VP: 0 mm (approx) MLT: 2719°F UEL: NA LEL: NA	Strong oxidizers, ammonium nitrate	Filter; Acid; FAAS; IV [#7027]
Cobalt carbonyl (as Co) $C_8Co_2O_8$ 10210-68-1 GG0300000	di-mu-Carbonythexa-carbonyldicobalt, Cobalt octacarbonyl, Cobalt tetracarbonyl dimer, Dicobalt carbonyl, Dicobalt octacarbonyl, Octacarbonyldicobalt	NIOSH 0.1 mg/m³ OSHA† none	N.D.	Orange to dark-brown, crystalline solid. [Note: The pure substance is white.]	MW: 341.9 BP: 126°F (Decomposes) Sol: Insoluble Fl.P: NA IP: ? Sp.Gr: 1.87 Noncombustible Solid, but flammable carbon monoxide is emitted during decomposition.	VP: 0.7 mm MLT: 124°F UEL: NA LEL: NA	Air [Note: Decomposes on exposure to air or heat; stable in atmosphere of hydrogen & carbon monoxide.]	None available
Cobalt hydrocarbonyl (as Co) $HCo(CO)_4$ 16842-03-8 GG0900000	Hydrocobalt tetracarbonyl, Tetracarbonylhydridocobalt, Tetracarbonylhydrocobalt	NIOSH 0.1 mg/m³ OSHA† none	N.D.	Gas with an offensive odor.	MW: 172.0 BP: ? Sol: 0.05% Fl.P: NA (Gas) IP: ? RGasD: 5.93 Flammable Gas	VP: >1 atm FRZ: -15°F UEL: ? LEL: ?	Air [Note: Unstable gas that decomposes rapidly in air at room temperature to cobalt carbonyl & hydrogen.]	None available

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards: Route	Symptoms (See Table 5)	First aid (See Table 6)		Target organs (See Table 5)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: N.R. Change: Daily [Coal tar pitch volatiles]	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHiE/SCBAE	Inh Con	Derm, bron, [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Resp sys, skin, bladder, kidneys [lung, kidney & skin cancer]
Skin: Prevent skin contact Eyes: N.R. Wash skin: When contam Remove: When wet or contam Change: Daily [Cobalt (dust and fume)]	NIOSH 0.25 mg/m³: DM^ 0.5 mg/m³: DMXSQ*^/DMFu*/SA* 1.25 mg/m³: SA:CF*/PAPRDM*^/PAPRDMFu* 2.5 mg/m³: HiEF/SCBAF/SAF 20 mg/m³: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE	Inh Ing Con	Cough, dysp, wheez, decr pulm func; low-wgt; derm; diffuse nodular fib; resp hypersensitivity, asthma	Eye: Skin: Breath: Swallow:	Irr immed Soap wash Resp support Medical attention immed	Skin, resp sys
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily [Cobalt carbonyl (as Co)]	TBAL	Inh Abs Ing Con	Irrit eyes, skin, muc memb; cough, decr pulm func, wheez, dysp; in animals: liver, kidney inj; pulm edema	Eye: Skin: Breath: Swallow:	Irr immed Soap wash Resp support Medical attention immed	Eyes, skin, resp sys, blood, CNS
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily [Cobalt hydrocarbonyl (as Co)]	TBAL	Inh Con	In animals: irrit resp sys; dysp, cough, decr pulm func, pulm edema	Eye: Skin: Breath:	Irr immed Soap wash Resp support	Eyes, skin, resp sys

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL Fl.P, IP, Sp, Gr, flammability	VP, FRZ UEL, LEL		
Coal tar pitch volatiles 65996-93-2 GF8655000	Synonyms vary depending upon the specific compound (e.g., pyrene, phenanthrene, acridine, chrysene, anthracene & benzo(a)pyrene). [Note: NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.]	NIOSH Ca 0.1 mg/m³ (cyclohexane-extractable fraction) See Appendix A See Appendix C OSHA [1910.1002] 0.2 mg/m³ (benzene-soluble fraction) See Appendix C	Ca [80 mg/m³]	Black or dark-brown amorphous residue.	Properties vary depending upon the specific compound. Combustible Solids		Strong oxidizers	Filter; Benzene; Grav; OSHA [#58]
Cobalt metal dust & fume (as Co) Co 7440-48-4 GF8750000	Cobalt metal dust, Cobalt metal fume	NIOSH 0.05 mg/m³ OSHA† 0.1 mg/m³	20 mg/m³ (as Co)	Odorless, silver-gray to black solid.	MW: 58.9 BP: 5612°F Sol: Insoluble Fl.P: NA IP: NA Sp.Gr: 8.92 Noncombustible Solid in bulk form, but finely divided dust will burn at high temperatures.	VP: 0 mm (approx) MLT: 2719°F UEL: NA LEL: NA	Strong oxidizers, ammonium nitrate	Filter; Acid; FAAS; IV [#7027]
Cobalt carbonyl (as Co) $C_8Co_2O_8$ 10210-68-1 GG0300000	di-mu-Carbonylhexa-carbonyldicobalt, Cobalt octacarbonyl, Cobalt tetracarbonyl dimer, Dicobalt carbonyl, Dicobalt octacarbonyl, Octacarbonyldicobalt	NIOSH 0.1 mg/m³ OSHA† none	N.D.	Orange to dark-brown, crystalline solid. [Note: The pure substance is white.]	MW: 341.9 BP: 126°F (Decomposes) Sol: Insoluble Fl.P: NA IP: ? Sp.Gr: 1.87 Noncombustible Solid, but flammable carbon monoxide is emitted during decomposition.	VP: 0.7 mm MLT: 124°F UEL: NA LEL: NA	Air [Note: Decomposes on exposure to air or heat; stable in atmosphere of hydrogen & carbon monoxide.]	None available
Cobalt hydrocarbonyl (as Co) $HCo(CO)_4$ 16842-03-8 GG0900000	Hydrocobalt tetracarbonyl, Tetracarbonylhydridocobalt, Tetracarbonylhydrocobalt	NIOSH 0.1 mg/m³ OSHA† none	N.D.	Gas with an offensive odor.	MW: 172.0 BP: ? Sol: 0.05% Fl.P: NA (Gas) IP: ? RGasD: 5.93 Flammable Gas	VP: >1 atm FRZ: -15°F UEL: ? LEL: ?	Air [Note: Unstable gas that decomposes rapidly in air at room temperature to cobalt carbonyl & hydrogen.]	None available

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
		Route	Symptoms (See Table 5)	First aid (See Table 6)		Target organs (See Table 5)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: N.R. Change: Daily [Coal tar pitch volatiles]	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHiE/SCBAE	Inh Con	Derm, bron, [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Resp sys, skin, bladder, kidneys [lung, kidney & skin cancer]
Skin: Prevent skin contact Eyes: N.R. Wash skin: When contam Remove: When wet or contam Change: Daily [Cobalt (dust and fume)]	NIOSH 0.25 mg/m³: DM^ 0.5 mg/m³: DMXSQ*^/DMFu*/SA* 1.25 mg/m³: SA:CF*/PAPRDM*^/PAPRDMFu* 2.5 mg/m³: HiEF/SCBAF/SAF 20 mg/m³: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE	Inh Ing Con	Cough, dysp, wheez, decr pulm func; low-wgt; derm; diffuse nodular fib; resp hypersensitivity, asthma	Eye: Skin: Breath: Swallow:	Irr immed Soap wash Resp support Medical attention immed	Skin, resp sys
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily [Cobalt carbonyl (as Co)]	TBAL	Inh Abs Ing Con	Irrit eyes, skin, muc memb, cough, decr pulm func, wheez, dysp; in animals: liver, kidney inj; pulm edema	Eye: Skin: Breath: Swallow:	Irr immed Soap wash Resp support Medical attention immed	Eyes, skin, resp sys, blood, CNS
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily [Cobalt hydrocarbonyl (as Co)]	TBAL	Inh Con	In animals: irrit resp sys; dysp, cough, decr pulm func, pulm edema	Eye: Skin: Breath:	Irr immed Soap wash Resp support	Eyes, skin, resp sys

NTP CHEMICAL REPOSITORY
PCB-1016

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 000558

*CAS NUMBER: 12674-11-2

*BASE CHEMICAL NAME: PCB-1016

*PRIMARY NAME: PCB-1016

*CHEMICAL FORMULA: Not available

*STRUCTURAL FORMULA:

*WLN: Not available

*SYNONYMS:
AROCHLOR 1016
AROCLOR 1016
POLYCHLORINATED BIPHENYL 1016
PCB 1016

-PHYSICAL CHEMICAL DATA
==========

*PHYSICAL DESCRIPTIONS: LITERATURE: Viscous oily liquid
REPOSITORY:

*MOLECULAR WEIGHT: Not available

*SPECIFIC GRAVITY: 1.4

*DENSITY: Not available

*MP (DEG C): Not available

*BP (DEG C): 385-420

*SOLUBILITIES:
WATER : Not available

DMSO : Not available

95% ETHANOL : Not available

METHANOL : Not available

ACETONE : Not available

TOLUENE : Not available

OTHER SOLVENTS: Not available

*VOLATILITY : LOW

*FLAMMABILITY(FLASH POINT):
286 F degrees: fires involving this chemical should be extinguished with water, foam, carbon dioxide and/or dry chemical.

*UEL: Not available LEL: Not available

*REACTIVITY: Not available

*STABILITY: This compound is very stable under normal laboratory conditions.

*OTHER PHYSICAL DATA: Not available

-TOXICITY
========

*NIOSH REGISTRY NUMBER: Not available

*TOXICITY: (abbreviations)
Not available

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION: THR: Skin effect and toxic to liver; the more chlori

*CARCINOGENICITY:
Review: IARC Cancer Review: Human Limited Evidence [610]
IARC Cancer Review: Animal Sufficient Evidence [610]
IARC probable human carcinogen (Group 2A) [610]
Status: EPA Carcinogen Assessment Group [610]
NTP anticipated human carcinogen [610]

*MUTAGENICITY: Not available

*TERATOGENICITY: Not available

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
OSHA: None
ACGIH: None
NIOSH Criteria Document: Recommended Exposure Limit to this compound-air:
TWA 0.001 mg/m3 [610]
NFPA Hazard Rating: Health (H): None
Flammability (F): None
Reactivity (R): None

*OTHER TOXICITY DATA: Not available

-OTHER DATA (Regulatory)
========================

*PROPER SHIPPING NAME (IATA): Polychlorinated biphenyls

*UN/ID NUMBER: UN2315

*HAZARD CLASS: 9 SUBSIDIARY RISK: None PACKING GROUP: II

*LABELS REQUIRED: Miscellaneous

*PACKAGING: PASSENGER: PKG. INSTR.: 907 MAXIMUM QUANTITY: 100 L
CARGO : PKG. INSTR.: 907 MAXIMUM QUANTITY: 220 L

*SPECIAL PROVISIONS: None

*USES: Not available

*COMMENTS:
Because of their persistance and ecological damage from water pollution their manufacture was discomtinued in the U.S.A. in 1976.

-HANDLING PROCEDURES
==========

*ACUTE/CHRONIC HAZARDS:
Toxic irritant. Hazardous decomposition products.

*MINIMUM PROTECTIVE CLOTHING:
If Tyvek-type disposable protective clothing is not worn during handling of this chemical, wear disposable Tyvek-type sleeves taped to your gloves.

*RECOMMENDED GLOVE MATERIALS: Glove.4

*RECOMMENDED RESPIRATOR:
Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with a combination filter cartridge, i.e. organic vapor/acid gas/HEPA (specific for organic vapors, HCl, acid gas, SO2 and a high efficiency particulate filter).

*OTHER:
Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure.

*STORAGE PRECAUTIONS:
You should protect this chemical from exposure to light, and store it in a freezer.

*SPILLS AND LEAKAGE:
If you spill this chemical, use absorbent paper to pick up all liquid spill material. Your contaminated clothing and absorbent paper should be sealed in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with alcohol followed by washing with a strong soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT:
You should dispose of all waste and contaminated materials associated with this chemical as specified by existing local, state and federal regulations concerning hazardous waste disposal. It is suggested that your contaminated materials should be destroyed by incineration in a special, high temperature (>2000 degrees F), chemical incinerator facility.

-EMERGENCY PROCEDURES
==========

*SKIN CONTACT:
IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.
IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop.
IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas.

*INHALATION:
IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath,

or burning in the mouth, throat, or chest) develop.
Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:
First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.
Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.
IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:
DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.
If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS: Not available

*FIREFIGHTING:
To extinguish a fire involving this chemical you may use a dry chemical, carbon dioxide, foam or halon extinguisher; a water spray may also be used.

-SOURCES
=======

*SOURCES:
Occupational Safety and Health Administration. Tentative OSHA Listing of Confirmed and Suspected Carcinogens by Category. Occupational Safety and Health Administration. Washington, DC. 1979. Listed

Aldrich Chemical Company. Aldrich Catalog/Handbook of Fine Chemicals. Aldrich Chemical Co., Inc. Milwaukee, WI. 1980. Not listed

Oak Ridge National Laboratory. Environmental Teratogen Information Center (ETIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed

Oak Ridge National Laboratory. Environmental Mutagen Information Center (EMIC), Bibliographic Data Base. Oak Ridge National Laboratory. Oak Ridge, TN. Listed

Steere, N.V., Ed. Handbook of Laboratory Safety. 2nd Ed. CRC Press, Inc. Cleveland, OH. 1971. Not listed

U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substances Inventory, Initial Inventory. 6 Vols. U.S. Environmental Protection Agency. Washington, D.C. 1979. Not listed

Proctor, N.H. and J.P. Hughes. Chemical Hazards of the Workplace. J.B. Lippincott. Philadelphia. 1978. Not listed

Hawley, G.G., Ed. The Condensed Chemical Dictionary. 10th Ed. Van Nostrand Reinhold. New York. 1981. p. 829

International Technical Information Institute. Toxic and Hazardous Industrial Chemicals Safety Manual for Handling and Disposal with Toxicity and Hazard Data. International Technical Information Institute. 1978. Not listed

Sax, N.I. Dangerous Properties of Industrial Materials. 5th Ed. Van Nostrand Reinhold. New York. 1979. Not listed

Windholz, M., Ed. The Merck Index. 9th Ed. Merck and Co. Rahway, NJ. 1976. Not listed

Weast, R.C. and M.A. Astle, Eds. CRC Handbook of Chemistry and Physics. 60th Ed. CRC Press, Inc. Boca Raton, FL. 1982. Not listed

Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. DHEW (NIOSH) Publication No. 79-100. National Institute for Occupational Safety and Health. Cincinnati, OH. 1979. Not listed

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Section 3, pp. 91, 135.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. November 6, 1990. Not listed.

NTP CHEMICAL REPOSITORY
PCB-1260

-IDENTIFIERS
==========

*CATALOG ID NUMBER: 000526

*CAS NUMBER: 11096-82-5

*BASE CHEMICAL NAME: PCB-1260

*PRIMARY NAME: PCB-1260

*CHEMICAL FORMULA:

*STRUCTURAL FORMULA:

*WLN: Not available

*SYNONYMS:
AROCLOR 1260
CHLORODIPHENYL (60 PERCENT CL)
AROCHLOR 1260
POLYCHLORINATED BIPHENYL 1260
PCB 1260

-PHYSICAL CHEMICAL DATA
==========

*PHYSICAL DESCRIPTIONS: Viscous oily liquid.

*MOLECULAR WEIGHT: Not available

*SPECIFIC GRAVITY: 1.4

*DENSITY:Not available

*MP (DEG C): Not available

*BP (DEG C): 385-420

*SOLUBILITIES:
WATER : Not available
DMSO : Not available
95% ETHANOL : Not available
METHANOL : Not available
ACETONE : Not available
TOLUENE : Not available

OTHER SOLVENTS: Not available

*VOLATILITY : Not available

*FLAMMABILITY(FLASH POINT):
286 F degrees: fires involving this chemical should be extinguished with water, foam, carbon dioxide and/or dry chemical.

*UEL: Not available LEL: Not available

*REACTIVITY: Not available

*STABILITY: This compound is very stable under normal laboratory conditions.

*OTHER PHYSICAL DATA: Not available

-TOXICITY
========

*NIOSH REGISTRY NUMBER: TQ1362000

*TOXICITY: (abbreviations)

typ. dose	mode	specie	amount	unit	other
LD50	orl	rat	1315	mg/kg	
LDLo	skn	rbt	2000	mg/kg	

*AQTX/TLM96: Not available

*SAX TOXICITY EVALUATION: THR: Moderate via oral and dermal routes.

*CARCINOGENICITY:
Tumorigenic Data:
TDLo: TDLo: orl-rat 4380 mg/kg/83W-C
Review: IARC Cancer Review: Human Limited Evidence
IARC Cancer Review: Animal Sufficient Evidence
IARC probable human carcinogen (Group 2A) [610]
Status: EPA Carcinogen Assessment Group [610]
NTP anticipated human carcinogen [610]

*MUTAGENICITY: cyt-rat-orl 1080 mg/kg/26W-C

*TERATOGENICITY:
orl-rat TDLo:1675 mg/kg (MGN)
orl-mus TDLo:74 mg/kg (62D pre/1-10D preg)
scu-mus TDLo:143 mg/kg (21D post)

*STANDARDS, REGULATIONS & RECOMMENDATIONS:
OSHA: None
ACGIH: None
NIOSH Criteria Document: Recommended Exposure Limit to this compound-air:
TWA 0.001 mg/m3 [610]
NFPA Hazard Rating: Health (H): None
Flammability (F): None
Reactivity (R): None

*OTHER TOXICITY DATA:
Review: Toxicology Review-4

-OTHER DATA (Regulatory)
========================

*PROPER SHIPPING NAME (IATA): Polychlorinated biphenyls

*UN/ID NUMBER: UN2315

*HAZARD CLASS: 9 SUBSIDIARY RISK: None PACKING GROUP: II

*LABELS REQUIRED: Miscellaneous

*PACKAGING: PASSENGER: PKG. INSTR.: 907 MAXIMUM QUANTITY: 100 L
CARGO : PKG. INSTR.: 907 MAXIMUM QUANTITY: 220 L

*SPECIAL PROVISIONS: None

*USES: Not available

*COMMENTS: Not available

-HANDLING PROCEDURES
==========

*ACUTE/CHRONIC HAZARDS:
Toxic irritant. Hazardous decomposition products.

*MINIMUM PROTECTIVE CLOTHING:
If Tyvek-type disposable protective clothing is not worn during handling of this chemical, wear disposable Tyvek-type sleeves taped to your gloves.

*RECOMMENDED GLOVE MATERIALS:
Permeation data indicate that Viton gloves may provide protection to contact with this compound. Viton over latex gloves is recommended. However, if this chemical makes direct contact with your gloves, or if a tear, hole or puncture develops, remove them at once.

*RECOMMENDED RESPIRATOR:
Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with a combination filter cartridge, i.e. organic vapor/acid gas/HEPA (specific for organic vapors, HCl, acid gas, SO2 and a high efficiency particulate filter).

*OTHER:
Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure.

*STORAGE PRECAUTIONS:
You should protect this material from exposure to light, and store it in a refrigerator.

*SPILLS AND LEAKAGE:
If you should spill this chemical, use absorbent paper to pick up all liquid spill material. Your contaminated clothing and absorbent paper should be sealed in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with acetone followed by washing with a strong soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.

*DISPOSAL AND WASTE TREATMENT:
You should dispose of all waste and contaminated materials associated with this chemical as specified by existing local, state and federal regulations concerning hazardous waste disposal. It is suggested that your contaminated materials should be destroyed by incineration in a special, high temperature (>2000 degrees F), chemical incinerator facility.

-EMERGENCY PROCEDURES
==========

*SKIN CONTACT:
IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water.

IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop.

IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas.

*INHALATION:

IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop.

Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Respirator Recommendation.

*EYE CONTACT:

First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center.

Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician.

IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

*INGESTION:

DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician.

If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.

*SYMPTOMS: Not available

*FIREFIGHTING:

This compound is not very flammable but any fire involving this compound may produce dangerous vapors. You should evacuate the area. All firefighters should wear full-body protective clothing and use self-contained breathing apparatuses.

You should extinguish any fires involving this chemical with a dry chemical, carbon dioxide, foam, or halon extinguisher.

-SOURCES
=======

*SOURCES:

Lewis, R.J., Sr. and R.L. Tatken, Eds. Registry of Toxic Effects of Chemical Substances. DHEW (NIOSH) Publication No. 79-100. National Institute for Occupational Safety and Health. Cincinnati, OH. 1979. TQ1362000.

Sax, N.I. Dangerous Properties of Industrial Materials. 5th Ed. Van Nostrand Reinhold. New York. 1979. PG. 537.

Proctor, N.H. and J.P. Hughes. Chemical Hazards of the Workplace. J.B. Lippincott. Philadelphia. 1978.

Aldrich Chemical Company. Aldrich Catalog/Handbook of Fine Chemicals. Aldrich Chemical Co., Inc. Milwaukee, WI. 1980. NOT LISTED.

Hawley, G.G., Ed. The Condensed Chemical Dictionary. 9th Ed. Van Nostrand Reinhold. New York. 1977.

International Technical Information Institute. Toxic and Hazardous Industrial Chemicals Safety Manual for Handling and Disposal with Toxicity and Hazard Data. International Technical Information Institute. 1978. NOT LISTED.

U.S. Environmental Protection Agency, Office of Toxic Substances. Toxic Substances Control Act Chemical Substances Inventory, Initial Inventory. 6 Vols. U.S. Environmental Protection Agency. Washington, D.C. 1979.

Windholz, M., Ed. The Merck Index. 9th Ed. Merck and Co. Rahway, NJ. 1976. NOT LISTED.

Weast, R.C. and M.A. Astle, Eds. CRC Handbook of Chemistry and Physics. 56th Ed. CRC Press, Inc. Boca Raton, FL. 1976. NOT LISTED.

Steere, N.V., Ed. Handbook of Laboratory Safety. 2nd Ed. CRC Press, Inc. Cleveland, OH. 1971.

[610] Clansky, Kenneth B., Ed. Suspect Chemicals Sourcebook: A Guide to Industrial Chemicals Covered Under Major Federal Regulatory and Advisory Programs. Roytech Publications, Inc. Burlingame, CA. 1990. Section 3, pp. 91, 133.

[620] United States National Toxicology Program. Chemical Status Report. NTP Chemtrack System. Research Triangle Park, NC. November 6, 1990. Not listed.

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties		Incompatibilities and reactivities	Measurement method (See Table 1)
					MW, BP, SOL Fl.P, IP, Sp, Gr, flammability	VP, FRZ UEL, LEL		
ANTU $C_{10}H_7NHC(NH_2)S$ 86-88-4 YT9275000 1651 153	α-Naphthyl thiocarbamide, 1-Naphthyl thiourea, α-Naphthyl thiourea	NIOSH/OSHA 0.3 mg/m³	100 mg/m³	White crystalline or gray, odorless powder. [rodenticide]	MW: 202.3 BP: Decomposes Sol: 0.06% Fl.P: NA IP: ? Sp.Gr: ? Noncombustible Solid	VP: Low MLT: 388°F UEL: NA LEL: NA	Strong oxidizers, silver nitrate	Filter; Methanol; HPLC/UVD; II(5) [#S276]
Arsenic (inorganic compounds, as As) As (Metal) 7440-38-2 (Metal) CG0525000 (Metal) 1558 152 (metal) 1562 152 (dust)	Arsenic metal: Arsenia Other synonyms vary depending upon the specific As compound. [Note: OSHA considers "Inorganic Arsenic" to mean copper acetoarsenite & all inorganic compounds containing arsenic except Arsine.]	NIOSH Ca C 0.002 mg/m³ [15-min] See Appendix A OSHA [1910.1018] 0.010 mg/m³	Ca [5 mg/m³ (as As)]	Metal: Silver-gray or tin-white, brittle, odorless solid.	MW: 74.9 BP: Sublimes Sol: Insoluble Fl.P: NA IP: NA Sp.Gr: 5.73 (Metal) Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of dust when exposed to flame.	VP: 0 mm (approx) MLT: 1135°F (Sublimes) UEL: NA LEL: NA	Strong oxidizers, bromine azide [Note: Hydrogen gas can react with inorganic arsenic to form the highly toxic gas arsine.]	Filter; Acid; HYAAS; IV [#7900] [Also #7300, Elements]
Arsenic (organic compounds, as As)	Synonyms vary depending upon the specific organic arsenic compound.	NIOSH none OSHA 0.5 mg/m³	N.D.	Appearance and odor vary depending upon the specific organic arsenic compound.	Properties vary depending upon the specific organic arsenic compound.		Varies	Filter; Reagent; IC/HYAAS; IV [#5022, Arsenic, Organo-]

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)		Target organs (See Table 5)
Skin: N.R. Eyes: N.R. Wash skin: N.R. Remove: N.R. Change: Daily [ANTU]		NIOSH/OSHA 3 mg/m³: CCROVDMFu/SA 7.5 mg/m³: SA:CF/PAPROVDMFu 15 mg/m³: CCRFOVHiE/GMFOVHiE/PAPRTOVHiE/SAT:CF/SCBAF/SAF 100 mg/m³: SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHiE/SCBAE	Inh Ing	After ingestion of large doses: vomit, dysp, cyan, coarse pulm rales; liver damage	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Resp sys, blood, liver
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam/Daily Remove: When wet or contam Change: Daily Provide: Eyewash, Quick drench		NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFAGHiE/SCBAE	Inh Abs Con Ing	Ulceration of nasal septum, derm, GI disturbances, peri neur, resp irrit, hyperpig of skin, [carc]	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Liver, kidneys, skin, lungs, lymphatic sys [lung & lymphatic cancer]
[Arsenic (inorganic compounds, as As)]							
Recommendations vary depending upon the specific compound.		TBAL	Inh Ing Con	In animals: irrit skin, possible derm; resp distress; diarr; kidney damage; musc tremor, sez; possible GI tract, terato, repro effects; possible liver damage	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Skin, resp sys, kidneys, CNS, liver, GI tract, repro sys
[Arsenic (organic compounds, as As]							

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties: MW, BP, SOL Fl.P, IP, Sp, Gr, flammability	Chemical and physical properties: VP, FRZ UEL, LEL	Incompatibilities and reactivities	Measurement method (See Table 1)
Benzyl chloride $C_6H_5CH_2Cl$ 100-44-7 XS8925000 1738 156	Chloromethylbenzene, α-Chlorotoluene 1 ppm = 5.18 mg/m³	NIOSH C 1 ppm (5 mg/m³) [15-min] OSHA 1 ppm (5 mg/m³)	10 ppm	Colorless to slightly yellow liquid with a pungent, aromatic odor.	MW: 126.6 BP: 354°F Sol: 0.05% Fl.P: 153°F IP: ? Sp.Gr: 1.10 Class IIIA Combustible Liquid	VP: 1 mm FRZ: -38°F UEL: ? LEL: 1.1%	Oxidizers, acids, copper, aluminum, magnesium, iron, zinc, tin [Note: Can polymerize when in contact with all common metals except nickel & lead. Hydrolyzes in H_2O to benzyl alcohol.]	Char; CS_2; GC/FID; IV [#1003; Halogenated Hydrocarbons]
Beryllium & beryllium compounds (as Be) Be (Metal) 7440-41-7 (Metal) DS1750000 (Metal) 1566 154 (compounds) 1567 134 (powder)	Beryllium metal: Beryllium Other synonyms vary depending upon the specific beryllium compound.	NIOSH Ca Not to exceed 0.0005 mg/m³ See Appendix A OSHA 0.002 mg/m³ C 0.005 mg/m³ 0.025 mg/m³ [30-min maximum peak]	Ca [4 mg/m³ (as Be)]	Metal: A hard, brittle, gray-white solid.	MW: 9.0 BP: 4532°F Sol: Insoluble Fl.P: NA IP: NA Sp.Gr: 1.85 (Metal) Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of a powder or dust.	VP: 0 mm (approx) MLT: 2349°F UEL: NA LEL: NA	Acids, caustics, chlorinated hydrocarbons, oxidizers, molten lithium	Filter; Acid; GFAAS; IV [#7102] [Also #7300, Elements]
Bismuth telluride, doped with Selenium sulfide (as Bi_2Te_3)	Doped bismuth sesquitelluride, Doped bismuth telluride, Doped bismuth tritelluride, Doped tellurobismuthite [Note: Doped with selenium sulfide. Commercial mix may contain 80% Bi_2Te_3, 20% stannous telluride, plus some tellurium.]	NIOSH 5 mg/m³ OSHA† none	N.D.	Gray, crystalline solid that has been enhanced (doped) with a small amount of selenium sulfide (SeS). [Note: Doping alters the conductivity of a semiconductor.]	Properties are unavailable but should be similar to Bismuth telluride, undoped. Sp.Gr: ? Noncombustible Solid		Strong oxidizers, moisture	Filter; none; Grav; IV [#0500, Particulates NOR (total)]

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards: Route	Symptoms (See Table 5)	First aid (See Table 6)		Target organs (See Table 5)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. Provide: Eyewash, Quick drench	NIOSH/OSHA 10 ppm: CCROVAG*/GMFOVAG/PAPROVAG*/SA*/SCBAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVAG/SCBAE	Inh Ing Con	Irrit eyes, skin, nose; weak; irrity; head; skin eruption; pulm edema	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Eyes, skin, resp sys, CNS
[Benzyl chloride]						
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contam Change: Daily Provide: Eyewash	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE	Inh Con	Beryllosis (chronic exposure): anor, low-wgt, weak, chest pain, cough, clubbing of fingers, cyan, pulm insufficiency; irrit eyes; derm; [carc]	Eye: Breath:	Irr immed Fresh air	Eyes, skin, resp sys [lung cancer]
[Beryllium & beryllium compounds (as Be)]						
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. Provide: Eyewash, Quick drench	TBAL	Inh Con	Irrit eyes, skin, upper resp sys; garlic breath; in animals: pulm lesions (nonfibrotic)	Eye: Skin: Breath: Swallow:	Irr immed Soap wash immed Resp support Medical attention immed	Eyes, skin, resp sys
[Bismuth telluride, doped with Selenium sulfide (as Bi_2Te_3)]						

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties: MW, BP, SOL Fl.P, IP, Sp, Gr, flammability	Chemical and physical properties: VP, FRZ UEL, LEL	Incompatibilities and reactivities	Measurement method (See Table 1)
p-tert-Butyltoluene $(CH_3)_3CC_6H_4CH_3$ 98-51-1 XS8400000 2667 131	4-tert-Butyltoluene, 1-Methyl-4-tert-butylbenzene 1 ppm = 6.07 mg/m³	NIOSH 10 ppm (60 mg/m³) ST 20 ppm (120 mg/m³) OSHA† 10 ppm (60 mg/m³)	100 ppm	Colorless liquid with a distinct aromatic odor, somewhat like gasoline.	MW: 148.3 BP: 379°F Sol: Insoluble Fl.P: 155°F IP: 8.28 eV Sp.Gr: 0.86 Class IIIA Combustible Liquid	VP(77°F): 0.7 mm FRZ: -62°F UEL: ? LEL: ?	Oxidizers	Char; CS₂; GC/FID; IV [#1501, Aromatic Hydro-carbons]
n-Butyronitrile $CH_3CH_2CH_2CN$ 109-74-0 ET8750000 2411 131	Butanenitrile, Butyronitrile, 1-Cyanopropane, Propyl cyanide, n-Propyl cyanide 1 ppm = 2.83 mg/m³	NIOSH 8 ppm (22 mg/m³) OSHA none	N.D.	Colorless liquid with a sharp, suffocating odor. [Note: Forms cyanide in the body.]	MW: 69.1 BP: 244°F Sol(77°F): 3% Fl.P: 62°F IP: 11.67 eV Sp.Gr: 0.81 Class IB Flammable Liquid	VP: 14 mm FRZ: -170°F UEL: ? LEL: 1.65%	Strong oxidizers & reducing agents, strong acids & bases	Char; Benzene; GC/FID; IV [Adapt #1606]
Cadmium dust (as Cd) Cd (Metal) 7440-43-9 (Metal) EU9800000 (Metal) 2570 154 (compounds)	Cadmium metal: Cadmium Other synonyms vary depending upon the specific cadmium compound.	NIOSH* Ca See Appendix A OSHA*[1910.1027] 0.005 mg/m³ [*Note: The REL and PEL apply to all Cadmium compounds (as Cd).]	Ca [9 mg/m³ (as Cd)]	Metal: Silver-white, blue-tinged, lustrous, odorless solid.	MW: 112.4 BP: 1409°F Sol: Insoluble Fl.P: NA IP: NA Sp.Gr: 8.65 (Metal) Metal: Noncombustible Solid in bulk form, but will burn in powder form.	VP: 0 mm (approx) MLT: 610°F UEL: NA LEL: NA	Strong oxidizers; elemental sulfur, selenium & tellurium	Filter; Acid; FAAS; IV [#7048]
Cadmium fume (as Cd) CdO/Cd 1306-19-0 (CdO) EV1930000 (CdO)	CdO: Cadmium monoxide, Cadmium oxide fume Cd: Cadmium	NIOSH* Ca See Appendix A OSHA*[1910.1027] 0.005 mg/m³ [*Note: The REL and PEL apply to all Cadmium compounds (as Cd).]	Ca [9 mg/m³ (as Cd)]	Odorless, yellow-brown, finely divided particulate dispersed in air.	MW: 128.4 BP: Decomposes Sol: Insoluble Fl.P: NA IP: NA Sp.Gr: 8.15 (crystalline form)/6.95 (amorphous form) Noncombustible Solid	VP: 0 mm (approx) MLT: 2599°F UEL: NA LEL: NA	Not applicable	Filter; Acid; FAAS; IV [#7048]

44

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards: Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. [p-tert-Butyltoluene]	NIOSH/OSHA 100 ppm: SA:CF[£]/PAPROV[¢]/CCRFOV/GMFOV/SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, skin; dry nose, throat; head; low BP, tacar, abnor CVS stress; CNS, hemato depres; metallic taste; liver, kidney inj	Eye: Irr immed Skin: Water flush prompt Breath: Resp support Swallow: Medical attention immed	Eyes, skin, resp sys, CVS, CNS, bone marrow, liver, kidneys
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet (flamm) Change: N.R. Provide: Quick drench [n-Butryonitrile]	NIOSH 80 ppm: CCROV/SA 200 ppm: SA:CF/PAPROV 400 ppm: CCRFOV/GMFOV/PAPRTOV/SCBAF/SAF 1000 ppm: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, skin, resp sys; head, dizz, weak, gidd, conf, convuls; dysp; abdom pain, nau, vomit	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Eyes, skin, resp sys, CNS, CVS
Skin: N.R. Eyes: N.R. Wash skin: Daily Remove: N.R. Change: Daily [Cadmium dust (as Cd)]	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE	Inh Ing	Pulm edema, dysp, cough, chest tight, subs pain; head; chills, musc aches; nau, vomit, diarr; anos, emphy, prot, mild anemia; [carc]	Eye: Skin: Irr immed Breath: Soap wash Swallow: Resp support Medical attention immed	Resp sys, kidneys, prostate, blood [prostatic & lung cancer]
Skin: N.R. Eyes: N.R. Wash skin: Daily Remove: N.R. Change: Daily [Cadmium fume (as Cd)]	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE	Inh	Pulm edema, dysp, cough, tight chest, subs pain; head; chills, musc aches; nau, vomit, diarr; emphy, prot, anos, mild anemia; [carc]	Breath: Resp support	Resp sys, kidneys, blood [prostatic & lung cancer]

45

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties MW, BP, SOL Fl.P, IP, Sp, Gr, flammability	 VP, FRZ UEL, LEL	Incompatibilities and reactivities	Measurement method (See Table 1)
Kepone $C_{10}Cl_{10}O$ 143-50-0 PC8575000	Chlordecone; Decachlorooctahydro-kepone-2-one; Decachlorooctahydro-1,3,4-metheno-2H-cyclobuta(cd)-pentalen-2-one; Decachlorotetrahydro-4,7-methanoindeneone;	NIOSH Ca See Appendix A 0.001 mg/m³ OSHA none	Ca [N.D.]	Tan to white, crystalline, odorless solid. [insecticide]	MW: 490.6 BP: Sublimes Sol(212°F): 0.5% Fl.P: NA IP: ? Sp.Gr: ? Noncombustible Solid	VP(77°F): <3 x 10^{-7} mm MLT: 662°F (Sublimes) UEL: NA LEL: NA	Acids, acid fumes	Filter/Imp; Benzene/Methanol; GC/ECD; IV [#5508]
Kerosene 8008-20-6 OA5500000 1223 128	Fuel Oil No. 1, Range oil [Note: A refined petroleum solvent (predominantly C_9-C_{16}), which typically is 25% normal paraffins, 11% branched paraffins, 30% monocycloparaffins, 12% dicycloparaffins, 1% tricycloparaffins, 16% mononuclear aromatics & 5% dinuclear aromatics.]	NIOSH 100 mg/m³ OSHA none	N.D.	Colorless to yellowish, oily liquid with a strong, characteristic odor.	MW: 170(approx) BP: 347-617°F Sol: Insoluble Fl.P: 100-162°F IP: ? Sp.Gr: 0.81 Class II Combustible Liquid	VP(100°F): 5 mm FRZ: -50°F UEL: 5% LEL: 0.7%	Strong oxidizers	Char; CS₂; GC/FID; IV [#1550, Naphthas]
Ketene $CH_2=CO$ 463-51-4 OA7700000 1 ppm = 1.72 mg/m³	Carbomethene, Ethenone, Keto-ethylene	NIOSH 0.5 ppm (0.9 mg/m³) ST 1.5 ppm (3 mg/m³) OSHA† 0.5 ppm (0.9 mg/m³)	5 ppm	Colorless gas with a penetrating odor.	MW: 42.0 BP: -69°F Sol: Reacts Fl.P: NA (Gas) IP: 9.61 eV RGasD: 1.45 Flammable Gas.	VP: >1 atm FRZ: -238°F UEL: ? LEL: ?	Water, alcohols, ammonia [Note: Readily polymerizes. Reacts with water to form acetic acid.]	Bub; $FeCl_3$; Vis; II(2) [#S92]
Lead Pb 7439-92-1 OF7525000	Lead metal, Plumbum	NIOSH* 0.100 mg/m³ See Appendix C OSHA* [1910.1025] 0.050 mg/m³ See Appendix C [*Note: The REL and PEL also apply to other lead compounds (as Pb) -- See Appendix C.]	100 mg/m³ (as Pb)	A heavy, ductile, soft, gray solid.	MW: 207.2 BP: 3164°F Sol: Insoluble Fl.P: NA IP: NA Sp.Gr: 11.34 Noncombustible Solid in bulk form.	VP: 0 mm (approx) MLT: 621°F UEL: NA LEL: NA	Strong oxidizers, hydrogen peroxide, acids	Filter; HNO_3/H_2O_2; AAS; III [#7082] [Also #7105.]

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam/Daily Remove: When wet or contam Change: Daily Provide: Eyewash, Quick drench [Kepone]	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHiE/SCBAE	Inh Abs Ing Con	Head, ner; tremor; liver, kidney damage; vis dist; ataxia; chest pain, skin eryt; testicular atrophy, low sperm count; [carc]	Eye: Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	Eyes, skin, resp sys, CNS, liver, kidneys, repro sys [in animals: liver cancer]
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. Provide: Quick drench [Kerosene]	NIOSH 1000 mg/m³: CCROV/SA 2500 mg/m³: SA:CF/PAPROV 5000 mg/m³: CCRFOV/GMFOV/PAPRTOV/SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, skin, nose, throat; burning sensation in chest; head, nau, weak, restless, inco, conf, drow; vomit, diarr; derm; chemical pneu (aspir liq)	Eye: Skin: Breath: Resp support Swallow: Medical attention immed	Eyes, skin, resp sys, CNS
Skin: N.R. Eyes: N.R. Wash skin: N.R. Remove: N.R. Change: N.R. [Ketene]	NIOSH/OSHA 5 ppm: SA*/SCBAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Con	Irrit eyes, skin, nose, throat, resp sys; pulm edema	Breath: Resp support	Eyes, skin, resp sys
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contam Change: Daily [Lead]	OSHA 0.5 mg/m³: HiE/SA 1.25 mg/m³: SA:CF/PAPRHiE 2.5 mg/m³: HiEF/SAT:CF/PAPRTHiE/SCBAF/SAF 50 mg/m³: SA:PD,PP 100 mg/m³: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE	Inh Ing Con	Weak, lass, insom; facial pallor; pal eye, anor, low-wgt, malnut; constip, abdom pain, colic; anemia; gingival lead line; tremor; para wrist, ankles; encephalopathy; kidney disease; irrit eyes; hypotension	Eye: Skin: Breath: Swallow: Medical attention immed	Eyes, GI tract, CNS, kidneys, blood, gingival tissue

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties: MW, BP, SOL Fl.P, IP, Sp, Gr, flammability	Chemical and physical properties: VP, FRZ UEL, LEL	Incompatibilities and reactivities	Measurement method (See Table 1)
Tetranitromethane $C(NO_2)_4$ 509-14-8 PB4025000 1510 143	Tetan; TNM 1 ppm = 8.02 mg/m³	NIOSH/OSHA 1 ppm (8 mg/m³)	4 ppm	Colorless to pale-yellow liquid or solid (below 57°F) with a pungent odor.	MW: 196.0 BP: 259°F Sol: Insoluble Fl.P: ? IP: ? Sp.Gr: 1.62 Combustible Liquid, but difficult to ignite.	VP: 8 mm FRZ: 57°F UEL: ? LEL: ?	Hydrocarbons, alkalis, metals, oxidizers, aluminum, toluene, cotton [Note: Combustible material wet with tetranitromethane may be highly explosive.]	Imp/Ethyl Acetate none; GC/FID IV [#3513]
Tetrasodium pyrophosphate $Na_4P_2O_7$ 7722-88-5 UX7350000	Pyrophosphate, Sodium pyrophosphate, Tetrasodium diphosphate, Tetrasodium pyrophosphate (anhydrous), TSPP	NIOSH 5 mg/m³ OSHA† none	N.D.	Odorless, white powder or granules. [Note: The decahydrate ($Na_4P_2O_7 \cdot 10H_2O$) is in the form of colorless, transparent crystals.]	MW: 265.9 BP: Decomposes Sol(77°F): 7% Fl.P: NA IP: NA Sp.Gr: 2.45 Noncombustible Solid	VP: 0 mm (approx) MLT: 1810°F UEL: NA LEL: NA	Strong acids	Filter; none; Grav; IV [#0500, Particulates NOR (total)]
Tetryl $(NO_2)_3C_6H_2N(NO_2)CH_3$ 479-45-8 BY6300000	N-Methyl-N,2,4,6-tetranitroaniline; Nitramine; 2,4,6-Tetryl; 2,4,6-Trinitrophenyl-N-methylnitramine	NIOSH/OSHA 1.5 mg/m³ [skin]	750 mg/m³	Colorless to yellow, odorless, crystalline solid.	MW: 287.2 BP: 356-374°F (Explodes) Sol: 0.02% Fl.P: Explodes IP: ? Sp.Gr: 1.57 Combustible Solid (Class A Explosive)	VP: <1 mm MLT: 268°F UEL: ? LEL: ?	Oxidizable materials, hydrazine	Filter; Reagent; Vis; II(3) [#S225]
Thallium (soluble compounds, as Tl) 1707 151 (compounds, n.o.s.)	Synonyms vary depending upon the specific soluble thallium compound.	NIOSH/OSHA 0.1 mg/m³ [skin]	15 mg/m³ (as Tl)	Appearance and odor vary depending upon the specific soluble thallium compound.	Properties vary depending upon the specific soluble thallium compound.		Varies	Filter; Acid; ICP; IV [#7300, Elements]

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards: Route	Health hazards: Symptoms (See Table 5)	Health hazards: First aid (See Table 6)	Health hazards: Target organs (See Table 5)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet (flamm) Change: Daily Provide: Eyewash [Tetranitromethane]	NIOSH/OSHA 4 ppm: SA:CF*/CCRFS*/GMFS*/PAPRS*/SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS*/SCBAE	Inh Ing Con	Irrit eyes, skin, nose, throat; dizz, head; chest pain, dysp; methemo, cyan; skin burns	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Eyes, skin, resp sys, blood, CNS
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily Provide: Eyewash (soln) [Tetrasodium pyrophosphate]	TBAL	Inh Ing Con	Irrit eyes, skin, nose, throat; derm	Eye: Skin: Breath: Swallow: Irr immed Water wash prompt Resp support Medical attention immed	Eyes, skin, resp sys
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam/Daily Remove: When wet or contam Change: Daily [Tetryl]	NIOSH/OSHA 7.5 mg/m³: DM 15 mg/m³: DMXSQ*/SA* 37.5 mg/m³: SA:CF*/PAPRDM* 75 mg/m³: HiEF/SCBAF/SAF 750 mg/m³: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE	Inh Abs Ing Con	Sens derm, itch, eryt; edema on nasal folds, cheeks, neck; kera, sneez; anemia; ftg; cough, coryza; irrity, mal, head, lass, insom; nau, vomit; liver, kidney damage	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Eyes, skin, resp sys, CNS, liver, kidneys
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily [Thallium (soluble compounds, as Tl)]	NIOSH/OSHA 0.5 mg/m³: DM^ 1 mg/m³: DMXSQ^/SA 2.5 mg/m³: SA:CF/PAPRDM^ 5 mg/m³: HiEF/SAT:CF/PAPRTHiE/SCBAF/SAF 15 mg/m³: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE	Inh Abs Ing Con	Nau, diarr, abdom pain, vomit; ptosis, strabismus; peri neuritis, tremor; retster tight, chest pain, pulm edema; sez, chorea, psychosis; liver, kidney damage; alopecia; pares legs	Eye: Skin: Breath: Swallow: Irr immed Water flush prompt Resp support Medical attention immed	Eyes, resp sys, CNS, liver, kidneys, GI tract, body hair

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties: MW, BP, SOL, Fl.P, IP, Sp, Gr, flammability	Chemical and physical properties: VP, FRZ, UEL, LEL	Incompatibilities and reactivities	Measurement method (See Table 1)
Vanadium dust V_2O_5 1314-62-1 YW2450000 2862 151	Divanadium pentoxide, Vanadic anhydride, Vanadium oxide, Vanadium pentaoxide Other synonyms vary depending upon the specific vanadium compound.	NIOSH* C 0.05 mg V/m³ [15-min] [*Note: The REL applies to all vanadium compounds except Vanadium metal & Vanadium carbide (see Ferrovanadium dust).] OSHA† C 0.5 mg V_2O_5/m³ (resp)	35 mg/m³ (as V)	Yellow-orange powder or dark gray, odorless flakes dispersed in air.	MW: 181.9 BP: 3182°F (Decomposes) Sol: 0.8% Fl.P: NA IP: NA Sp.Gr: 3.36 Noncombustible Solid, but may increase intensity of fire when in contact with combustible materials.	VP: 0 mm (approx) MLT: 1274°F UEL: NA LEL: NA	Lithium, chlorine trifluoride	Filter; THF; XRD; IV [#7504] [Also #7300, Elements]
Vanadium fume V_2O_5 1314-62-1 YW2460000 2862 151	Divanadium pentoxide, Vanadic anhydride, Vanadium oxide, Vanadium pentaoxide Other synonyms vary depending upon the specific vanadium compound.	NIOSH* C 0.05 mg V/m³ [15-min] OSHA† C 0.1 mg V_2O_5/m³	35 mg/m³ (as V)	Finely divided particulate dispersed in air.	MW: 181.9 BP: 3182°F (Decomposes) Sol: 0.8% Fl.P: NA IP: NA Sp.Gr: 3.36 Noncombustible Solid	VP: 0 mm (approx) MLT: 1274°F UEL: NA LEL: NA	Lithium, chlorine trifluoride	Filter; THF; XRD; IV [#7504] [Also #7300, Elements]
Vegetable oil mist 68956-68-3 YX1850000	Vegetable mist	NIOSH 10 mg/m³ (total) 5 mg/m³ (resp) OSHA 15 mg/m³ (total) 5 mg/m³ (resp)	N.D.	An oil extracted from the seeds, fruit, or nuts of vegetables or other plant matter.	MW: varies BP: ? Sol: Insoluble Fl.P: 323-540°F IP: ? Sp.Gr: 0.91-0.95 Combustible Liquid	VP: ? FRZ: ? UEL: ? LEL: ?	None reported	Filter; none; Grav; IV [Particulates NOR; #0500 (total) #0600 (resp)]
Vinyl acetate CH_2=CHOOCCH$_3$ 108-05-4 AK0875000 1301 129P	1-Acetoxyethylene, Ethenyl acetate, Ethenyl ethanoate, VAC, Vinyl acetate monomer, Vinyl ethanoate 1 ppm = 3.52 mg/m³	NIOSH C 4 ppm (15 mg/m³) [15-min] OSHA† none	N.D.	Colorless liquid with a pleasant, fruity odor. [Note: Raw material for many polyvinyl resins.]	MW: 86.1 BP: 162°F Sol: 2% Fl.P: 18°F IP: 9.19 eV Sp.Gr: 0.93 Class IB Flammable Liquid	VP: 83 mm FRZ: -136°F UEL: 13.4% LEL: 2.6%	Acids, bases, silica gel, alumina, oxidizers, azo compounds, ozone [Note: Usually contains a stabilizer (e.g., hydroquinone or diphenylamine) to prevent polymerization.]	Carbon mol sieve; CH_2Cl_2/ Methanol; GC/FID; IV [#1453]

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards: Route	Symptoms (See Table 5)	First aid (See Table 6)		Target organs (See Table 5)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. [Vanadium dust]	NIOSH (as V) 0.5 mg/m³: HiE*/SA* 1.25 mg/m³: SA:CF*/PAPRHiE* 2.5 mg/m³: HiEF/PAPRTHiE*/ SCBAF/SAF 35 mg/m³: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE	Inh Ing Con	Irrit eyes, skin, throat; green tongue, metallic taste, eczema; cough; fine rales, wheez, bron, dysp	Eye: Skin: Breath: Swallow:	Irr immed Soap wash prompt Resp support Medical attention immed	Eyes, skin, resp sys
Skin: N.R. Eyes: N.R. Wash skin: N.R. Remove: N.R. Change: N.R. [Vanadium fume]	NIOSH (as V) 0.5 mg/m³: HiE*/SA* 1.25 mg/m³: SA:CF*/PAPRHiE* 2.5 mg/m³: HiEF/PAPRTHiE*/ SCBAF/SAF 35 mg/m³: SAF:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE	Inh Con	Irrit eyes, throat; green tongue, metallic taste; cough, fine rales, wheez, bron, dysp; eczema	Breath:	Resp support	Eyes, skin, resp sys
Skin: N.R. Eyes: N.R. Wash skin: N.R. Remove: N.R. Change: N.R. [Vegetable oil mist]	TBAL	Inh Con	Irrit eyes, skin, resp sys; lac	Eye: Breath:	Irr immed Fresh air	Eyes, skin, resp sys
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. Provide: Eyewash, Quick drench [Vinyl acetate]	NIOSH 40 ppm: CCROV*/SA* 100 ppm: SA:CF*/PAPROV* 200 ppm: CCRFOV/GMFOV/PAPRTOV*/ SCBAF/SAF 4000 ppm: SA:PD,PP* §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Ing Con	Irrit eyes, skin, nose, throat; hoarseness, cough; loss of smell; eye burns, skin blisters	Eye: Skin: Breath: Swallow:	Irr immed Soap flush immed Resp support Medical attention immed	Eyes, skin, resp sys

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties: MW, BP, SOL, Fl.P, IP, Sp, Gr, flammability	Chemical and physical properties: VP, FRZ, UEL, LEL	Incompatibilities and reactivities	Measurement method (See Table 1)
Yttrium Y 7440-65-5 ZG2980000	Yttrium metal	NIOSH*/OSHA* 1 mg/m³ [*Note: The REL and PEL also apply to other yttrium compounds (as Y).]	500 mg/m³ (as Y)	Dark-gray to black, odorless solid.	MW: 88.9 BP: 5301°F Sol: Soluble in hot H_2O Fl.P: NA IP: NA Sp.Gr: 4.47 Noncombustible Solid in bulk form.	VP: 0 mm (approx) MLT: 2732°F UEL: NA LEL: NA	Oxidizers	Filter; Acid; ICP; IV [#7300, Elements]
Zinc chloride fume $ZnCl_2$ 7646-85-7 ZH1400000	Zinc dichloride fume	NIOSH 1 mg/m³ ST 2 mg/m³ OSHA† 1 mg/m³	50 mg/m³	White particulate dispersed in air.	MW: 136.3 BP: 1350°F Sol(70°F): 435% Fl.P: NA IP: NA Sp.Gr: 2.91 Noncombustible Solid	VP: 0 mm (approx) MLT: 554°F UEL: NA LEL: NA	Potassium	Filter; Water; FAAS; OSHA [#ID121]
Zinc oxide ZnO 1314-13-2 ZH4810000 1516 143	Zinc peroxide	NIOSH 5 mg/m³ (fume/dust) ST 10 mg/m³ (fume) C 15 mg/m³ (dust) OSHA† 5 mg/m³ (fume) 15 mg/m³ (total dust) 5 mg/m³ (resp dust)	500 mg/m³	White, odorless solid.	MW: 81.4 BP: ? Sol(64°F): 0.0004% Fl.P: NA IP: NA Sp.Gr: 5.61 Noncombustible Solid	VP: 0 mm (approx) MLT: 3587°F UEL: NA LEL: NA	Chlorinated rubber (at 419°F), water [Note: Slowly decomposed by water.]	Filter; none; XRD; IV [#7502]
Zinc stearate $Zn(C_{18}H_{35}O_2)_2$ 557-05-1 ZH5200000	Dibasic zinc stearate, Zinc distearate, Zinc salt of stearic acid	NIOSH 10 mg/m³ (total) 5 mg/m³ (resp) OSHA† 15 mg/m³ (total) 5 mg/m³ (resp)	N.D.	Soft, white powder with a slight, characteristic odor.	MW: 632.4 BP: ? Sol: Insoluble Fl.P(oc): 530°F IP: NA Sp.Gr: 1.10 Combustible Solid	VP: 0 mm (approx) MLT: 266°F UEL: ? LEL: ? MEC: 20 g/m³	Oxidizers, dilute acids [Note: Hydrophobic (i.e., repels water).]	Filter; none; Grav; IV [Particulates NOR: #0500 (total), #0600 (resp)]

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards: Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Skin: N.R. Eyes: N.R. Wash skin: N.R. Remove: N.R. Change: N.R. [Yttrium]	NIOSH/OSHA 5 mg/m³: DM 10 mg/m³: DMXSQ/SA 25 mg/m³: SA:CF/PAPRDM 50 mg/m³: HiEF/SAT:CF/PAPRTHiE/SCBAF/SAF 500 mg/m³: SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE	Inh Ing Con	Irrit eyes; in animals: pulm irrit; eye inj; possible liver damage	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Eyes, resp sys, liver
Skin: N.R. Eyes: N.R. Wash skin: N.R. Remove: N.R. Change: N.R. [Zinc chloride fume]	NIOSH/OSHA 10 mg/m³: DMFu*/SA* 25 mg/m³: SA:CF*/PAPRDMFu* 50 mg/m³: HiEF/PAPRTHiE*/SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE	Inh Con	Irrit eyes, skin, nose, throat; conj; cough, copious sputum; dysp, chest pain, pulm edema, broncopneu; pulm fib, cor pulmonale; fever; cyan; tachypnea; skin burns	Breath: Resp support	Eyes, skin, resp sys, CVS
Skin: N.R. Eyes: N.R. Wash skin: N.R. Remove: N.R. Change: N.R. [Zinc oxide]	NIOSH/OSHA 50 mg/m³: DMFu/SA 125 mg/m³: SA:CF/PAPRDMFu 250 mg/m³: HiEF/SAT:CF/PAPRTHiE/SCBAF/SAF 500 mg/m³: SA:PD,PP §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE	Inh	Metal fume fever: chills, musc ache, nau, fever, dry throat, cough, weak, lass; metallic taste; head; blurred vision; low back pain; vomit; ftg; mal; tight chest, dysp, rales, decr pulm func	Breath: Resp support	Resp sys
Skin: N.R. Eyes: N.R. Wash skin: N.R. Remove: N.R. Change: N.R. [Zinc stearate]	TBAL	Inh Ing Con	Irrit eyes, skin, upper resp sys; cough	Eye: Skin: Breath: Swallow: Irr immed Soap wash Fresh air Medical attention immed	Eyes, skin, resp sys

APPENDIX F

MATERIAL SAFETY DATA SHEETS

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ALCONOX(R)

MSDS Number: A2052 --- *Effective Date: 02/21/00*

1. Product Identification

Synonyms: Proprietary blend of sodium linear alkylaryl sulfonate, alcohol sulfate, phosphates, and carbonates.
CAS No.: Not applicable.
Molecular Weight: Not applicable to mixtures.
Chemical Formula: Not applicable to mixtures.
Product Codes: A461

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Alconox(R) proprietary detergent mixture	N/A	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO EYES AND RESPIRATORY TRACT.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT

Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:
May cause irritation to the respiratory tract. Symptoms may include coughing and shortness of breath.
Ingestion:
May cause irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea.
Skin Contact:
No adverse effects expected.
Eye Contact:
May cause irritation, redness and pain.
Chronic Exposure:
No information found.
Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
Remove to fresh air. Get medical attention for any breathing difficulty.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Wash exposed area with soap and water. Get medical advice if irritation develops.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Not expected to be a fire hazard.
Explosion:
No information found.
Fire Extinguishing Media:
Dry chemical, foam, water or carbon dioxide.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. When mixed with water, material foams profusely. Small amounts of residue may be flushed to sewer with plenty of water.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Moisture may cause material to cake. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL):
15 mg/m3 total dust, 5 mg/m3 respirable fraction for nuisance dusts.
- ACGIH Threshold Limit Value (TLV):
10 mg/m3 total dust containing no asbestos and < 1% crystalline silica for Particulates Not Otherwise Classified (PNOC).

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face dust/mist respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece dust/mist respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear protective gloves and clean body-covering clothing.

Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
White powder interspersed with cream colored flakes.

Odor:
No information found.

Solubility:
Moderate (1-10%)

Specific Gravity:
No information found.

pH:
No information found.

% Volatiles by volume @ 21C (70F):
0

Boiling Point:
No information found.

Melting Point:
No information found.

Vapor Density (Air=1):

No information found.
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
No information found.
Conditions to Avoid:
No information found.

11. Toxicological Information

No LD50/LC50 information found relating to normal routes of occupational exposure.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Alconox(R) proprietary detergent mixture	No	No	None

12. Ecological Information

Environmental Fate:
This product is biodegradable.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Alconox(R) proprietary detergent mixture	Yes	No	No	No

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Alconox(R) proprietary detergent mixture	No	No	Yes	No

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Alconox(R) proprietary detergent mixture	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Alconox(R) proprietary detergent mixture	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
Reactivity: No (Pure / Solid)

Australian Hazchem Code: No information found.
Poison Schedule: No information found.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **0** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO EYES AND RESPIRATORY TRACT.
Label Precautions:
Avoid contact with eyes.
Keep container closed.
Use with adequate ventilation.
Avoid breathing dust.
Wash thoroughly after handling.
Label First Aid:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial

respiration. If breathing is difficult, give oxygen. In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes. In all cases, get medical attention.

Product Use:
Laboratory Reagent.

Revision Information:
MSDS Section(s) changed since last revision of document include: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16.

Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

TEXACO REFINING AND MARKETING, -- 00351 UNLEADED REGULAR GASOLINE(26000 UNLEADE

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

FSC: 9130
NIIN: 00-148-7102
MSDS Date: 05/19/1997
MSDS Num: CHKWR
Product ID: 00351 UNLEADED REGULAR GASOLINE(26000 UNLEADED REG GASOLINE)
MFN: 01
Responsible Party
Cage: 2R503
Name: TEXACO REFINING AND MARKETING, INC
Box: 7812
City: UNIVERSAL CITY CA 91608-4427
Info Phone Number: 800-782-7852/914-838-7204 (#4;MSDS)
Emergency Phone Number: 914-831-3400/800-424-9300(CHEMTREC)
Review Ind: Y
Published: Y

==========
Preparer Co. when other than Responsible Party Co.
==========

Cage: 2R503
Name: TEXACO REFINING AND MARKETING INC
Address: 1111 RUSK ST
City: HOUSTON TX 77002-3310

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

Cage: 7B131
Name: TEXACO INC
Address: UNKNOWN
Box: 509
City: BEACON NY 12508-0509
Phone: 914-831-3400
Cage: 2R503
Name: TEXACO REFINING AND MARKETING INC
Address: 1111 RUSK ST
City: HOUSTON TX 77002-3310
Phone: 713-650-5206

==========
Item Description Information
==========

Item Name: GASOLINE,AUTOMOTIVE
Specification Number: ASTM D4814
Type/Grade/Class: CL A,B,C,D,E,SPEC GR
Unit of Issue: GL
UI Container Qty: BULK GALLON
Type of Container: UNKNOWN

==========
Ingredients
==========

Cas: 8006-61-9
RTECS #: LX3300000
Name: GASOLINE CONSISTS OF STRAING/BRANCHED PARAFFINIC
HYDROCARBONS,OLEFINS,CYLCOPARAFFIN,AROMATICS. 95.00-99.99%.
% Wt: SEE ING
Other REC Limits: NONE RECOMMENDED
OSHA PEL: 300 PPM
ACGIH TLV: 300 PPM/500STEL;9596

Name: OXYGENATES,MAY OR MAY NOT CONTAIN ANY COMBINATION OF THESE
OXYG:MTBE,ETBE,TAME &/OR ETOH IN RANGE OF 0-20%.
% Wt: SEE ING
Other REC Limits: NONE RECOMMENDED
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Cas: 1634-04-4
RTECS #: KN5250000
Name: METHYL TERT-BUTYL ETHER (SARA 313) (CERCLA), 10.00-19.99%.
% Wt: SEE ING
Other REC Limits: NONE RECOMMENDED
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: 40 PPM, A3; 9596
EPA Rpt Qty: 1 LB
DOT Rpt Qty: 1 LB

Cas: 637-92-3
RTECS #: KN4730200
Name: ETHYL-T-BUTYL ETHER, 10.00-19.99%
% Wt: SEE ING
Other REC Limits: NONE RECOMMENDED
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Cas: 994-05-8
RTECS #: 1007422AM
Name: TERT-AMYL METHYL ETHER, 10.00-19.99%
% Wt: SEE ING
Other REC Limits: NONE RECOMMENDED
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Cas: 64-17-5
RTECS #: KQ6300000
Name: ETHYL ALCOHOL (ETHANOL), 3.00-9.99%.
% Wt: SEE ING
Other REC Limits: NONE RECOMMENDED
OSHA PEL: 1000 PPM
ACGIH TLV: 1000 PPM; 9596

Cas: 1330-20-7
RTECS #: ZE2100000
Name: XYLENES (O-,M-,P- ISOMERS) (SARA 313) (CERCLA), 3.00-9.99%.
% Wt: SEE ING
Other REC Limits: NONE RECOMMENDED
OSHA PEL: 100 PPM
ACGIH TLV: 100 PPM/150STEL;9596
EPA Rpt Qty: 1000 LBS
DOT Rpt Qty: 1000 LBS

Cas: 108-88-3
RTECS #: XS5250000
Name: TOLUENE (SARA 313) (CERCLA), 3.00-9.99%.
% Wt: SEE ING
Other REC Limits: NONE RECOMMENDED
OSHA PEL: 200 PPM; Z-2
ACGIH TLV: S, 50 PPM; 9596
EPA Rpt Qty: 1000 LBS
DOT Rpt Qty: 1000 LBS

Cas: 71-43-2
RTECS #: CY1400000
Name: BENZENE (SARA 313) (CERCLA), 1.00-2.99%.
% Wt: SEE ING
Other REC Limits: NONE RECOMMENDED
OSHA PEL: SEE 1910.1028
ACGIH TLV: 10 PPM; A2; 9596
EPA Rpt Qty: 10 LBS
DOT Rpt Qty: 10 LBS

Cas: 95-63-6
RTECS #: DC3325000
Name: 1,2,4-TRIMETHYLBENZENE (SARA 313), 1.00-2.99%.

% Wt: SEE ING
Other REC Limits: NONE RECOMMENDED
OSHA PEL: 25 PPM
ACGIH TLV: 25 PPM; 9596

Cas: 110-54-3
RTECS #: MN9275000
Name: HEXANE (N-HEXANE) (CERCLA), 1.00-2.99%.
% Wt: SEE ING
Other REC Limits: NONE RECOMMENDED
OSHA PEL: 500 PPM
ACGIH TLV: 50 PPM; 9596
EPA Rpt Qty: 1 LB
DOT Rpt Qty: 1 LB

Cas: 100-41-4
RTECS #: DA0700000
Name: ETHYL BENZENE (SARA 313), 1.00-2.99%.
% Wt: SEE ING
Other REC Limits: NONE RECOMMENDED
OSHA PEL: 100 PPM
ACGIH TLV: 100 PPM/125STEL;9596
EPA Rpt Qty: 1000 LBS
DOT Rpt Qty: 1000 LBS

Health Hazards Data

LD50 LC50 Mixture: ORAL LD50(RAT) >5.00 G/KG.
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: NO
Carcinogenicity Inds - NTP: YES
IARC: YES
OSHA: YES
Effects of Exposure: EYE:MAY CAUSE IRRIT,EXPERIENCE MILD DISCOMFT,SLIGHT EXCESS REDNESS.SKIN:BRIEF CONTACT MAY CAUSE SLIGHT IRRIT.PROLONG CONTACT MAY CAUSE MORE SEVERE IRRIT,DISCOMFT,LOCAL REDNESS,SWELLING.PROL/WIDEPSREAD/REP CONTACT MAY RESULT IN ABSORPT OF PO T HARMFUL AMTS OF MATL.INHAL:VAP/MIST IRRTI NOSE/THROAT.INGEST:MORE THAN (SUPPL)
Explanation Of Carcinogenicity: PER MSDS:PRODUCT &/OR COMPONENET(S) CARCINOGENIC ACCORDING TO OSHA/IARC/NTP/OTHER. BENZENE. CA PROP 65.
Signs And Symptions Of Overexposure: INHAL:DIZZ,DROWS,EUPHORIA,LOSS OF COORD,DISORIENT,HEAD,NAU,VOMIT.POORLY VENTI AREA/CONF SPACE UNCONSC,ASPHYXIATION.PROL/REP OVEREXPO ABSORPT OF POT HARMFUL AMTS OF MATL.SEE HEALTH HAZ ABOVE.CHRONIC:PROL/REP ETHANOL VAP EXPO-HEAD,LACK OF COO RD,SLEEPINESS,FTG,DIFF CONC.CHRONIC ALCOHOLIC BEV-LIVER/STOM/HEART/NERV SYS DMG.
Medical Cond Aggravated By Exposure: BECAUSE OF ITS IRRIT PROPERTIES,REPEATED SKIN CONTACT MAY AGGRAVATE EXISTING DERM(SKIN CONDITION).
First Aid: EYE:IMMED FLUSH W/LOTS OF H2O @LEAST 15MINS,HOLD EYELIDS APART.GET MED ATTN.SKIN:WASH W/LOTS OF SOAP/H2O SEVERAL MINS.IRRIT DVLPS/PERSIST GET MED ATTN.INGEST:CONSC/CAN SWALLO GIVE 2GLASSES H2O(16OZ),DONT INDUCE VOMIT.VOMIT OCCURS GIVE FLUID S AGAIN.DETERMINE STOMAC EVACUATION/VOMIT INDUCTION BY MED PERSONNEL.DONT GIVE ANYTHING BY MOUTH IF UNCONSC/CONVULS.INHAL:MOVE TO FRESH AIR.NOT BREATH/RESP(SUP)

Handling and Disposal

Spill Release Procedures: REMOVE ALL IGN SOURCE INCLUDE INTERNAL COMBUST ENGINES/POWER TOOLS.VENTI AREA.BARRICADE AREA.STAY UPWIND,WARN OF POSSIBLE DOWNWIDE EXPLO HAZ.AVOID BREATH VAP/SKIN/EYE/CLOTH CONTACT.PRESSURE DEMAND AIR SUP RESP-CONTAM/OXY UNK CONC.PPE.>714LB S SARA 304
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods: MATL PRESENTLY CONSTITUTED HAS RCRA CLASSIF OF BENZENE TOXIC/IGN.DISCARD IN PRESENT FORM HAZ WASTE D018/D001.RCRA-USER RESPON TO DETERMINE WHETHER PROD MEETS RCRA CRITERIA FOR HAZ WASTE @DISPO TIME.USE/TRANSFORM/MIX/ETC CHANGE CLASSIF.DONT (OTH PREC)
Handling And Storage Precautions: MATL MAY BE @ELEVATED TEMP &/OR

PRESSURES.EXERCISE ARE WHEN OPN BLEEDERS/SMPL PORTS.GROUND/BOND SHIP CNTNR,TRANSF LINE,REC CNTNR.
Other Precautions: KEEP AWAY FRM HEAT/SPARK/FLAME/OTHER IGN SOURCES.PRODINTENDED FO9R USE AS MOTOR FUEL ONLY.USE NONSPARK TOOLS,GROUND/BOND ALLCNTNRS. DISPO:ALLOW TO ENTER DRAIN/SEWER.CAN CAUSE EXPLO.CONTAINS SEC 313TOXIC CHEM/CERCLA 102 CHEMS.

==========

Fire and Explosion Hazard Information

==========

Flash Point Method: PMCC
Flash Point: =-40.C, -40.F
Lower Limits: 1.4
Upper Limits: 7.6
Extinguishing Media: H2O INEFFECTIVE ON FLAMES.USE WATER SPRAY,DRY CHEMICAL,ALCOHOL RESISTANT FOAM,CO2 TO EXTINGUISH FIRE.
Fire Fighting Procedures: H2O SHOULD BE USED TO COOL FIRE-EXPO CNTNR/PROVIDE PROTECTION FOR PERSONS ATTEMPTING TO STOP LEAK.WEAR FULL PROTECTIVE CLOTH & POSITIVE PRESSURE BREATH APPARATU
Unusual Fire/Explosion Hazard: VAP HEAVIER THAN AIR,TRAVEL CONSIDERABLE DISTANCE TO IGN SOURCE-FLASHBK.FLOWING MATL GENERATE STATIC ELECT,CAUSE FIRE EXPO W/SPARK IN FLAM VAP-AIR ATM.EXT FLAMM

==========

Control Measures

==========

Respiratory Protection: AIRBORNE CONC SHOULD BE KEPT TO LOWEST LEVELS POSSIBLE.VAP/MIST/DUST GENERATED & OCCUPAT EXPO LIMIT OF PROD/COMPO EXCEEDED USE APPRO NIOSH/MSHA APPROV AIR PURIFY/AIR SUPPL RES AFT DETERM AIRBORNE CONTAM CONC.AIR SUPPL RES-CONTAM CON/OXY UNK
Ventilation: EXPLO-PROOF EQPMT-MAINTAIN ADEQ VENTI TO MEET OCCUP EXP LIMITS.PREVENT EXPO AIR-GAS MIX ACCUMM,AVOID SIGN OXY DISPLACE.
Protective Gloves: NITRILE RUBB,TEFLON,VITRON-RESIST TO PET
Eye Protection: SAF GLASSES,CHEM TYP GOGG,FCSHIELD
Other Protective Equipment: PROTECGIVE CLOTH-COVERALLS,BOOTS.OXY LEVELS SHOULD BE @LEAST 19.5% IN CONFINE SPACE/OTHER WORKAREA.
Work Hygienic Practices: REMOVE/DRY CLEAN(MORE EFFECTIVE)/LAUNDER CLOTH SOAK/SOIL W/MATL BEF REUSE.INFORM CLOTH CLEANERS OF POT HAZ W/CONTAM CLOT
Supplemental Safety and Health: HEALTH:SEVERAL MOUTHFULS SWALLOW ABD DISCOMFT,NAU,DIARR MAY OCCUR.ASPIRATION MAY OCCUR DURING SWALLO/VOMIT RESULT IN LUNG DMG. 1STAID:DISTRESS CLEAR AIRWAY,START ART RESP.W/DR ADVICE GIVE SUPPL OXY W/BAG-VALV MASK/MANUAL TRIG OXY SUPPLY.STO MACH EVAC-USE METHOD LEAST LIKELY TO CAUSE ASPIRATION. DISPO:ENTER DRAIN/SEWERS.

==========

Physical/Chemical Properties

==========

HCC: F1
Boiling Point: >32.2C, 90.F
Vapor Pres: 300-700
Vapor Density: 3-4
Spec Gravity: 0.7-0.77
PH: NA
Evaporation Rate & Reference: NONE SPECIFIED BY MANUFA.
Solubility in Water: 0.1-1, SLIGHT
Appearance and Odor: LIGHT RED TO LIGHT STRAW LIQUID, PETROLEUM ODOR

==========

Reactivity Data

==========

Stability Condition To Avoid: HEAT,IGN SOURCES.
Materials To Avoid: HEAT, STRONG OXIDIZERS
Hazardous Decomposition Products: TOXIC LEVELS OF CARBON MONOXIDE, CARBON DIOXIDE, IRRIT ALDEHYDES & KETONES.
Hazardous Polymerization Indicator: NO

==========

Toxicological Information

==========

==========

Ecological Information

==========

==========

MSDS Transport Information
==========
==========
Regulatory Information
==========
==========
Other Information
==========
==========
Transportation Information
==========
Responsible Party Cage: 2R503
Trans ID NO: 50948
Product ID: 00351 UNLEADED REGULAR GASOLINE(26000 UNLEADED REG GASOLINE)
MSDS Prepared Date: 05/19/1997
Review Date: 07/15/1998
MFN: 1
Net Unit Weight: 5.8 LBS
Multiple KIT Number: 0
Review IND: Y
Unit Of Issue: GL
Container QTY: BULK GALLON
Type Of Container: UNKNOWN
Additional Data: PER MSDS:DOT PROPER SHIPPING NAME:GASOLINE, HAZ CLASS 3,
UN1203, PKG II,FLAMM LIQ LABEL.
==========
Detail DOT Information
==========
DOT PSN Code: GTN
DOT Proper Shipping Name: GASOLINE
Hazard Class: 3
UN ID Num: UN1203
DOT Packaging Group: II
Label: FLAMMABLE LIQUID
Special Provision: B33,B101,T8
Non Bulk Pack: 202
Bulk Pack: 242
Max Qty Pass: 5 L
Max Qty Cargo: 60 L
Vessel Stow Req: E
==========
Detail IMO Information
==========
IMO PSN Code: HRV
IMO Proper Shipping Name: GASOLINE
IMDG Page Number: 3141
UN Number: 1203
UN Hazard Class: 3.1
IMO Packaging Group: II
Subsidiary Risk Label: -
EMS Number: 3-07
MED First Aid Guide NUM: 311
==========
Detail IATA Information
==========
IATA PSN UC
IATA UN ID Num: 1203
IATA Proper Shipping Name: GASOLINE
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
UN Packing Group: II
Packing Note Passenger: 305
Max Quant Pass: 5L
Max Quant Cargo: 60L
Packaging Note Cargo: 307
Exceptions: A100
==========
Detail AFI Information

==========
AFI PSN UC
AFI Proper Shipping Name: GASOLINE
AFI Hazard Class: 3
AFI UN ID NUM: UN1203
AFI Packing Group: II
Special Provisions: P5
Back Pack Reference: A7.3
==========
HAZCOM Label
==========
Product ID: 00351 UNLEADED REGULAR GASOLINE(26000 UNLEADED REG GASOLINE)
Cage: 2R503
Company Name: TEXACO REFINING AND MARKETING INC
Street: 1111 RUSK ST
City: HOUSTON TX
Zipcode: 77002-3310
Health Emergency Phone: 914-831-3400/800-424-9300(CHEMTREC)
Label Required IND: Y
Date Of Label Review: 07/15/1998
Status Code: C
Label Date: 07/15/1998
Origination
Chronic Hazard IND: Y
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: DANGER
Respiratory Protection IND: YES
Health Hazard: Moderate
Contact Hazard: Moderate
Fire Hazard: Severe
Reactivity Hazard: None
Hazard And Precautions: EXTREMELY FLAMM LIQ/VAP.VAP CAN CAUSE FLASH FIRE.MAY CAUSE DIZZ/DROWS.MAY CAUSE EYE IRRIT.ASPIRATION HAZ IF INGEST.CAN ENTER LUNGS,CAUSE DMG.ATTN:POSSIBLE CANC HAZ-MAY CAUSE CANC BASED ON ANIMAL DATA.1STAID:EYE:IMMED FLUSH W/LOTS OF H2O @LE AST 15MINS,HOLD EYELIDS APART.GET MED ATTN.SKIN:WASH W/LOTS OF SOAP/H2O SEVERAL MINS.IRRIT DVLPS/PERSIST GET MED ATTN.INGEST:CONSC/CAN SWALLO GIVE 2GLASSES H2O(16OZ),DONT INDUCE VOMIT.VOMIT OCCURS GIVE FLUIDS AGAIN.DETERMINE STOMAC EVACUATI ON/VOMIT INDUCTION BY MED PERSONNEL.DONT GIVE ANYTHING BY MOUTH IF UNCONSC/CONVULS.INHAL:MOVE TO FRESH AIR.NOT BREATH/RESP/SUPPL OXY.TARGET ORGANS:LUNGS,EYE,CNS.
==========
Disclaimer (provided with this information by the compiling agencies): This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever expressly or implied warrants, states, or intends said information to have any application, use or viability by or to any person or persons outside the Department of Defense nor any person or persons contracting with any instrumentality of the United States of America and disclaims all liability for such use. Any person utilizing this instruction who is not a military or civilian employee of the United States of America should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation regardless of similarity to a corresponding Department of Defense or other government situation.

International Chemical Safety Cards

METHANE

ICSC: 0291

METHANE
(cylinder)
CH_4
Molecular mass: 16.0

CAS # 74-82-8
RTECS # PA1490000
ICSC # 0291
UN # 1971;1972
EC # 601-001-00-4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Extremely flammable.	NO open flames, NO sparks, and NO smoking.	Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with water spray, powder, carbon dioxide
EXPLOSION	Gas/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting.	In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.
EXPOSURE			
• **INHALATION**	Unconsciousness.	Ventilation. Breathing protection if high concentration.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
• **SKIN**	Serious frostbite.	Cold-insulating gloves.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
• **EYES**			
• **INGESTION**			

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Ventilation (extra personal protection: self-contained breathing apparatus)	Fireproof. Cool. Ventilation along the floor and ceiling.	F symbol R. 12 S: 9-16-33 UN Hazard Class: 2.1

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0291

International Chemical Safety Cards

METHANE

ICSC: 0291

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** COLOURLESS, COMPRESSED OR LIQUEFIED GAS , WITH NO ODOUR. **PHYSICAL DANGERS:** The gas is lighter than air. **CHEMICAL DANGERS:** **OCCUPATIONAL EXPOSURE LIMITS (OELs):** TLV: ppm, mg/m^3 simple asphyxiant (ACGIH 1993-1994). MAK not established.	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation. **INHALATION RISK:** On loss of containment this gas can cause suffocation by lowering the oxygen content of the air in confined areas. **EFFECTS OF SHORT-TERM EXPOSURE:** Contact with compressed or liquid gas may cause frostbite. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
PHYSICAL PROPERTIES	Boiling point. -161°C Melting point: -183°C Solubility in water, ml/100 ml at 20°C: 3.3 Relative vapour density (air = 1): 0.6	Flash point: Flammable Gas Auto-ignition temperature: 537°C Explosive limits, vol% in air: 5-15
ENVIRONMENTAL DATA		

NOTES

Density of the liquid at boiling point: 0.42 kg/l. The substance may travel to a source of ignition and flash back. High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. After use for welding, turn valve off; regularly check tubing, etc., and test for leaks with soap and water. The measures mentioned in section PREVENTION are applicable to production, filling of cylinders, and storage of the gas.

Transport Emergency Card. TEC (R)-622, 20G04
NFPA Code: H 1; F 4; R 0,

ADDITIONAL INFORMATION

ICSC: 0291 **METHANE**

International Chemical Safety Cards

ISOBUTENE

ICSC: 1027

ISOBUTENE
Isobutylene
2-Methylpropene
(cylinder)
$C_4H_8/CH_2=C(CH_3)_2$
Molecular mass: 56.1

CAS # 115-11-7
RTECS # UD0890000
ICSC # 1027
UN # 1055
EC # 601-012-00-4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Extremely flammable.	NO open flames, NO sparks, and NO smoking. NO contact with oxidizing materials.	Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with sand, powder, carbon dioxide.
EXPLOSION	Gas/air mixtures are explosive. Risk of fire and explosion on contact with oxidants, halogens (see Chemical Dangers).	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Use non-sparking handtools	In case of fire: keep drums, etc., cool by spraying with water. Combat fire from a sheltered position.
EXPOSURE			
• **INHALATION**	Dizziness. Drowsiness. Dullness. Nausea. Unconsciousness. Vomiting.	Closed system and ventilation.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
• **SKIN**	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
• **EYES**	Frostbite.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**			

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Ventilation. Remove all sources of ignition. Do NOT wash away into sewer. NEVER direct water jet on liquid (extra personal protection: self-contained breathing apparatus).	Fireproof. Separated from incompatible substances (see Chemical Dangers). Cool.	F symbol F+ symbol R: 12 S: (2-)9-16-33 Note: C UN Hazard Class: 2.1

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1027	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

ISOBUTENE

ICSC: 1027

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS COMPRESSED LIQUEFIED GAS OR COLOURLESS VOLATILE LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The gas is heavier than air and may travel along the ground; distant ignition possible, and may accumulate in low ceiling spaces causing deficiency of oxygen. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
The substance can presumably form explosive peroxides. The substance is able to polymerize with fire or explosion hazard. Reacts violently with oxidants, chlorine, fluorine, nitrogen oxides, hydrogen chloride, hydrogen bromide, causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS (OELs):
MAK not established

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation.

INHALATION RISK:
On loss of containment this liquid evaporates very quickly causing supersaturation of the air with serious risk of suffocation when in confined areas. A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the central nervous system. Exposure may result in death. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

PHYSICAL PROPERTIES

Boiling point: -6.9°C
Melting point: -140.3°C
Relative density (water = 1): 0.59
Solubility in water: practically insoluble
Vapour pressure, kPa at 20°C: 1976
Relative vapour density (air = 1): 1.94
Flash point: flammable°C
Auto-ignition temperature: 465°C
Explosive limits, vol% in air: 1.8-9.6%

ENVIRONMENTAL DATA

NOTES

Density of the liquid at boiling point: 0.605 kg/l. High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state.

Transport Emergency Card: TEC (R)-502
NFPA Code: H 1; F 4; R 0;

ADDITIONAL INFORMATION

IMPORTANT LEGAL NOTICE:	Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject The user should verify compliance of the cards with the relevant legislation in the country of use.

TEXACO REFINING AND MARKETING -- 02624 DIESEL FUEL

==========

MSDS Safety Information

==========

FSC: 9140
MSDS Date: 12/08/1995
MSDS Num: CDLLF
LIIN: 00N076893
Product ID: 02624 DIESEL FUEL
MFN: 01
Responsible Party
Cage: 2R503
Name: TEXACO REFINING AND MARKETING INC
Box: 7812
City: UNIVERSAL CITY CA 91608
Info Phone Number: 914-838-7204
Emergency Phone Number: 914-831-3400;800-424-9300(CHEMTREC)
Published: Y

==========

Contractor Summary

==========

Cage: 2R503
Name: TEXACO REFINING AND MARKETING INC
Address: 1111 RUSK ST
City: HOUSTON TX 77002-3310
Phone: 713-650-5206

==========

Ingredients

==========

RTECS #: 1000011HC
Name: HYDROCARBONS; (COMPLEX MIX OF HYDROCARBS PRDCED BY CRUDE OIL DISTIL. CONSISTS PREDOMINANTLY OF HYDROCARBS RANGING
% Wt: 100
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Name: ING 1:FROM C-9 TO C-20, & BOILING IN RANGE OF 325-675F. HYDROTREATED/HYDROSULFURIZED PROD ALSO CONTAINS SOME

Name: ING 2:HYDROCARBS PRDCED BY DISTIL OF CATALYTIC CRACKING. LATTER MATLS CONTAIN BICYCLIC & TRICYCLIC AROMATIC HYDROCARBS.)

Cas: 98-82-8
RTECS #: GR8575000
Name: CUMENE (SARA 313) (CERCLA). % (WT):0.01-0.09
% Wt: SEE ING
OSHA PEL: S, 50 PPM
ACGIH TLV: S, 50 PPM
EPA Rpt Qty: 5000 LBS
DOT Rpt Qty: 5000 LBS

Cas: 71-43-2
RTECS #: CY1400000
Name: BENZENE (SARA 313) (CERCLA). % (WT):0.01-0.90
% Wt: SEE ING
OSHA PEL: SEE 1910.1028
ACGIH TLV: 10 PPM; A2
EPA Rpt Qty: 10 LBS
DOT Rpt Qty: 10 LBS

RTECS #: 9999999VO
Name: VOLATILE ORGANIC COMPOUND:NOT DETERMINED.
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Name: SUPDAT:INFO:MIDDLE DISTIL HAVE CAUSED SKIN IRRIT & SKIN CANCER IN LAB ANIMALS WHEN RPTDLY APPLIED & LEFT IN PLACE

Name: ING 7:BETWEEN APPLIC. STUDIES TO FURTHER EVAL CARCIN POTNTL OF MIDDLE DISTIL ARE CURRENTLY UNDERWAY. KIDNEY DMG

Name: ING 8:HAS ALSO BEEN OBSERVED IN LAB ANIMALS EXPOS TO MIDDLE DISTIL. CHRONIC:NIOSH HAS REC WHOLE DIESEL EXHAUST

Name: ING 9:BE REGARDED AS POTNTL OCCUP CARCIN, BASED ON FINDINGS OF CARCIN RESPONSES IN LAB ANIMALS EXPOS TO WHOLE

Name: ING 10:DIESEL EXHAUST. EXCESS CANCER RISK FOR WORKERS EXPOS TO DIESEL EXHAUST HAS NOT BEEN CALCULATED;

Name: ING 11:PROBABILITY OF DEVELOPING CANCER SHOULD BE DECR BY MINIMIZING EXPOS TO LOWEST FEASIBLE LIMS. RPTD SKIN

Name: ING 12:CONT MAY CAUSE PERSISTENT IRRITATION OR DERMATITIS.

Name: FIRST AID PROC:IS CONSCIOUS & CAN SWALLOW, GIVE 2 GLASSES OF WATER(16 OZ) BUT DO NOT INDUCE VOMIT. IF VOMIT

Name: ING 14:OCCURS, GIVE FLUIDS AGAIN. HAVE MED PERS DETERM IF EVAC OF STOM/INDUCTION OF VOMIT IS NEC. DO NOT GIVE

Name: ING 15:ANYTHING BY MOUTH TO UNCON/CONVL PERSON. INHAL:REMOVE TO FRESH AIR. IF NOT BRTHG, CLEAR PERSON'S AIRWAY

Name: ING 16:GIVE ARTF RESP. IF BRTHG IS DFCLT, QUALIFIED MED PERS MAY ADMIN OXYG. GET MED ATTN IMMED. OTHER

Name: ING 17:INSTRUCTIONS:REMOVE & DRY-CLEAN/LAUNDER CLTHG SOAKED/SOILED W/THIS MATL BEFORE REUSE. DRY CLEANING OF

Name: ING 18:CONTAMD CLTHG MAY BE MORE EFTIVE THAN NORM LAUNDERING. INFORM INDIVIDUALS RESPONSIBLE FOR CLEANING OF

Name: ING 19:POTNTL HAZS ASSOC W/HNDLG CONTAMD CLTHG. ASPIR OF PROD DURING INDUCED EMESIS MAY RSLT IN SEV LUNG INJURY.

Name: ING 20:IF EVAC OF STOM IS NEC, USE METH LST LIKELY TO CAUSE ASPIR, SUCH AS GASTRIC LAVAGE AFTER ENDOTRACHEAL

Name: ING 21:INTUBATION. CONT POIS CTL CTR FOR ADDITIONAL TREATMENT INFORMATION.

Name: SPILL PROC:>100,000 POUNDS OF PROD IS SPILLED, RPT SPILL ACCORD TO SARA 304 &/OR CERCLA 102(A) REQUIREMENTS,
---
Name: ING 23:UNLESS PROD QUALIFIES FOR PETROLEUM EXEMPTION (CERCLA SECTION 101(14)).
==========
Health Hazards Data
==========
LD50 LC50 Mixture: LD50:(ORAL,RAT) 9.00 ML/KG
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: NO
Carcinogenicity Inds - NTP: YES
IARC: YES
OSHA: YES
Effects of Exposure: ACUTE:EYES:MAY CAUSE IRRIT, EXPERIENCED AS MILD DISCOMFORT & SEEN AS SLIGHT EXCESS REDNESS OF EYE. SKIN:CAUSES SEV IRRIT W/PAIN, SEV EXCESS REDNESS & SWELL W/CHEM BURNS, BLISTER FORMATION, & POSS TISS DESTRUCTION. PRLNGD, WIDESPREAD/RPTD SK IN CONT MAY RSLT IN ABSORP OF POTNTLY HARMFUL AMTS OF MATL. (EFTS OF OVEREXP)
Explanation Of Carcinogenicity: BENZENE:IARC MONOGRAPHS, SUPP, VOL 7, PG 120, 1987:GROUP 1. NTP 7TH ANNUAL RPT ON CARCINS, 1994:KNOWN TO BE (SUPDAT)
Signs And Symptions Of Overexposure: HLTH HAZ:INHAL:VAPS/MIST MAY CAUSE IRRIT

OF NOSE & THROAT. MAY CAUSE DIZZ, DROW, EUPHORIA, LOSS OF COORDINATION, DISORIENTATION, HDCH, NAUS, & VOMIT. IN POORLY VENTILATED AREAS/CONFINED SPACES, UNCON & ASPHY MAY RSLT. PRLNGD/RPTD OVEREXP MA Y RSLT IN ABSORP OF POTNTLY HARMFUL AMTS OF MATL. INGEST:IF MORE THAN (SUPDAT)
Medical Cond Aggravated By Exposure: SKIN CONTACT MAY AGGRAVATE AN EXISTING DERMATITIS (SKIN CONDITION).
First Aid: EYES:IMMED FLUSH W/PLENTY OF WATER FOR @ LST 15 MINS. HOLD EYELIDS APART WHILE FLUSHING TO RINSE ENTIRE SURF OF EYE & LIDS W/WATER. GET MED ATTN. SKIN:IMMED REMOVE CONTAM CLTHG & SHOES. UNDER SFTY SHOWER, FLUSH SKIN THOROUGHLY W/LG AMTS OF RUNNING WATER FOR @ LST 15 MINS. DO NOT ATTEMPT TO NEUT W/CHEM AGENTS. GET MED ATTN IMMED. DISCARD/DECONTAM CLTHG & SHOES BEFORE REUSE. INGEST:IF PERSON

==========

Handling and Disposal

==========

Spill Release Procedures: VENTILATE AREA. AVOID BRTHG VAP. WEAR APPROP PERSONAL PROT EQUIP, INCL APPROP NIOSH APPRVD RESP PROT. CONTAIN SPILL IF POSS. WIPE UP/ABSORB ON SUITABLE MATL & SHOVEL UP. PVNT ENTRY INTO SEWERS & WATERWAYS. AVOID CONT W/SKIN, EYES/CLTHG. IF
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods: DISPOSAL MUST BE I/A/W FEDERAL, STATE & LOCAL REGULATIONS (FP N). FOR MORE SPECIFIC INFORMATION CONTACT NEHC (FP N).
Handling And Storage Precautions: STORE AWAY FROM HEAT & OPEN FLAME. PERIODS OF EXPOS TO HIGH TEMPS SHOULD BE MINIMIZED. WATER CONTAM SHOULD BE AVOIDED. KEEP AWAY FROM HEAT & FLAME.
Other Precautions: AVOID BREATHING VAPOR, MIST, OR GAS. KEEP CONTAINERCLOSED. NEVER SIPHON BY MOUTH. USE ONLY WITH ADEQUATE VENTILATION.

==========

Fire and Explosion Hazard Information

==========

Flash Point Method: CC
Flash Point Text: 125F,52C
Lower Limits: 0.5%
Upper Limits: 4.1%
Extinguishing Media: USE WATER SPRAY, DRY CHEMICAL, FOAM/CARBON DIOXIDE TO EXTINGUISH FLAMES. USE WATER SPRAY TO COOL FIRE-EXPOSED CNTNRS.
Fire Fighting Procedures: NIOSH APPRVD SCBA & FULL PROT EQUIP (FP N). APPROACH FIRE FROM UPWIND TO AVOID HAZ VAPS & TOX DECOMP PRODS. DECONTAM/DISCARD ANY CLTHG CONTAINING CHEM (SUPDAT)
Unusual Fire/Explosion Hazard: NONE.

==========

Control Measures

==========

Respiratory Protection: NIOSH APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N). FOR MORE SPECIFIC INFORMATION CONTACT NEHC (FP N).
Ventilation: LOC EXHAUST VENT REC IF GENERATING VAP, DUST/MIST. IF EXHAUST VENT IS NOT AVAIL/INADEQ, USE NIOSH APPRVD RESP AS APPROP.
Protective Gloves: CHEMICAL RESISTANT GLOVES.
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGLES (FP N).
Other Protective Equipment: ANSI APPRVD EYE WASH & DELUGE SHOWER (FP N). COVERALLS/LAB COATS, IMPERVIOUS SUITS, GLOVES, & RUBB BOOTS.
Work Hygienic Practices: LAUNDER/DRY-CLEAN WHEN SOILED. AVOID CONT W/EYES, SKIN & CLTHG. WASH THOROUGHLY AFTER HANDLING.
Supplemental Safety and Health: FIRE FIGHT PROC:RESIDUES. EXPLAN OF CARCIN: CARCIN FED REGISTER, VOL 52, PG 34460, 1987:OSHA-CANCER HAZ. HUMAN:MYELOID LEUKEMIA, HODGKINS DISEASE, LYMPHOMIA. EFTS OF OVEREXP:SEVERAL MOUTHFULS ARE SWALLOWED, ABDOM DISCOMFORT, NAUS, & DIARR M AY OCCUR. ASPIR MAY OCCUR DURING SWALLOWING/VOMIT RSLTG IN LUNG DMG. TOX:

==========

Physical/Chemical Properties

==========

B.P. Text: 650F,343C
Vapor Pres: <10 @ 68F
Spec Gravity: 0.8521(WATER=1)
Evaporation Rate & Reference: NOT KNOWN
Appearance and Odor: BRIGHT AND CLEAR LIQUID (TAX EXEMPT DIESELS-PALE RED LIQUID), PETROLEUM ODOR.

==========

Reactivity Data
==========
Stability Indicator: YES
Stability Condition To Avoid: NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: HEAT, STRONG OXIDIZERS.
Hazardous Decomposition Products: PRODS EVOLVED WHEN SUBJECTED TO HEAT/COMBUST:TOX LEVELS OF CO*2, CO, IRRITATING ALDEHYDES & KETONES.
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: NOT RELEVANT.
==========
Toxicological Information
==========
==========
Ecological Information
==========
==========
MSDS Transport Information
==========
==========
Regulatory Information
==========
==========
Other Information
==========
==========
HAZCOM Label
==========
Product ID: 02624 DIESEL FUEL
Cage: 2R503
Company Name: TEXACO REFINING AND MARKETING INC
Street: 1111 RUSK ST
City: HOUSTON TX
Zipcode: 77002-3310
Health Emergency Phone: 914-831-3400;800-424-9300(CHEMTREC)
Label Required IND: Y
Date Of Label Review: 03/04/1997
Status Code: C
Label Date: 03/04/1997
Origination Code: G
Chronic Hazard IND: Y
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: DANGER
Respiratory Protection IND: YES
Health Hazard: Severe
Contact Hazard: Severe
Fire Hazard: Moderate
Reactivity Hazard: None
Hazard And Precautions: COMBUSTIBLE. ACUTE:EYES:IRRITATION; DISCOMFORT, & REDNESS. SKIN:SEVERE IRRITATION; PAIN, REDNESS, SWELLING, CHEMICAL BURNS, BLISTERS, TISSUE DAMAGE. INHAL:IRRITANT. DIZZINESS, DROWSINESS, EUPHORIA, LOSS OF COORDINATION, DISORIENTATION, HEAD ACHE, NAUSEA, & VOMITING. INGEST:ABDOMINAL DISCOMFORT, NAUSEA, & DIARRHEA. ASPIRATION MAY OCCUR RESULTING IN LUNG DAMAGE. CHRONIC:CANCER HAZARD. CONTAINS BENZENE WHICH IS LISTED AS A HUMAN BLOOD CARCINOGEN (FP N). KIDNEY DAMAGE. SKIN DERMAT ITIS. REPEATED/PRLGD OVEREXPOSURE MAY RESULT IN ABSORPTION OF POTENTIALLY HARMFUL AMTS. REPEATED SKIN CONTACT MAY CAUSE A PERSISTANT IRRITATION OR DERMATITIS.
==========
Disclaimer (provided with this information by the compiling agencies): This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever expressly or implied warrants, states, or intends said information to have any application, use or viability by or to any person or persons outside the Department of Defense nor any person or persons contracting with any instrumentality of the United States of America and disclaims all liability for such use. Any person utilizing this instruction who is not a military or civilian employee of the United States of America should seek competent professional advice to verify and assume responsibility for the suitability of this information to their

particular situation regardless of similarity to a corresponding Department of Defense or other government situation.

CITGO PETROLEUM CORP -- NO 2 FUEL OILS, DIESEL FUELS-ALL GRADES, 1763

==========

MSDS Safety Information

==========

FSC: 9150
MSDS Date: 11/11/1994
MSDS Num: BXWZC
LIIN: 00N060728
Product ID: NO 2 FUEL OILS, DIESEL FUELS-ALL GRADES, 1763
MFN: 01
Responsible Party
Cage: 1JW40
Name: CITGO PETROLEUM CORP
Box: 3758
City: TULSA OK 74102
Info Phone Number: 918-495-5933
Emergency Phone Number: 800-424-9300(CHEMTREC)
Published: Y

==========

Contractor Summary

==========

Cage: 1JW40
Name: CITGO PETROLEUM CORP
Address: OFF HWY 108
Box: 3758
City: LAKE CHARLES LA 70602
Phone: 918-561-5165
Cage: 12518
Name: CITIES SERVICE CO
Address: 110 W 7TH
Box: 300
City: TULSA OK 74102
Phone: UNKNOWN

==========

Ingredients

==========

Name: NO INGREDIENT FOR THIS FORMULATION_INGREDIENT

==========

Health Hazards Data

==========

LD50 LC50 Mixture: SEE INGREDIENTS
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: YES
Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO
Effects of Exposure: LOW HAZ UNDER AMBIENT CNDTNS. VAPS, MISTS & FUMES HAZ. NORMALLY OF LOW TOX EXCEPT ON INGEST, IF MISTING OCCURS/DERM ABSORP. ACUTE:INHAL:MISTS/FUMES ABOVE TLV MAY CAUSE TRANSIENT EUPHORIA, RESP & GI IRRIT, HDCH, DIZZ, CNS & GENERALIZED DEPRE SS, COMA, PARTICULARLY IN OXYG-DEFICIENT ATM. PULM IRRIT. SKIN:(EFTS OF OVEREXP)
Explanation Of Carcinogenicity: NOT RELEVANT
Signs And Symptions Of Overexposure: HLTH HAZS:MILD TEMP IRRIT. EYES:MILD TO MOD IRRIT. INGEST:TOX DOSE:1 OZ TO 1 PINT FOR HUMAN ADULT. SYMPS INCLUDE BURNING OF MOUTH & UPPER GI TRACT, VOMIT & DIARR. LESS THAN 1 OZ W/RETENTION MAY PRDCE GEN DEPRESS, SEDATION, RESP & CARDIAC IN SUFFICIENCY & COMA. INJECTION:IRRIT, ERYTHEMA, EDEMA. CHRONIC:PRLNGD,
Medical Cond Aggravated By Exposure: PRE-EXISTING DERMATOSIS.
First Aid: INHAL:REMOVE FROM EXPOS, SEEK IMMED MED AID. SKIN:WASH W/SOAP & WATER. DO NOT WEAR HEAVILY CONTAM CLTHG BEFORE CLEANING. EYES:FLUSH W/LG VOLS OF TEPID WATER FOR @ LST 15 MIN. INGEST:DO NOT INDUCE VOMIT. SEEK MED AID. INJECTION:SEEK IMMED ME D AID. NOTE TO MD:THIS IS LOW VISCOSITY MATL, W/SAYBOLT VISCOSITY @ 100F OF 32.6-40 SUS. IF INGEST & VOMIT OCCURS, THERE EXISTS HIGH PULM ASPIR HAZ, (SUP DAT)

==========

Handling and Disposal

==========
Spill Release Procedures: REMOVE SOURCES OF IGNIT, VENT AREA. SM SPILLS:TAKE UP W/NONCOMBUST ABOSRB SUCH AS FULLERS EARTH/SAND. PLACE INTO CNTNRS FOR LATER DISP. LG SPILLS:CNTN SPILL IN EARTHEN DIKES FOR LATER RECOVERY. CTL IGNIT SOURCES AROUND SPILL AREA. FIRE-FIGH T
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods: DISP MUST BE I/A/W FED, STATE & LOC REGS(FPN). IT IS RESPONSIBILITY OF USER TO DETERM IF MATL IS HAZ WASTE AT TIME OF DISP. CHECK BEFORE DISPOSING TO BE SURE YOU ARE IN COMPLIANCE W/ALL APPLIC LAWS & REGS. RCRA EMER HOTLINE #:800-424-9346.
Handling And Storage Precautions: KEEP CNTNR TIGHTLY CLSD & AWAY FROM HEAT & FLAME. DO NOT STORE W/STRONG OXIDIZERS. CAUTN:COMBUST LIQ. DO NOT INHALE VAPS, FUMES/MISTS. PVNT DERM CONT.
Other Precautions: CAUTN:EMPTY CNTNRS MAY CNTN PROD RESIDUE WHICH COULDINCLUDE FLAM/EXPLO VAPS. CONSULT FED, STATE & LOC AUTHS BEFORE REUSING,RECNDTNING, RECLAIMING, RECYCLING/DISP OF EMPTY CNTNRS &/OR WASTE RESIDUESOF PROD. PROT MEASURES DURING
==========
Fire and Explosion Hazard Information
==========
Flash Point Method: CC
Flash Point Text: >126F,>52C
Extinguishing Media: CO*2, DRY CHEMICAL, FOAM, WATER FOG.
Fire Fighting Procedures: WEAR NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire/Explosion Hazard: MATERIAL IS HIGHLY VOLATILE AND EMITS VAPORS WHICH MAY BE IGNITED BY OTHER IGNITION SOURCES.
==========
Control Measures
==========
Respiratory Protection: NIOSH/MSHA APPROVED ORGANIC RESPIRATOR ABOVE THE TLV'S.
Ventilation: USE IN WELL VENT AREA. IN CONFINED SPACES, MECH VENT MAY BE REQ TO KEEP LEVELS OF CERTAIN COMPONENTS BELOW
Protective Gloves: OIL IMPERVIOUS GLOVES.
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGS &(SUPDAT)
Other Protective Equipment: ANSI APPRVD EMER EYE WASH & DELUGE SHOWER (FP N). WEAR BODY-COVERING WORK CLTHS TO AVOID PRLNGD/RPTD EXPOS.
Work Hygienic Practices: WASH EXPOSED SKIN THOROUGLY WITH SOAP AND WATER. LAUNDER SOILED WORK CLOTHES BEFORE REUSE.
Supplemental Safety and Health: APPEAR & ODOR:OIL/DIESEL FUEL:WATER WHITE TO LEMON LIQ, PETROL ODOR. FIRST AID PROC:POSS INDUCING LIPOID PNEUM. FOR QTYS >FEW DROPS, USE CAREFUL GASTRIC LAVAGE W/TIGHT FITTING, CUFFED ENDOTRACHEAL TUBE. EYE PROT:FULL LENGTH FACE SHIELD (FP N).
==========
Physical/Chemical Properties
==========
B.P. Text: >342F,>172C
Vapor Density: >1
Spec Gravity: 0.87 (H*2O=1)
Solubility in Water: NEGLIGIBLE
Appearance and Odor: HIGH SULFUR FUEL OIL/DIESEL FUEL:RED LIQ, PETROL ODOR. LOW SULFUR FUEL (SUP DAT
==========
Reactivity Data
==========
Stability Indicator: YES
Stability Condition To Avoid: HEAT, FLAME.
Materials To Avoid: CAUSTICS, OXIDIZING AGENTS AND STRONG ACIDS.
Hazardous Decomposition Products: CO*2, (CO UNDER INCOMPLETE COMBUSTION).
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: NOT RELEVANT
==========
Toxicological Information
==========
==========
Ecological Information
==========
==========

MSDS Transport Information

==========

==========

Regulatory Information

==========

==========

Other Information

==========

==========

HAZCOM Label

==========

Product ID: NO 2 FUEL OILS, DIESEL FUELS-ALL GRADES, 1763
Cage: 1JW40
Company Name: CITGO PETROLEUM CORP
Street: OFF HWY 108
PO Box: 3758
City: LAKE CHARLES LA
Zipcode: 70602
Health Emergency Phone: 800-424-9300(CHEMTREC)
Label Required IND: Y
Date Of Label Review: 06/14/1995
Status Code: C
Label Date: 06/14/1995
Origination Code: G
Chronic Hazard IND: Y
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: WARNING
Respiratory Protection IND: YES
Health Hazard: Moderate
Contact Hazard: Moderate
Fire Hazard: Moderate
Reactivity Hazard: None
Hazard And Precautions: FLAMMABLE. ACUTE:INHAL:MISTS/FUMES ABOVE TLV MAY CAUSE TRANSIENT EUPHORIA, RESP & GI IRRIT, HDCH, DIZZ, CNS & GENERALIZED DEPRESS, COMA, PARTICULARLY IN OXYG-DEFICIENT ATM. SKIN:MILD TEMPORARY IRRIT. EYE:MILD TO MOD IRRIT. INGEST:TOX DOSE:1 OZ TO 1 PINT FOR HUMAN ADULT. SYMPS INCLUDE BURNING OF MOUTH & UPPER GI TRACT, VOMITING AND DIARRHEA. LESS THAN 1 OZ WITH RETENTION MAY PRODUCE GENERAL DEPRESSION, SEDATION, RESP & CARDIAC INSUFFICIENCY & COMA. INJECTION:IRRIT, ERYTHEMA, E DEMA. CHRONIC:PRLNGD, RPTD DERM CONT MAY CAUSE DRYING, CRACKING, DERMATOSES. DIESEL EXHST MAY BE CONSIDERED POTNTL CANCER HAZ. TARGET ORGANS:LUNGS, CNS (DEPRESSANT).

==========

APPENDIX G

FIELD OPERATING PROCEDURES

APPENDIX G

FIELD OPERATING PROCEDURES

The WESTON Field Operating Procedures (FLDs) relevant to the Non-time Critical Removal Action at this site are FLDs 01, 02, 05, 06, 07, 10, 11, 12, 18, 19, 20, 22, 23, 24, 28, 29, 30, 41, and 47. These FLDs are included in the WESTON Field Safety Officers Manual. A hard copy of the manual will be maintained in the on-site project office. An electronic copy can be accessed and downloaded from the WESTON internet website.