
UNIVERSAL WASTE AND TRANSIT INC.

CONSTRUCTION PERMIT APPLICATION

LOCATED AT

**7208 - 9th Avenue
Tampa, Florida**



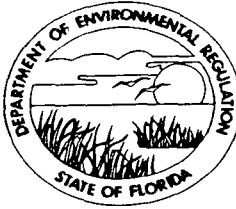
VOLUME 2

Contingency Plan

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

SOUTHWEST DISTRICT

4520 OAK FAIR BLVD.
TAMPA, FLORIDA 33610-7347
813-623-5561
Suncom—552-7612



BOB MARTINEZ
GOVERNOR
DALE TWACHTMANN
SECRETARY
DR. RICHARD D. GARRITY
DISTRICT MANAGER

December 1, 1987

RECEIVED

DEC 02 1987

Hazardous Waste

Mr. James H. Scarbrough, P.E., Chief
Residuals Management Branch
Waste Management Division
U.S. Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, Georgia 30365


Re: Universal Waste & Transit, Inc., EPA I.D. No. applied for
Construction Permit Application HC29-141782

Dear Mr. Scarbrough:

In accordance with the Memorandum of Agreement FDER/EPA,
Section V.C., I am enclosing a permit application submitted by the
referenced facility on November 12, 1987.

For any questions, please contact me at 813/623-5561.

Sincerely,


Armando Gonzalez
Permitting Engineer
Hazardous Waste Section

AG/br

cc: Satish Kastury - DER/Tallahassee

HAZARDOUS WASTE CONTINGENCY

AND

EMERGENCY RESPONSE PLAN

for

Universal Waste & Transit, Inc.

located at

9th Avenue and Orient Rd.

Tampa, Florida

October 1987

RECEIVED

DEC 02 1987

Hazardous Waste

E. H. R.

NOV 12 1987

SOUTH

UNIVERSAL WASTE & TRANSIT
HAZARDOUS WASTE CONTINGENCY
AND
EMERGENCY RESPONSE PLAN
CONTENTS

<u>Chapter</u>	<u>Page</u>
Introduction	1
I. Organization and Communications	2
II. Hazardous Waste Emergency Procedures	8
III. Emergency Equipment and Alarm System	21
IV. Care for the Injured	26
V. Emergency Waste Movement Coordination	29
VI. Emergency Waste Movement - Flood/Hurricane Situation	32
Enclosures	
Appendix 1 - Personnel Protective Equipment	
Appendix 2 - Anticipated Response Actions for Certain Compounds	
- Reference Key to Response Index	
- Response Definitions	
Appendix 3 - Decontamination Procedures	
Attachment 1 - Space Utilization	
Attachment 2 - Discharge Log	
Attachment 3 - Escape Routes	
Attachment 4 - Common Solvents	
Attachment 5 - Incompatible Materials	
Attachment 6 - Explosives List	
Attachment 7 - Peroxides	

UNIVERSAL WASTE & TRANSIT, INC.
HAZARDOUS WASTE CONTINGENCY/EMERGENCY PLAN

Introduction

The purpose of this plan is to provide Universal Waste & Transit employees with an organized procedure for responding to unusual occurrences or emergencies involving hazardous chemicals or wastes when such releases could cause potential harm to human health or the environment. This plan is designed to present as simply as possible the necessary steps required in an emergency.

Emergencies covered under this procedure are fires, explosions, floods, hurricanes or unplanned sudden and non-sudden release into the environment of hazardous waste including liquids, vapors and particulates.

NOV 1 8 1987
SOUTH WEST FLORIDA
TAMPA

UNIVERSAL WASTE & TRANSIT, INC.
HAZARDOUS WASTE CONTINGENCY AND EMERGENCY PLAN
CHAPTER I
ORGANIZATION AND COMMUNICATIONS

SCOPE

The purpose of this section is to establish the organizational structure which will be in force during a response to a chemical emergency and what procedures will be utilized to notify corporate officials, outside response teams, local government authorities, and State and Federal Regulatory Agencies.

EMERGENCY RESPONSE NOTIFICATIONS

In the event of an emergency situation involving hazardous chemicals or wastes, the personnel listed below shall be responsible for coordinating the necessary response and/or cleanup.

During normal working hours (Monday - Friday: 8:00 am to 5:00 pm) UW&T headquarters is to be notified immediately upon discovery of an emergency situation involving hazardous chemicals or wastes.

Universal Waste & Transit Corporate Headquarters:

7217 - Gulf Blvd., Suite 7

St. Petersburg Beach, FL 33706

813/360-9100

a toll free number will become part of this contingency plan when operations are begun.

Headquarters will notify, via mobile telephone or voice pager, the required UW&T personnel for response to the scene. UW&T emergency response vehicles are equipped with necessary cleanup/safety materials and first aid supplies.

After normal working hours contact the following:

Universal Waste & Transit Emergency Coordinators:

Robert Bedore - Primary

813/864-4076

Richard Powell - Alternate

813/831-1871

voice pager numbers will be assigned when operations are begun

All Emergency Coordinators have the authority to commit corporate funds during an emergency incident.

FIRE DEPARTMENT AND OUTSIDE CONTRACTOR NOTIFICATIONS

In any emergency situation contact the following:

1. Call Tampa Fire Department, Dial 223-4211 Indicate the extent and type of emergency which exists (fire, spill etc.)

2. In the event of emergencies involving chemical spills, leaks or explosions at the direction of the UW&T Emergency Coordinator the following spill control contractors should be notified:

a. Haztech

7813 B Professional Place

Tampa, Florida 33610

813/988-5650

b. O H Materials Emergency Response Group

1-800-537-9540

90 Almon Road

Covington, Georgia 30209

GOVERNMENT AGENCY NOTIFICATION

In the event of an emergency where environmental contamination is eminent, in addition to notifying the City of Tampa, the following governmental agencies will be notified by the UW&T Emergency Coordinator or his designated representative:

1. Florida DER Emergency Response - (904) 488 0300 (normal working hours)
(904) 488 1900 (nights)
2. Tampa Hazmat Team 681-9927
3. National Response Center 1-800-424-8802
4. Florida DER
District Office (Tampa) 623-5561 (normal working hours)
5. U.S. Coast Guard
(Tampa Office Marine
Safety Division) 228-2189
6. Tampa Sewer District 223-8078
7. Hillsborough County
Environmental Protection
Division 272-5965
8. Florida Marine Patrol 893-2221
9. Civil Emergency Services 272-6849

These telephone numbers are correct as of September 20, 1987.

The following information will be communicated to the governmental agencies contacted.

1. Name and telephone number of the reporter.
2. Name and address of the facility.
3. Time of the incident.
4. Type of incident (whether fire, explosion, or release).
5. Name of the material released.
6. Quantity of the material released.
7. Extent of injury or injuries, if any.
8. Possible hazards to human health or the environment, outside the facility.

UNIVERSAL WASTE & TRANSIT, INC.
HAZARDOUS WASTE CONTINGENCY AND EMERGENCY PLAN
CHAPTER II
HAZARDOUS WASTE EMERGENCY PROCEDURES

PURPOSE

The purpose of this section is to alert all emergency response groups, regulatory agencies and affected parties, as to the location of the hazardous waste storage areas within the facility and the procedures to be followed in response to emergencies in these areas. IT MUST BE UNDERSTOOD THAT POTENTIALLY TOXIC GASES AND VAPORS MAY BE PRESENT IN ANY FIRE INVOLVING HAZARDOUS MATERIALS.

COMMUNICATION

The following people must be notified in the event of an emergency involving hazardous waste:

1. Primary Emergency Coordinator Robert Bedore
864-4076
2. Alternate Emergency Coordinator Richard Powell
831-1871

(voice pager number to be included upon commencement of operations)

3. Facility Manager (Alternate
Emergency Coordinator)
to be named at commencement of operations

All other notifications are included in Chapter I.

EMPLOYEE RESPONSE

1. Notification to evacuate the UW&T facility in an emergency would be handled by one of two methods. These are:
 - a. Emergency air horns with flashers are located throughout the facility and are sounded when evacuation is necessitated.
 - b. An intercom system is also located throughout the facility and can also be used for notifying employees to evacuate the building. Verbal commands will be given should the intercom system be inoperative.
2. In the event of an emergency situation (spill, fire, explosion the first employee to notice the emergency is to immediately sound the emergency air horns located throughout the building. These horns are color coded green for ease of identification.
3. All employees are to don the necessary protective clothing including self contained breathing apparatus (SCBA). This equipment is located in the main storage area in green safety equipment cabinets. Additional safety equipment is located in the equipment trailer. A complete outline of required safety equipment for various situations is included as Appendix 1.
4. Fire fighting or spill containment should begin immediately under the direction of the facility manager/supervisor until the UW&T Emergency Coordinator arrives on-site. Procedures are identified later in this chapter. Particular response actions are indicated in Appendix 2. Refer to the CHRIS Manual for additional information.

5. The facility supervisor is to contact the UW&T Emergency Coordinator by telephone immediately. (Telephone numbers are listed in Chapter I).
6. In the event of a fire or explosion, the sprinkler system will be automatically activated. Both the sprinkler system and fire hoses are monitored on a 24-hour basis. When the sprinklers or fire hoses are activated the Tampa Fire Department will be immediately notified.
7. Electric should be shut off in the event of a fire or explosion. The main electric shut-off is located on the south wall and prominently identified as such. No additional process systems, valves, gages, or equipment are required to be monitored or shut down since no potentially dangerous processes are employed at the facility.
8. In situations immediately dangerous to life and health (IDLH) evacuation of the facility may be necessary. This decision will be made by the Emergency Coordinator or facility supervisor. If the evacuation occurs, the primary evacuation route should be used unless blocked or impassable. In that situation, the secondary evacuation route should be employed. Both routes are prominently outlined at the facility and are included with this plan.

ENTRANCE PROCEDURES

The following procedures are to be followed by all response personnel before entering the hazardous waste storage areas in emergency situations:

1. Consult the attached facility drawing which indicates both types and locations of materials which would be stored in the area to be entered. A general description of these areas is included in the next section.
2. Assume toxic/hazardous materials present in the area. A complete inventory is kept in the office area. Keys to the office area located on a lock box at the main gate.
3. Select proper protective gear, including SCBA.
4. Consult DOT P 5800.2 Hazardous Materials Emergency Response Guide Book which is in the office area.

Remember, the primary responsibility during initial emergency response efforts is to save lives and protect the environment.

FACILITY LOCATIONS OF HAZARDOUS WASTE

(Reference Attachment I)

1. Main Storage Room
 - a. Emergency Response/Safety Equipment
 - b. Main Electrical Disconnect
 - c. Sprinkler Standpipe
 - d. Foam Tank
 - e. General Storage area for Non-Flammable Waste
2. Secondary Storage Area (trailers)
 - a. Non-Flammable waste awaiting transport
3. Treatment Area
 - a. Solidification (Filter Press)
4. Flammable Storage (explosion - proof room)
 - a. Drummed Flammable Liquids
5. Office/Lab Area

SPILL RESPONSE PROCEDURES

In the event of a spill, certain procedures must be instituted immediately. The facility is designed so that the simultaneous rupture of most containers would result in no release of contaminants outside of the facility.

The storage area for acidic and alkaline wastes are segregated to insure that no co-mingling of these materials will result.

Should a spill occur, the following steps are to be taken:

1. Don protective equipment located in the main room in green safety cabinets.
2. Contact UW&T Emergency Coordinator by telephone.
3. Contain the spill with either sorbent boom, sorbent pillows, or bulk sorbent material. All sorbents and booms are stored in the spill control storage area.
4. In the event of an acid/alkaline spill use calcium carbonate to neutralize the material.
5. Once the spill has been contained, begin cleanup.
6. Contact Haztech and request mobilization of portable treatment system is necessary. (Telephone # 988-5650)
7. Complete the Discharge Log shown as Attachment 2.
8. A complete list of response actions for specific chemical spills is included as Appendix 2.
9. If immediate evacuation of the building is required escape air packs are located throughout the building. Additional SCBA's and level "A" and "B" clothing are located in the emergency response area.

RE-ENTRY MONITORING

Before employees are allowed to return to the area, after an emergency, the on-site Emergency Coordinator will confirm that the area is safe for re-entry. This will be accomplished by physical inspection of the area, the use of detection equipment, followed by decontamination as necessary. Chemical detection equipment available to the Emergency Coordinator is as follows:

1. Chemical detector tubes - Draeger, MSA
 2. Explosion meter
 3. Portable hydrocarbon monitors
 4. Portable gas chromatograph
 5. Portable pH/specific ion meter
 6. A fully equipped environmental laboratory is located nearby.
- Any wet chemical or instrumental analyses can be performed as required.

DECONTAMINATION PROCEDURE

After an emergency incident, decontamination of equipment is required. All expendable items, such as sorbent, booms and so on are to be placed into 55-gallon drums, analyzed, and disposed as required by state and federal law. Non-expendable items such as tools, chemical suits and material handling equipment are to be cleaned in an appropriate solvent and placed back in their normal location. The suitable solvent will be determined by UW&T's senior chemist.

All containerized waste will be thoroughly inspected for leaks, pressure buildup and structural integrity by the sit supervisor as well as a UW&T chemist. Any deficiencies will be immediately corrected.

Air monitoring will be performed as required to insure that the facility is safe to resume normal operations.

A complete list of all available emergency equipment is included in Chapter III. Specific decontamination solutions are included as Appendix 3.

LOCAL AGENCY RESPONSE PLAN FAMILIARITY

The City of Tampa Fire & Police Departments, USCG; Florida DER and an outside spill response contractor will have been notified as to the operation of this facility prior to commencement of operations. All agencies will have inspected the site and will be aware of waste locations; access; on-site emergency equipment and available fire protection items. A copy of the contingency plan will be sent to:

Chief Earl Goff	City of Tampa Fire Dept.
Chief Austin McLane	City of Tampa Police Dept.
Lt. McDowell	USCG
Mr. John Lee	Haztech Operations Manager
	Emergency Response Team

Notification will be made to Humana Hospital Brandon and Centro Espanol Memorial Hospital relative to the materials handled, potential exposures and possible accidents which may occur.

HAZARDOUS MATERIALS EMERGENCY RESPONSE REFERENCES

The following is a list of references available at UW&T corporate headquarters and at the storage facility manager's office.

1. CHRIS - Hazardous Chemical Data, Department of Transportation/U.S. Coast Guard.
2. Hazardous Materials Emergency Response Guidebook, Department of Transportation/DOT P 5800.2.
3. Merck Index
4. Handbook of Hazardous Materials, Sax
5. Florida Fire Code
6. Cancer Causing Chemicals, Sax.
7. Toxic Organic Chemicals, E. Ellsworth Hackman III
8. NIOSH Registry of Toxic Effects of Chemical Substances
9. Emergency First Aid, American Red Cross

UNIVERSAL WASTE & TRANSIT, INC.
HAZARDOUS WASTE CONTINGENCY/EMERGENCY RESPONSE PLAN
CHAPTER III
EMERGENCY EQUIPMENT AND ALARM SYSTEMS

PURPOSE

This chapter describes the emergency equipment and alarm systems at the UW&T facility.

EMERGENCY EQUIPMENT LOCATED AT STORAGE AREA

All equipment listed below is stored in the spill control storage area:

1. Fire extinguishers located throughout the building and prominently identified by signs and red markings. All are ABC extinguishers which can be used in any fire which may occur. Several halon extinguishers are located in the flammable storage area.
2. Hazorb sorbent used to absorb any chemical spill.
3. Oil-Dri and sawdust used for solvent and oil spills.
4. Calcium carbonate used to neutralize acids and alkalies.
5. Spill control/sorbent booms used to contain any spill.
6. Protective clothing including PVC suits and polyethylene splash suits.
7. Full-face respirators, half-face respirators, air-line respirators and SCBA's for respiratory protection.
8. Gloves, boots, faceshields, goggles and hardhats to be used as protective equipment.
9. Plug and dike sealant used to seal leaking drums and tanks.

10. Air powered pumps with hose for removal of liquids or water.
11. Two inch Patay pump for removal of any flammable liquids.
12. Drum pumps for removal of any containerized liquids.
13. Fork lift with barrel attachment for material handling.
14. Compressed air cylinders to be used in conjunction with air supplied respirators.
15. Shovel, brooms, buckets, mops, tools, bung wrenches, etc.
16. Telephones located on the north and south walls of the main storage area; in the flammable room, and in the office area.
17. Empty 55-gallon DOT 17H and 17C containers.
18. Empty 85 and 110-gallon overpack drums for recontainerizing damaged or leaking 55-gallon drums.

COMMUNICATIONS AND ALARM SYSTEMS

1. Aerosol can horns with flashers are located throughout the hazardous waste storage area. In case of a spill, explosion, or other emergency, these can be used to alert all employees.
2. An intercom system for verbal notification is located throughout the building.
3. An emergency shower is located in the main storage area. Eye wash systems are located throughout the building.
4. Flame and smoke detection in the flammable storage area. Lower explosive limit monitors in the flammable storage area and smoke detectors in the general storage area.

UNIVERSAL WASTE & TRANSIT, INC.

HAZARDOUS WASTE CONTINGENCY AND EMERGENCY PLAN

CHAPTER IV

CARE FOR THE INJURED

SCOPE AND POLICY

The objective is to provide first aid or immediate care for a person who has been injured, or has been suddenly taken ill, in the event of an emergency.

All employees of UW&T shall have been trained in standard first aid and cardiopulmonary resucitation programs offered and presented by the American Red Cross.

PLAN

In the event of an emergency, the UW&T facility manager shall be in charge until the arrival of the Emergency Coordinator.

All injured shall be taken to either Humana Hospital Brandon or Centro Espanol Memorial Hospital by the local life squad. Both hospitals will have been notified as to the type of injuries which may result at our facility.

The nearest life squad is the City of Tampa. They can be contacted by dialing 681-4422.

Contact Humana Hospital Brandon at 681-5511. Inform them of the extent of the emergency and what injuries to expect. Contact Centro Espanol Hospital at 879-1550 if necessary.

Implement emergency first aid as required.

UNIVERSAL WASTE & TRANSIT

HAZARDOUS WASTE CONTINGENCY AND EMERGENCY PLAN

CHAPTER V

EMERGENCY WASTE MOVEMENT COORDINATION

EMERGENCY WASTE MOVEMENT COORDINATION

In the event of an emergency situation, where the movement of waste materials is required on a short-term basis, the following procedures are too be employed:

1. Contact Mr. Robert Bedore at 864-4076 or

Mr. Richard Powell at 831-1871

Both toll-free and voice pager numbers will be added to this document upon commencement of operations.

2. Contact all UW&T drivers. All trucks are kept at the site.

3. Contact additional transportation firms if required:

- Chemical Conservation Corp. (305) 859-4441

- Florida Waste Pumping Service (813) 996-4822

(tankers)

4. All containers would temporarily be held on storage trailers in compliance with the Florida transfer facility regulations.

5. Contact Florida DER, Emergency Response Group, to inform them of the emergency waste movement. The number for Florida DER, Emergency Response is (904) 488-1900. Contact Florida DER District Office in Tampa at 623-5561 and notify them of same.

6. After all notifications have been performed, begin placing all drums onto the storage trailers in the following order:

Reactives

Corrosives

Oxidizers

Flammable Solids

Poisons

Flammable Liquids

ORM-E

Consumer Commodities

7. Upon arrival of the drivers on contractor vehicles begin moving the various trailers to the far west portion of the property. Keep accurate records as to the quantity of material placed on each and their hazard class. Continue this operation until all drums have been removed.
8. Complete all shipping documents as required.

UNIVERSAL WASTE & TRANSIT, INC.
HAZARDOUS WASTE CONTINGENCY AND EMERGENCY PLAN
CHAPTER VI
EMERGENCY WASTE MOVEMENT - FLOOD OR HURRICANE SITUATION

EMERGENCY WASTE MOVEMENT - FLOOD OR HURRICANE SITUATION

In the event of an unexpected or rapid rise of flood waters or hurricane situations certain actions must be taken immediately.

1. Contact the UW&T Emergency Coordinator or his alternate immediately.
2. Contact DER Emergency Response and the District Office in Tampa. Telephone numbers for these groups are indicated in Chapter I.
3. Contact all UW&T drivers and the contract transportation firms listed in Chapter V.
4. If rising waters are sufficient to warrant concern (possible entry into the facility) the UW&T Emergency Coordinator or his alternate will contact Haztech for mobilization of the portable water treatment system.
5. If rising waters pose a potential hazard the following should be performed immediately:
 - a. Immediately implement the "Emergency Waste Movement Plan" detailed in Chapter V.
 - b. All personnel are to remain at the facility.

Universal Waste & Transit will stay apprised of all potential flood or hurricane situations by monitoring existing weather related agencies.

Federal Aviation Administration	531-0500
National Weather Service	645-2181
U.S. Coast Guard	535-1437

Universal Waste & Transit will also monitor all weather bulletins through radio transmissions. This should give sufficient warning of any potentially approaching flood or hurricane.

APPENDIX 1

PERSONNEL PROTECTIVE EQUIPMENT

In order to adequately protect yourself from hazardous exposures, personnel protective equipment must be employed. Appendix 1 indicates various hazardous situations and the personnel protective equipment which is required.

PERSONNEL PROTECTIVE EQUIPMENT REQUIRED FOR HAZARDOUS SITUATIONS

Level A Protection

HAZARD INVOLVED

- Situations immediately dangerous to life and health.
- Oxygen deficient atmospheres.
- Unknown hazardous materials.
- Chemicals which can be absorbed through the skin.
- Materials which cannot be removed with an air purifying respirator.

REQUIRED PERSONNEL PROTECTION EQUIPMENT

- Self-contained breathing apparatus (SCBA) or air line respirator with SCBA escape air system.
- Full Body Encapsulation Suit

ALL listed personal protective equipment is required for any hazard situation indicated.

PERSONNEL PROTECTIVE EQUIPMENT REQUIRED FOR HAZARDOUS SITUATIONS

Level B Protection

HAZARD INVOLVED

- Oxygen deficient atmosphere where chemical composition of the material is known and falls into the classification of an irritant.

REQUIRED PERSONNEL PROTECTION EQUIPMENT

- Self contained breathing apparatus or air line respirator with SCBA for emergency use.
- PVC splash suit with hood.
- Neoprene/nitrile/butyl rubber arm length gloves.
- Steel toed rubber boots.

All listed personal protective equipment is required for any hazard situation indicated.

PERSONNEL PROTECTIVE EQUIPMENT REQUIRED FOR HAZARDOUS SITUATIONS

Level C Protection

HAZARD INVOLVED

- Situations not immediately dangerous to life and health.
- Sufficient oxygen present to support life.
- Irritant or corrosive chemicals.
- Contaminated soils.
- Liquid/solvents not immediately dangerous to life and health.

REQUIRED PERSONNEL PROTECTION EQUIPMENT

- Full face mask with air purifying (cartridge) respirator. Or, half face (cartridge) respirator with goggles and face shield.
- PVC splash suit.
- Protective gloves (type dependent on chemical being handled).
- Steel toed rubber boots.

All listed protective equipment is required for any hazard situation indicated.

PERSONNEL PROTECTIVE EQUIPMENT REQUIRED FOR HAZARDOUS SITUATIONS

Level D Protection

HAZARD INVOLVED

- Situations which contain no immediate hazard, but where there is the potential for accidental release of a hazardous substance.

REQUIRED PERSONNEL PROTECTION EQUIPMENT

- Half face air purifying (cartridge) respirator.
 - Safety goggles.
 - Disposable coveralls.
 - Surgical rubber gloves or suitable hand protection.
- Rubber boots.

All listed personnel protective equipment is required for any hazard situation indicated.

APPENDIX 2

ANTICIPATED RESPONSE ACTIONS FOR CERTAIN COMPOUNDS

	Restrict Access	Restrict Ignition	Evacuate	Restrict Human Use	Restrict Farm Use	Restrict Industrial Use	Contain	Reference Key to Special Precautions/ Information
Acetaldehyde	X	X	X	X				1,2
Acetic Acid						X		1,2
Acetic Anhydride						X		1,2
Acetone	X	X						1,3,4
Acetonitrile	X	X		X		X		1,2
Acetophenone				X			X	2,9
Acetyl Bromide	X		X	X		X		1,2,3,8,11,18
Acetyl Chloride	X	X	X			X		1,2,3,5,8,11,18
Acetylene	X	X	X					1,4,6,20
Acrolein	X	X	X	X	X	X		1,2,5,6
Acrylamide	X			X	X	X		1,2
Acrylonitrile	X	X	X	X	X	X	X	1,2,5,12,19
Aldrin	X			X	X	X	X	1,2,9,12
Alkyl Benzene Sulfonic Acids	X							2,18
Allyl Alcohol	X	X		X				1,2,3,5,12
Allyl Chloride	X	X		X				1,2,5,12
Aluminum Chloride				X		X		1,2,5,8,11,18
Aluminum Fluoride								1,12
Aluminum Nitrate	X	X				X		1,2
Ammonia, anhydrous	X		X	X				1,2,5,11,20

APPENDIX 2

ANTICIPATED RESPONSE ACTIONS FOR CERTAIN COMPOUNDS

	Restrict Access	Restrict Ignition	Evacuate	Restrict Human Use	Restrict Farm Use	Restrict Industrial Use	Contain	Reference Key to Special Precautions/Information
Ammonium Bifluoride	X			X	X			1,2,18
Ammonium Chloride				X				1,2
Ammonium Dichromate	X	X		X	X	X		1,2,3,7,8,12,21
Ammonium Fluoride	X				X	X		1,2,18
Ammonium Hydroxide**	X		X	X				1,2
Ammonium Molybdate	X			X	X			7,12
Ammonium Nitrate	X	X		X		X		
Ammonium Oxalate	X			X	X			1,2
Ammonium Pentaborate	X				X			1,2
Ammonium Perchlorate	X	X		X		X		2,7
Ammonium Sulfide	X	X	X	X	X	X		1,2,5,6,8,12
Ammonium Thiocyanate	X			X	X			1,2
Amyl Acetate	X	X				X	X	1,2
Iso-Amyl Nitritelfonic Acids	X	X	X		X	X	?	1,2,3,5,6,8,12,19
n-Amyl Alcohol	X	X				X	X	1,3
n-Amyl Nitrate	X	X			X	X	?	1,2,12,21
n-Amyltrichlorosilane	X		X			X		1,2,8,11,12,18,21
Aniline	X				X	X	X	1,2,12,19
Antimony Pentachloride	X		X	X	X	X		1,2,8,18

**Dilute and disperse only when other corrective methods cannot be used.

APPENDIX 2

ANTICIPATED RESPONSE ACTIONS FOR CERTAIN COMPOUNDS

	Restrict Access	Restrict Ignition	Evacuate	Restrict Human Use	Restrict Farm Use	Restrict Industrial Use	Contain	Reference Key to Special Precautions/Information
Antimony Trioxide	X							1,2
Arsenic Acid	X			X	X	X		1,2,18
Arsenic Trichloride	X		X	X	X	X		1,2,5,8,18
Arsenic Trioxide	X			X	X	X		1,2
Barium Chlorate	X	X	X	X	X			1,2,7
Barium Nitrate	X	X		X	X			1,2,7
Barium Perchlorate	X	X	X	X	X			1,2,7
Benzaldehyde	X			X			X	1,2
Benzene	X	X		X		X	X	1,2,4,15
Benzophenone							X	2
Benzoyl Chloride	X			X		X	X	1,2,5,11,12,18
Beryllium, metallic	X	X						1,2,21
Beryllium Nitrate	X	X		X	X	X		1,2,18,21
Beryllium Oxide	X	X		X	X	X		1,2,21
Boron Trichloride	X		X			X		1,2,5,8,11,18,21
Bromine	X		X	X	X	X		1,2,5,8
Butadiene, inhibited	X	X	X			X		1,2,4,6,20
Butane	X	X	X			X		1,2,4,6,20
1,4-Butanediol				X	X			2
n-Butyl Acetate	X	X					X	1,2,19

APPENDIX 2

ANTICIPATED RESPONSE ACTIONS FOR CERTAIN COMPOUNDS

	Restrict Access	Restrict Ignition	Evacuate	Restrict Human Use	Restrict Farm Use	Restrict Industrial Use	Contain	Reference Key to Special Precautions/Information
n-Butyl Alcohol	X	X						3
Butylamine	X	X	X	X	X	X		1,2,5,6
Butylene Oxide	X	X	X	X	X	X		1,2,3,4,5,6,14
tert-Butyl Hydroperoxide	X	X		X		X		1,2,7
N-Butyl Mercaptan	X	X	X			X	?	1,2,5,6,12
Butyraldehyde	X	X		X			X	1,2
Cadmium Nitrate	X	X		X	X	X		1,2,3,7
Calcium Carbide	X	X	X	X				2,10,11
Calcium Chlorate	X	X	X	X	X			1,2,7
Calcium Chromate	X			X	X			1,2
Calcium Cyanide	X		X	X	X	X		1,2,5,21
Calcium Hypochlorite	X			X		X		1,2
Calcium, metallic	X	X	X					2,8,10,21
Carbon Bisulfide	X	X	X	X	X	X		1,2,5,6,12
Carbon Monoxide	X	X	X					1,5,6,14,20,21
Carbon Tetrachloride	X			X			X	1,2,5
Caustic Soda Solution	X			X	X	X		2,8
Chlordane	X				X	X	X	1,2,9,12
Chlorine	X		X	X	X	X		1,2,5,8,11,20
Chlorine Trifluoride	X		X	X	X	X		1,2,5,7,8,11,20

APPENDIX 2

ANTICIPATED RESPONSE ACTIONS FOR CERTAIN COMPOUNDS

	Restrict Access	Restrict Ignition	Evacuate	Restrict Human Use	Restrict Farm Use	Restrict Industrial Use	Contain	Reference Key to Special Precautions/Information
Chlorobenzene	X	X		X			X	1,2,12
Chloroform	X			X		X	X	1,2,12
Chloromethyl Methyl Ether	X	X	X	X	X	X	?	1,2,3,5,6,7,10,12,18
Chloropicrin, liquid	X		X	X	X	X		1,2,5,8,21
Chlorosulfonic Acid	X		X	X	X	X		1,2,5,8,11
Chromyl Chloride	X		X	X	X	X		1,2,5,6,7,11,18
Collodion	X	X	X			X	?	1,5,6,12
Copper Nitrate	X	X			X	X		1,2,3,7
Cresols	X			X	X	X	X	1,2,12
Crotonaldehyde	X	X		X				1,2
Cumene Hydroperoxide	X	X			X	X	X	1,2,3,8,12,21
Cyanogen	X	X	X	X	X	X		1,2,5,6,12,20
Cyanogen Bromide	X		X	X	X	X		1,2,5,12
Cyanogen Chloride	X		X	X	X	X		1,2,5,12,20
Cyclohexane	X	X		X		X	X	1,2,4
Cyclohexanone				X			X	1,2,19
Cyclohexylamine				X	X		X	1,2,19
Cyclopentane	X	X	X			X	?	1,2,4,6,14
Cyclopropane	X	X	X				X	1,2,4,6,14,20

APPENDIX 2

ANTICIPATED RESPONSE ACTIONS FOR CERTAIN COMPOUNDS

	Restrict Access	Restrict Ignition	Evacuate	Restrict Human Use	Restrict Farm Use	Restrict Industrial Use	Contain	Reference Key to Special Precautions/Information
DDD	X			X	X		X	1,2
DDT	X	X		X	X	X	X	2,9
Decaborane	X	X		X	X	X	X	1,2,4,15
Diazinon	X			X	X	X		1,2,3,9,12
Dibenzoyl Peroxide	X	X		X	X			1,2,7
Dichlorobenzene				X			X	2,12
Dichlorodifluoromethane (Freon 22)	X							1
1,2-Dichloroethylene	X	X	X			X		1,2,3,5,6,9,12
Dichloromethane	X			X		X	X	1,2,12
2,4-Dichlorophenoxy Acetic Acid	X			X	X		X	1,2
Dichloropropane	X	X		X			X	1,2,12
Diethylzinc	X	X	X					1,2,8,10,21
Dimethylamine	X	X	X	X				1,2,3,20
Dimethyldichlorosilane	X	X	X			X		1,2,3,5,6,8,11
Dimethylformamide	X	X	X	X	X	X		1,2
1,1-Dimethylhydrazine	X	X	X	X	X	X		1,2,5,12
Dimethyl Sulfate	X		X	X	X	X		1,2,8,12
Dimethyl Sulfide	X	X	X	X		X	?	1,2,5,6,12,19
Dimethylzinc	X	X	X				X	1,2,6,8,10,21

APPENDIX 2

ANTICIPATED RESPONSE ACTIONS FOR CERTAIN COMPOUNDS

	Restrict Access	Restrict Ignition	Evacuate	Restrict Human Use	Restrict Farm Use	Restrict Industrial Use	Contain	Reference Key to Special Precautions/Information
2,4-Dinitroaniline	X		X	X			X	1,2,12
Dinitrobenzene	X	X		X	X		X	1,2,3,21
2,4-Dinitrophenol	X			X			X	1,2,12
2,4-Dinitrotoluene	X	X		X	X		X	1,2,3,21
1,4-Dioxane	X	X		X				1,2,3
Endrin	X			X	X		X	1,2,12
Ethyl Acetate or methane	X	X		X			X	1,2
Ethyl Acrylate	X	X		X			X	1,2,19
Ethyl Alcohol	X	X						3
Ethylaluminum Dichloride	X	X	X			X		1,2,3,5,6,8,10,11,18,21
Ethylamine	X	X	X	X	X	X		1,2,5,6,8,12,20
Ethylbenzene	X	X		X			X	1,2,19
Ethyl Chloroformate	X	X	X	X	X	X		1,2,3,8,12,18
Ethyl dichlorosilane	X	X	X			X		1,2,3,5,6,8,11,18,21
Ethylene	X	X	X					1,2,4,6,20
Ethylene Glycol								None
Ethylene Glycol Monoethyl Ether				X				2
Ethylene Glycol Monomethyl Ether				X				2

APPENDIX 2

ANTICIPATED RESPONSE ACTIONS FOR CERTAIN COMPOUNDS

	Restrict Access	Restrict Ignition	Evacuate	Restrict Human Use	Restrict Farm Use	Restrict Industrial Use	Contain	Reference Key to Special Precautions/Information
Ethyl Formate	X	X	X	X	X	X		1,2,3,5,6
Ethyleneimine	X	X	X	X	X			1,2,5
Ethylene Oxide	X	X	X					1,2,6,20
Ethyl Ether	X	X	X			X		1,2,4,6,14
Ethyl Mercaptan	X	X	X	X		X	?	1,2,5,6,12,19
Ferric Nitrate	X	X				X		1,2,3,7
Fluorine	X		X	X	X	X		1,2,5,8,20
Fluosulfonic Acid	X		X			X		1,2,5,8,11,18
Formaldehyde Solution	X			X	X			1,2
Formic Acid	X							1,2,8
Fumaric Acid								1,2
Furfural	X			X	X			1,2
Furfuryl Alcohol	X			X	X			1,2
Heptachlor	X			X	X	X	X	1,2,21
Heptane	X	X	X			X	X	1,2,4,15
Heptanol		X					X	
Hexane	X	X	X			X	X	1,2,4,15
Hydrazine	X	X	X	X	X	X		1,2,5,6
Hydrochloric Acid	X		X	X	X	X		1,2,8
Hydrofluoric Acid	X		X	X	X	X		1,2,8,20

APPENDIX 2

ANTICIPATED RESPONSE ACTIONS FOR CERTAIN COMPOUNDS

	Restrict Access	Restrict Ignition	Evacuate	Restrict Human Use	Restrict Farm Use	Restrict Industrial Use	Contain	Reference Key to Special Precautions/Information
Hydrogen Bromide	X		X			X		1,2,5,8,18,20
Hydrogen Chloride	X		X	X	X	X		1,2,5,8,11,20
Hydrogen Cyanide	X	X	X	X	X	X		1,2,5,11,20
Hydrogen Peroxide	X		X	X		X		1,2,7
Hydrogen Sulfide	X	X	X	X	X	X		1,5,20
Hydroquinonete	X			X	X			1,2
Isobutane	X	X	X			X		1,4,6,14,20
Isobutyl Acetated	X	X					X	1,2
Isobutyl Alcohol	X	X		X			X	1,2,3
Isobutylamine	X	X	X	X	X	X		1,2,5,6,8
Isobutyronitrile	X	X	X			X	?	1,2,5,6,12
Isopentane	X	X	X			X	X	1,2,4
Isopropyl Alcohol	X	X						1
Isopropylamine	X	X	X	X	X	X		1,2,5,6,12
Isopropyl Mercaptan	X	X	X	X	X	X		1,2,5,6,12
Isovaleraldehyde	X	X	X		X	X	?	1,2,4,5,6,14
Lauroyl Peroxide	X	X	X		X	X	X	2,7,17,21
Lauryl Mercaptan	X			X			X	1,2,12
Lead Nitrate	X	X		X	X	X		1,2,7
Lead Tetracetate	X	X		X	X	X		1,2,3,7,8

APPENDIX 2

ANTICIPATED RESPONSE ACTIONS FOR CERTAIN COMPOUNDS

	Restrict Access	Restrict Ignition	Evacuate	Restrict Human Use	Restrict Farm Use	Restrict Industrial Use	Contain	Reference Key to Special Precautions/Information
Lead Thiocyanate	X			X	X		1,2	
Liquified Natural Gas	X	X	X					1,2,4,6,14,20
Liquified Petroleum Gas	X	X	X					1,2,4,6,14,20
Lithium Aluminum Hydride	X	X	X	X	X	X		2,8,10,11
Lithium Hydride	X	X	X					1,2,3,5,6,7,8,10,11,16,21
Lithium, metallic	X	X	X					1,2,3,5,6,7,8,10,11,16,21
Magnesium		X						21
Magnesium Perchlorate	X	X	X		X	X		1,2,7,21
Malathion	X			X	X	X	X	1,2,9,12
Mercuric Nitrate	X	X		X	X	X		1,2,3,7,21
Mercury	X						X	2,13
Mesityl Oxide	X	X		X	X	X	?	1,2,3,4,8,14,19
Methaneylamine	X	X	X					1,2,4,6,14,20
Methoxychlor	X			X		X	X	1,2
Methyl Acetate	X	X	X	X	X	X		1,2,3,5,6
Methyl Acrylate	X	X	X	X	X			1,2
Methyl Alcohol	X	X						1,2,3
Methylamine	X	X	X	X	X	X		1,2,3,5,6,8,12,20
ethyl Bromide	X		X	X				1,2,5,12,20

APPENDIX 2

ANTICIPATED RESPONSE ACTIONS FOR CERTAIN COMPOUNDS

	Restrict Access	Restrict Ignition	Evacuate	Restrict Human Use	Restrict Farm Use	Restrict Industrial Use	Contain	Reference Key to Special Precautions/Information
Methyl Chloride	X	X	X	X				1,2,5,12,20
Methyl Chloroformate	X	X	X	X	X	X		1,2,3,8,12,18
Methylcyclopentane	X	X	X			X	?	1,2,4,6,14
Methyldichlorosilane	X	X	X			X		1,2,3,5,6,8,11,12,18,21
Methyl Ethyl Ketone	X	X		X				1,2
Methyl Formate	X	X	X	X		X		1,2,3,5,6,12
Methylhydrazine	X	X	X	X	X	X		1,2,3,5,6,8,21
Methyl Isobutyl Ketone				X			X	1,2,19
Methyl Mercaptan	X	X	X	X		X		1,2,3,4,5,6,20
Methyl Methacrylate	X	X	X	X	X	X		1,2
Methyl Vinyl Ketone	X	X	X	X	X	X		1,2,3,5,6,8,21
Nickel Carbonyl	X	X	X	X	X	X		1,2,3,5,6,8,9,12,20
Nickel Nitrate	X	X			X	X		1,2,7
Nicotine	X			X	X	X		1,2,12
Nitric Acid	X		X	X	X	X		1,2,5,7,8
Nitrobenzene	X			X	X	X		2,12
Nitrogen, liquified	X							2,20
Nitrogen Tetroxide	X		X	X	X	X		1,2,5,8,20
Nitromethane	X	X		X				1,3

ANTICIPATED RESPONSE ACTIONS FOR CERTAIN COMPOUNDS

[illegible]

APPENDIX 2

ANTICIPATED RESPONSE ACTIONS FOR CERTAIN COMPOUNDS

	Restrict Access	Restrict Ignition	Evacuate	Restrict Human Use	Restrict Farm Use	Restrict Industrial Use	Contain	Reference Key to Special Precautions/Information
Phosphorus, red	X	X		X				2,12
Phosphorus Tribromide	X		X			X		1,2,5,8,11,18
Phosphorus Trichloride	X		X	X	X	X		1,2,5,11,18
Phosphorus, white	X	X	X	X				1,2,5,12
Polychlorinated Biphenyl	X			X	X		X	2
Polyphosphoric Acid	X							2,8
Potassium Arsenate	X			X	X			1,21
Potassium Chlorate	X	X		X	X	X		1,2,7,21
Potassium Chromate	X	X		X	X	X		1,2,7,8,21
Potassium Hydroxide	X							1,2,8
Potassium, metallic	X	X						2,7,16
Potassium Peroxide	X	X	X					1,2,7,8,11,21
Propane	X	X	X					1,2,4,6,14,20
Propionaldehyde	X	X		X				1,2
Propylene Oxide	X	X	X					1,2,3
Propyleneimine, inhibited	X	X	X	X	X	X		1,2,5,6,8,12
Propyl Alcohol	X	X						1,3
Pyridine	X	X	X	X				1,2,3,5
Resorcinol	X			X	X			1,2
Silicon Tetrachloride	X		X			X		1,2,5,11,18

APPENDIX 2

ANTICIPATED RESPONSE ACTIONS FOR CERTAIN COMPOUNDS

	Restrict Access	Restrict Ignition	Evacuate	Restrict Human Use	Restrict Farm Use	Restrict Industrial Use	Contain	Reference Key to Special Precautions/Information
Sodium	X	X	X					2,6,10,12,16
Sodium Amide	X	X						1,2,5,8,11
Sodium Azide	X			X	X	X		1,2,21
Sodium Borohydride	X	X						1,2,6,10
Sodium Chromate	X	X		X	X	X		1,2,7,8,21
Sodium Cyanide	X			X	X			1,2,5
Sodium Hydride	X	X	X					2,6,10,11
Sodium Hydroxide	X			X	X	X		2,8
Sodium Methylate	X	X						1,2,3,4,8,11,14
Sodium Nitrite	X	X		X	X	X		1,2
Styrene	X	X		X		X	X	1,2
Sulfuric Acid	X							2,8
Sulfur Dioxide	X		X	X	X	X		1,2,5,8,11,20
Sulfuryl Chloride	X		X	X		X		1,2,5,8,11,18
Tetrachloroethane	X				X	X		1,2
Tetraethyl Lead	X		X	X	X	X		1,2,5,12
Tetrahydrofuran	X	X						1,2
Thiophosgene	X		X	X	X	X		1,2,5,8,10,12,18
Thorium Nitrate	X	X	X	X	X	X		1,2,3,7,18,21
Titanium Tetrachloride	X		X					1,2,8,11,18

APPENDIX 2

ANTICIPATED RESPONSE ACTIONS FOR CERTAIN COMPOUNDS

	Restrict Access	Restrict Ignition	Evacuate	Restrict Human Use	Restrict Farm Use	Restrict Industrial Use	Contain	Reference Key to Special Precautions/Information
Toluene	X	X		X			X	1,2,4,15
Toluene 2,4-Diisocyanate	X			X	X			1,2,12
o-Toluidine	X	X		X	X	X		1,2,12,19
Trichloroethaneide	X						X	1,2,12
Trichloroethylene	X			X	X		X	1,2,12
Trichlorosilane	X	X	X					1,2,3,5,6,8,11,12,18,21
Triethylamine	X	X		X				1,2
Trifluorochloroethylene	X	X	X					1,2,5,6,12,20,21
Trimethylamine	X	X	X					1,2,5,20
Triethylaluminum	X	X	X					1,2,5,6,8,10,15,2
Uranyl Nitrate	X	X	X	X	X	X		1,2,3,7,18,21
Urea								
Valeraldehyde	X	X						1,2
Vanadium Oxytrichloride	X			X	X	X		1,2,5,8,11,18
Vanadium Pentoxide	X				X			1,2
Vinyl Acetate	X	X	X	X				1,2
Vinyl Chloride	X	X	X	X				1,2,12,20
Vinyl Fluoride, inhibited	X	X	X					1,2,6,12,20
Vinyl Methyl Ether, inhibited	X	X	X			X		1,2,4,5,6,12,20

APPENDIX 2

ANTICIPATED RESPONSE ACTIONS FOR CERTAIN COMPOUNDS

	Restrict Access	Restrict Ignition	Evacuate	Restrict Human Use	Restrict Farm Use	Restrict Industrial Use	Contain	Reference Key to Special Precautions/Information
Vinyltrichlorosilane	X	X	X	X		X	X	1,2,3,5,8,11,12 18,20
Xylene	X	X		X	X		X	1,2,4,15
Zinc Arsenate	X			X	X	X		1,2,21
Zinc Borate	X							1,2

REFERENCE KEY TO RESPONSE INDEX

1. Avoid inhalation. Vapors or dust are irritating or toxic.
2. Avoid direct contact. Contact with skin or eyes can cause irritation or burns.
3. No ignition hazard once material is dissolved, reacted, or covered with water.
4. Burning may be prohibited by anti-air pollution laws and regulations.
5. Poisonous gas or vapor danger. Substance is highly volatile.
6. Flammable or explosive gas or vapor danger. Substance is highly volatile.
7. Powerful oxidant - explosion and/or fire hazard in the presence of organic matter.
8. Highly corrosive, particularly to eyes and skin.
9. Sorbs strongly on bottom sediments. Substance is not at all soluble or reactive.
10. Reacts with water to form explosive or flammable gas or vapor.
11. Water reactive compound which reacts vigorously or violently. Disperse or neutralize contaminated waters after reaction subsides.
12. Burning not recommended; fire difficult to control and/or poisonous gas is formed.
13. Cover with organic sulfur-containing compounds or free sulfur.
14. Clean burning.
15. Sooty burning.
16. DO NOT ADD water to chemical; AFTER the chemical has reacted with water, the resulting alkaline solution can be diluted.
17. Floating solids.
18. Strong acid formed in water.
19. First try to contain and skim; THEN dilute and disperse what has dissolved in water.
20. Chemical shipped as gas or liquified compressed gas; depending on atmospheric conditions, a large portion of the hazard will be dissipated with no action necessary.

REFERENCE KEY TO RESPONSE INDEX

21. Has unusual fire or toxicity hazards. See the hazardous chemical data sheets for chemical.

22. May float or sink as insoluble substance or dissolve like miscible substance. See the hazardous chemical data sheets for chemical.

RESPONSE DEFINITIONS

A. CAUTIONARY RESPONSES

1. Restrict Access - This response is invoked when appreciable danger arises from a flammable or toxic spill, and the general public (spectators) should be kept from the spill area. Access is restricted if ignition is considered possible (restrict ignition), or if evacuation is recommended.
2. Restrict Ignition - This response is invoked when chemicals are involved which develop flammable vapors.
3. Evacuate - This response is invoked when there is a very real danger that a highly flammable or toxic spill may spread, or develop a detrimental reaction with water. This category includes flammable chemicals and extremely toxic chemicals, e.g., poisonous gases.
4. Restrict Human Use - This response is invoked when mostly soluble substances or those which are exceptionally toxic are involved in a spill. The primary danger is that of ingesting the chemicals in drinking water.
5. Restrict Farm Use - This response is invoked when a toxic chemical contaminant is spilled in water used for irrigation or animals.
6. Restrict Industrial Use - This response is invoked when the spill contains chemicals which could corrode machinery, or if the possibility of ignition from highly flammable organics is developed. Those chemicals which upon heating could release poisonous gases could also cause this response to be invoked; as could those which might form an insulating film on internal boiler surfaces.

B. CORRECTIVE RESPONSES

It is possible that several responses may be appropriate for a particular chemical spill. On-site conditions will dictate which responses are required. Also, a chemical could exist in more than one physical form and, thus, require several ameliorative responses. In cases where multiple responses are checked, "dilute and disperse" should be the last response implemented.

1. Dilute and Disperse - This response is invoked to handle spills primarily involving dissolved species which are dangerous in a concentrated state. The situation can be ameliorated by water jets, propellers, or similar means of agitation, spreading and mixing.
2. Contain - This response is invoked to contain spills involving insoluble species which form surface slicks. Slicks having vapors of very low flammability may be contained near ships, piers, etc., but highly flammable materials should only be confined in areas which are remote from ignition sources. Explosion-proof equipment should be employed. Corrosivity with respect to materials should also be considered.

RESPONSE DEFINITIONS (Continued)

B. CORRECTIVE RESPONSES

3. Skim - This response is invoked to handle insoluble species which float and form surface slicks. Corrosivity with respect to hoses and pumps should be considered.
4. Pump - This response is invoked to handle insoluble species which sink (particularly liquids or finely divided solids), but which may be pumped directly from the spill. Again, corrosivity should be considered.
5. Dredge - This response is invoked to handle insoluble species which sink (solids and some liquids).
6. Burn - This response is invoked to handle highly flammable floating chemicals. Even though there is an ignition danger, the "contain" category is checked. Containment may have to be accomplished by air barriers, herders, or expendable booms since few booms are fire-resistant.
7. Neutralize - This response is invoked to handle acids, bases, oxidants, or reductants. Calcium hypochlorite or caustic soda is often used in neutralization. This response action is largely confined to still or confined to non-flowing waters.
8. Absorption - This response is invoked to handle chemical species which can be absorbed or adsorbed. These species which form surface slicks (float) and include: oil-like chemicals, solvents, toxic compounds (e.g., pesticides and halogenated hydrocarbons). Treatment by ion exchange is also possible for miscible chemicals. Materials for sorption include hay, paper, styrofoam, plastic, glass beads, charcoal, and ion exchange resins.
9. Other Treatments - This response is invoked to handle oils and other floating materials by specialized methods. These treatments include the use of emulsifiers, dispersants, sinking agents, coagulants, and flocculants. Biological degradation is also included in this category.
10. Clean Shore Line - This response is invoked to handle insolubles (especially oils) with high surface tensions.
11. Salvage Waterfowl - This response is invoked when it is deemed feasible to salvage waterfowl that have been exposed to an oil discharge.

APPENDIX 3

DECONTAMINATION PROCEDURES

Inorganic/Organic Acids

Prepare mixture of 10% sodium carbonate and 10% trisodium phosphate in water, clean items/area with mop or cloth. Wear protective equipment.

Alkalai (Caustics)

Prepare mixture of 5% acetic acid (vinegar) in water - clean items/area with mop or cloth. Wear protective equipment.

Oils and PCB

Methylene chloride or isooctane applied directly to the contaminated area. Remove solvent and contaminant with sorbent or absorbent cloths. Wear protective equipment.

Alkalai and Alkaline Earth

Metals (Sodium, Potassium, Phosphorus)

Cover immediately with dry soda ash (sodium-carbonate) and remove with broom and shovel. Keep dry - do not contact with water. Wear protective equipment.

Solvents

Cover with absorbent material as quickly as possible. Remove with broom and shovel - wear protective equipment.

ATTACHMENT 2

UNIVERSAL WASTE & TRANSIT, INC.

9th AVENUE AND ORIENT RD.

TAMPA, FL

Discharge Log

Date	Inspection Area	Material Discharged	Response Action
	<u>Drums</u>	ORM-E	
		Poison	
		Corrosive	
		Flammable Liquid	
		Flammable Solid	
		Oxidizer	
		PCB	
		Reactive	
		Aerosols	

Treatment

Areas Solidification Area

Agencies Notified:	Fire Department.	223-4211
	Life Squad	223-4211
	Police Department	223-4211
	Florida DER	904/488-1900
	UW&T Emergency	864-4076
	Coast Guard	1/228-2189
	Nat'l Response Ctr	1/800/424/880
	Tampa Sewer Dist.	254-1805

Discharge Identified By:

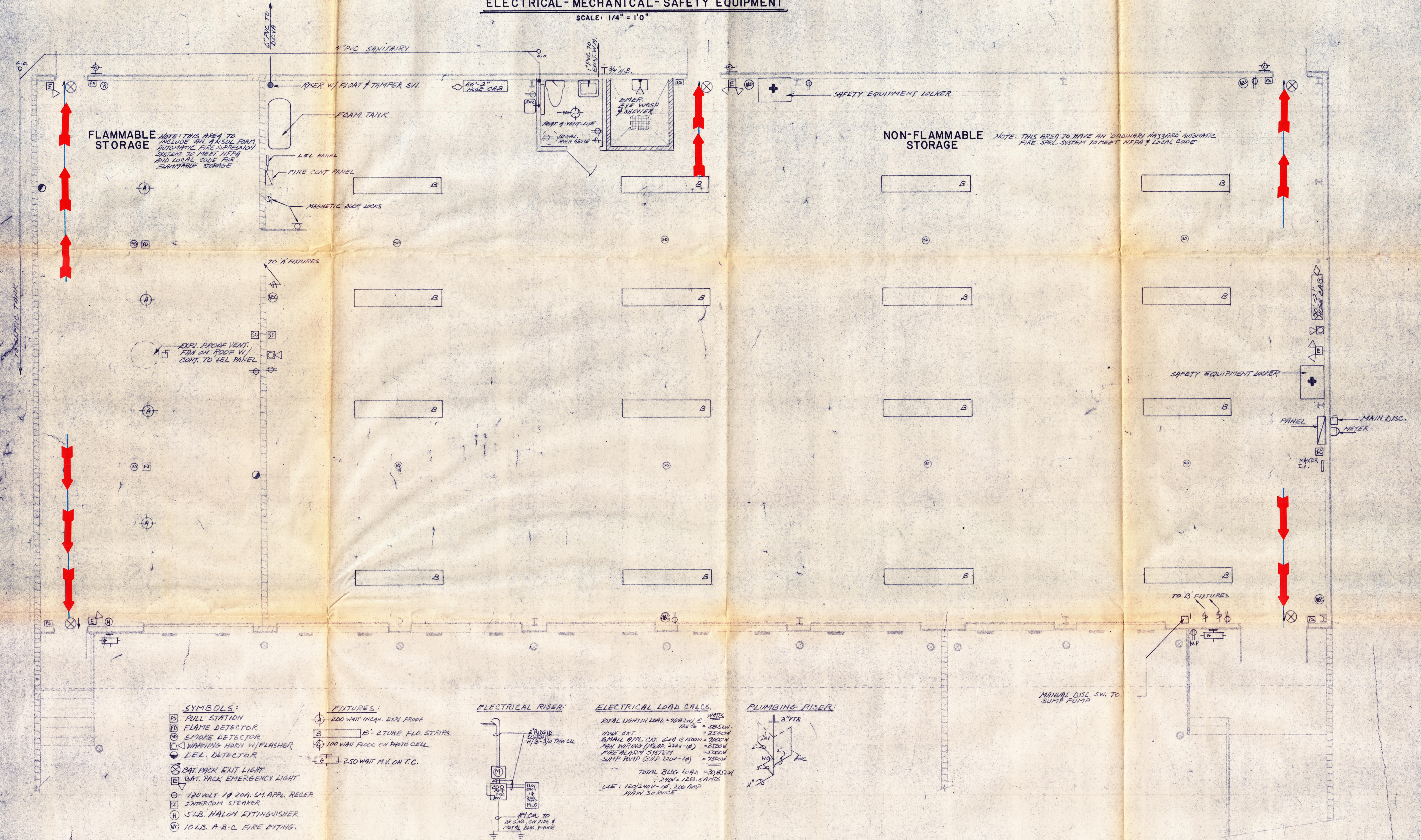
NAME

DATE

TIME

ELECTRICAL-MECHANICAL-SAFETY EQUIPMENT

SCALE: 1/4" = 1'0"



		REVISIONS DESCRIPTION DATE		PROJECT NEW STORAGE FACILITY		SHEET TITLE FLOOR PLAN	
		4800 118th AVE NORTH CLEARWATER, FL 34620 PINELLAS (813) 575 8000 TAMPA (813) 223 5800		OWNER UNIVERSAL WASTE & TRANSIT, INC.		JOB NO. 8709-5H	
DRAWN BY RMW		DATE 6-30-87		APPROVAL		SCALE AS NOTED	
						PAGE MEP-1	

Chart of Common Solvents

SOLVENT	Permissible Limit	Health Effects	First Aid	Personal Protection	Recommended Glove Material	Disposal Method Suggested
ACETONE	1000 ppm* or 2400 mg/m ³ **	Irritation of eyes, nose, throat; headaches, dizziness, dermatitis	A	Proper clothing & eye-wear; emergency shower provisions; frequent washing & change of clothes	Polyethylene (1 1/4 mils thick)	Incineration
ANILINE	5 ppm* or 19 mg/m ³ **	Irritation of eyes; anemia; cyanosis	A	Respirator & skin protection (butyl rubber suit) in areas of high vapor concentration; daily change of clothes; eye-wear; emergency shower provisions & frequent wash-ups	Polyethylene (1 1/4 mils thick) or Latex (28 mils thick)	Incineration (w/provisions for NO _x removal from flue gases)
BENZENE	(No standard set, either air or water)	Skin irritant	A	Proper clothing & eye-wear; wash promptly w/soap & water when wet or contaminated	Neoprene Latex (28 mils thick)	Incineration
CARBON TETRACHLORIDE	10 ppm* or 65 mg/m ³ **	Removes skin covering, which could lead to a dry, scaly dermatitis	A	Proper clothing eye-wear; wash up promptly when skin is wet or contaminated; frequent change of clothes	Nitrile (15 mils thick)	Incineration, after mixing w/ another combustible fuel
CHLOROFORM	50 ppm* or 240 mg/m ³	Skin burns/poor digestion; dizziness; liver & kidney damage	A	(Same as above: Carbon Tetrachloride)	Natural Rubber (18 mils thick)	Incineration, after mixing w/ another combustible fuel
CYCLOHEXANE	300 ppm* or 1050 mg/m ³	Dry, scaly, fissured dermatitis; possible conjunctivitis from vapor exposure	A	Proper clothing & eye-wear; wash & remove clothing immediately when wet/contaminated	Nitrile (15 mils thick)	Incineration
ETHYLENE DICHLORIDE	50 ppm* with a max peak of 300 ppm in any 3-hr. period	Dry, scaly, fissured dermatitis; vapors may cause eye damage	A	(Same as above: Cyclohexane)	Nitrile (15 mils thick)	Incineration, after mixing w/ another combustible fuel
FORMALDEHYDE	No standard yet; EPA suggests 41.4 ug/l based on health effects	Irritation to respiratory tract and eyes; possible dermatitis via prolonged exposure	A	Adequate ventilation & proper clothing; barrier creams; face masks when vapors are a factor; eye-wear; wash at once if skin is wet/contaminated; emergency shower provisions	N/A*	Incineration (may also be recovered from waste waters)
FREON	N/A*	Irritant to eyes & respiratory passages; dermatitis or skin rashes. High concentrations: dizziness, lack of co-ordination &/or asphyxiation	A	Nonporous gloves, aprons, and goggles; well-ventilated work-place	N/A*	N/A*
METHYL ALCOHOL	300 ppm* or 240 mg/m ³ **	Mild dermatitis; prolonged effect might be optic nerve damage or blindness; headaches, nausea, giddiness	A	Appropriate clothing and eye-wear; wash promptly when skin is wet; remove clothing at once if wet or contaminated	N/A*	Incineration

LEGEND

* = parts per million (ppm) of air averaged over an eight-hour work shift.

** = milligrams (mg) per cubic meter of air (m³).

A = refer to First Aid section on page 78 and consult your Material Safety Data Sheets.

• = data not available to include on chart (N/A)

CAUTION #1: Never give fluids by mouth to an unconscious person. Seek immediate emergency medical attention.

CAUTION #2: Facts may change. This chart is not designed to be used for technical guidance. Refer to your Material Safety Data Sheets for more accurate and up-to-date information.

Chart of Common Solvents

SOLVENT	Exposure Limit	Health Effects	HAZARD	Personal Protection	Compatible Material	Disposal Method
METHYL ETHYL KETONE (MEK)	200 ppm* or 500 mg/m ³ ; STEL: 300 ppm; IDLH: 1,000 ppm	Irritation of eyes & nose; headaches; dizziness; vomiting	A	Proper clothing & eyewear to prevent contact; remove clothing if wet or contaminated; provide E-eyewash	Natural rubber (18 mils thick)	Incineration
METHYLENE CHLORIDE	600 ppm* over 8-hour shift on average; max peak: 1,000 ppm	Severe dermatitis; eye & lung irritation; skin burns; headaches; dizziness; stupor; tingling in limbs	A	Proper clothing & eyewear to prevent contact; remove clothing & wash if wet or contaminated	Polyethylene, neoprene or polyvinyl alcohol	Incineration, after mixing with another combustible fuel
PHENOL	5 ppm* or 19 mg/m ³ as a time-weight average	No skin pain but a whitening & poisoning; severe eye burn or blindness; weakness; sweating; headache; prolonged exp: death	A	Impervious protective clothing & goggles for liquid; fullface mask w/protective clothing, gloves, boots for vapor; emerg. showers & eyewash	Natural rubber (18 mils thick) or Polyethylene (1 1/4 mils thick)	Incineration
PYRIDINE	5 ppm* or 15 mg/m ³ ; STEL: 10 ppm or 30 mg/m ³ ; IDLH level: 300 ppm	Irritation to eyes & lungs; necrosis; headache, dizziness, lacrimation, nervousness, nausea, vomiting	A	Proper clothing & eyewear to prevent contact; wash when skin is wet or contaminated; emergency showers & eyewash	Polyethylene (1 1/4 mils thick)	Controlled incineration (nitrogen oxides are removed from the effluent gas)
TETRAHYDROFURAN (THF)	200 ppm* or 500 mg/m ³ ; STEL: 350 ppm; IDLH: 20,000 ppm	Irritation of eyes & lungs; nausea, dizziness, headache; kidney/liver damage	A	Proper clothing & eyewear to prevent contact; remove clothing & wash if wet/contaminated to avoid flammability	Nitrile (15 mils thick)	Controlled incineration w/scrubbing for collection of lead oxides for recycle or landfill
TOLUENE	200 ppm* as an 8-hr. TWA; ceiling level: 300 ppm; NIOSH TWA: 100 ppm	Skin, eye & lung irritant; dry dermatitis; headache, dizziness, fatigue, uncoordination, collapse	A	Proper clothing & eyewear to prevent contact; remove clothing & wash if wet/contaminated to avoid flammability	Nitrile (15 mils thick)	Incineration
1,1,1-TRICHLOROETHANE	350 ppm* or 1,000 mg/m ³ ; ACGIH: 400 ppm; IDLH: 1,000 ppm	Irritating to eyes on contact; scalp dermatitis; dizziness; uncoordination; drowsiness; slowness	A	Clothing, not rubber, and eyewear to prevent contact; remove clothing & wash when wet or contaminated	Polyethylene, neoprene or polyvinyl alcohol	Incineration, after mixing with another combustible fuel, to prevent phosgene
TRICHLOROETHYLENE	100 ppm* or 333 mg/m ³ as an 8-hr. TWA; ceiling: 300 ppm	Irritation of eyes, nose, throat; dermatitis; headache, dizziness, tremors, nausea; fatigue; lacer's	A	Clothing, not rubber, and eyewear to prevent contact; remove clothing & wash when wet or contaminated	Polyethylene, neoprene or polyvinyl alcohol	Incineration, after mixing with another combustible fuel, to prevent phosgene
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE (TCE)	1,000 ppm* or 7,000 mg/m ³ ; STEL: 1,250 ppm; IDLH: 4,500 ppm	Throat irritation; dermatitis; drowsiness	A	Clothing, not rubber, and eyewear to prevent contact; remove clothing & wash when wet or contaminated	M/A*	Incineration, after mixing with another combustible fuel, to prevent phosgene
XYLENE	100 ppm* or 415 mg/m ³ for all isomers; NIOSH: 100 ppm/200 max	Irritation of eyes, nose, throat; dermatitis; dizziness, drowsiness, staggering; liver/kidney damage	A	Proper clothing & eyewear to avoid contact; wash skin when wet; remove clothing when wet to avoid flammability hazard	Nitrile (18 mils thick)	Incineration

* = parts per million (ppm) of air breathed out over an eight-hour work shift.
 mg = milligrams (mg) per cubic meter of air (m³).
 A = refer to Item 400 caution on page 70 and consult your Material Safety Data Sheet.
 + = data not available to include on chart (M/A)
 DANGER: Air flow rate should be such as to disperse vapors. Don't breathe emergency medical attention.
 DANGER: The data may change. This chart is not designed to be used for technical purposes. Refer to your Material Safety Data Sheet for more complete and up-to-date information.



SAFETY IN THE LABORATORY

INCOMPATIBLE MATERIALS

Certain combinations of chemicals are remarkably explosive, poisonous or hazardous in some other way, and these are generally avoided as a matter of course. There are many others that are perhaps equally dangerous but do not come to mind as readily. The following list, although not complete, may serve as a memory-refresher. Stop and think for a moment before starting any work, especially if one hazardous chemical is involved.

DO NOT CONTACT

Alkali metals, such as calcium, potassium and sodium with water, carbon dioxide, carbon tetrachloride, and other chlorinated hydrocarbons.

Acetic Acid with chromic acid, nitric acid, hydroxyl-containing compounds, ethylene glycol, perchloric acid, peroxides and permanganates.

Acetone with concentrated sulphuric and nitric acid mixtures.

Acetylene with copper (tubing), fluorine, bromine, chlorine, iodine, silver, mercury or their compounds.

Ammonia, Anhydrous with mercury, halogens, calcium hypochlorite or hydrogen fluoride.

Ammonium Nitrate with acids, metal powders, flammable fluids, chlorates, nitrates, sulphur and finely divided organics or other combustibles.

Aniline with nitric acid, hydrogen peroxide or other strong oxidizing agents.

Bromine with ammonia, acetylene, butadiene, butane, hydrogen, sodium carbide, turpentine, or finely divided metals.

Chlorates with ammonium salts, acids, metal powders, sulfur, carbon, finely divided organics or other combustibles.

Chromic Acid with acetic acid, naphthalene, camphor, alcohol, glycerine, turpentine and other flammable liquids.

Chlorine with ammonia, acetylene, butadiene, benzene and other petroleum fractions, hydrogen, sodium carbides, turpentine and finely divided powdered metals.

Cyanides with acids.

Hydrogen Peroxide with copper, chromium, iron, most metals or their respective salts, flammable fluids and other combustible materials, aniline and nitro-methane.

Hydrogen Sulfide with nitric acid, oxidizing gases.

Hydrocarbons, generally, with fluorine, chlorine, bromine, chromic acid or sodium peroxide.

Iodine with acetylene or ammonia.

Mercury with acetylene, fulminic acid, hydrogen.

Nitric Acid with acetic, chromic and hydrocyanic acids, aniline, carbon, hydrogen sulfide, flammable fluids or gases and substances which are readily nitrated.

Oxygen with oils, grease, hydrogen, flammable liquids, solids and gases.

Oxalic Acid with silver or mercury.

Perchloric Acid with acetic anhydride, bismuth and its alloys, alcohol, paper, wood and other organic materials.

Phosphorous Pentoxide with water.

Potassium Permanganate with glycerine, ethylene glycol, benzaldehyde, sulfuric acid.

Sodium Peroxide with any oxidizable substances, for instance: methanol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerine, ethylene glycol, ethyl acetate, furfural, etc.

Sulfuric Acid with chlorates, perchlorates, permanganates and water.

The list is intended to also include any and all mixtures containing any of the materials in the list. Materials constituting blasting agents are marked by an asterisk. While the list is comprehensive, it is *not* all inclusive. The fact that an explosive material may not be on the list does not mean that it is not within the coverage of the law if it otherwise meets the statutory definitions in Section 841 of Title 18, United States Code. Explosive materials are listed alphabetically by their common names followed by chemical names and synonyms in brackets. This revised list supersedes the List of Explosive Materials dated August 8, 1980 (45 FR 52976).

List of Explosive Materials

A

Acetylides of heavy metals.
Aluminum containing polymeric propellant.
Aluminum ophorite explosive.
Amatex.
Amatol.
Ammonal.
Ammonium nitrate explosive mixtures (cap sensitive).
*Ammonium nitrate explosive mixtures (non cap sensitive).
Aromatic nitro-compound explosive mixtures.
Ammonium perchlorate having particle size less than 15 microns.
Ammonium perchlorate composite propellant.
Ammonium picrate [picrate of ammonia, Explosive D].
Ammonium salt lattice with isomorphously substituted inorganic salts.
*ANFO [ammonium nitrate-fuel oil].

B

Baratol.
Baronol.
BEAF [1,2-bis (2,2-difluoro-2-nitroacetoxyethane)].
Black powder.
Black powder based explosive mixtures.
*Blasting agents, nitro-carbo-nitrates, including non cap sensitive slurry and water-gel explosives.
Blasting caps.
Blasting gelatin.
Blasting powder.
BTNEC [bis (trinitroethyl) carbonate].
BTNEN [bis (trinitroethyl) nitramine].
BTTN [1,2,4 butanetriol trinitrate].
Butyl tetryl.

C

Calcium nitrate explosive mixture.
Cellulose hexanitrate explosive mixture.
Chlorate explosive mixtures.
Composition A and variations.
Composition B and variations.
Composition C and variations.
Copper acetylides.
Cyanuric triazide.

Cyclotrimethylenetrinitramine [RDX].
Cyclotetramethylenetetranitramine [HMX].
Cyclotol.

D

DATB [diaminotrinitrobenzene].
DDNP [diazodinitrophenol].
DEGDN [diethyleneglycol dinitrate].
Detonating cord.
Detonators.
Dimethylol dimethyl methane dinitrate composition.
Dinitroethyleneurea.
Dinitroglycerine [Glycerol dinitrate].
Dinitrophenol.
Dinitrophenolates.
Dinitrophenyl hydrazine.
Dinitroresorcinol.
Dinitrotoluene-sodium nitrate explosive mixtures.
DIPAM.
Dipicryl sulfone.
Dipicrylamine.
DNBP [dinitropentano nitrile].
DNPA [2,2-dinitropropyl acrylate].
Dynamite.

E

EDNA.
Ednatol.
EDNP [ethyl 4,4-dinitropentanoate].
Erythritol tetranitrate explosives.
Esters of nitro-substituted alcohols.
EGDN [ethylene glycol dinitrate].
Ethyl-tetryl.
Explosive conitrates.
Explosive getatins.
Explosive mixtures containing oxygen releasing inorganic salts and hydrocarbons.
Explosive mixtures containing oxygen releasing inorganic salts and nitro bodies.
Explosive mixtures containing oxygen releasing inorganic salts and water insoluble fuels.
Explosive mixtures containing oxygen releasing inorganic salts and water soluble fuels.
Explosive mixtures containing sensitized nitromethane.
Explosive mixtures containing tetranitromethane (nitro form).
Explosive nitro compounds of aromatic hydrocarbons.
Explosive organic nitrate mixtures.
Explosive liquids.
Explosive powders.

F

Fulminate of mercury.
Fulminate of silver.
Fulminating gold.
Fulminating mercury.
Fulminating platinum.
Fulminating silver.

G

Gelatinized nitrocellulose.
Gem-dinitro aliphatic explosive mixtures.
Guanyl nitrosamino guanyl tetrazene.

Guanyl nitrosamino guanylidene hydrazine.
Guncotton.

H

Heavy metal azides.
Hexanite.
Hexanitrodiphenylamine.
Hexanitrosilbene.
Hexogene or octogene and a nitrated N-methylaniline.
Hexolites.
HMX [cyclo-1,3,5,7-tetramethylene-2,4,6,8-tetranitramine; Octogen].
Hydrazinium nitrate/hydrazine/aluminum explosive system.
Hydrazoic acid.

I

Igniter cord.
Igniters.

K

KDNBF [potassium dinitrobenzofuroxane].

L

Lead azide.
Lead mannite.
Lead mononitroresorcinates.
Lead picrate.
Lead salts, explosive.
Lead styphnate [styphnate of lead, lead trinitroresorcinates].
Liquid nitrated polyol and trimethylolethane.
Liquid oxygen explosives.

M

Magnesium ophorite explosives.
Mannitol hexanitrate.
MDNP [methyl 4,4-dinitropentanoate].
Mercuric fulminate.
Mercury oxalate.
Mercury tartrate.
Minol-2 [40% TNT, 40% ammonium nitrate, 20% aluminum].
Mononitrotoluene-nitroglycerin mixture.
Monopropellants.

N

NIBTN [nitroisobutametrial trinitrate].
Nitrate sensitized with gelled nitroparaffin.
Nitrated carbohydrate explosive.
Nitrated glucoside explosive.
Nitrated polyhydric alcohol explosives.
Nitrates of soda explosive mixtures.
Nitric acid and a nitro aromatic compound explosive.
Nitric acid and carboxylic fuel explosive.
Nitric acid explosive mixtures.
Nitro aromatic explosive mixtures.
Nitro compounds of furane explosive mixtures.
Nitrocellulose explosive.
Nitroderivative of urea explosive mixture.
Nitrogelatin explosive.
Nitrogen trichloride.
Nitrogen tri-iodide.
Nitroglycerine [NG, RNG, nitro, glyceryl trinitrate, trinitroglycerine].

Nitroglycide.
Nitroglycol (ethylene glycol dinitrate, EGDN)

Nitroguanidine explosives.
Nitroparaffins Explosive Grade and ammonium nitrate mixtures.
Nitronium perchlorate propellant mixtures.
Nitrostarch.
Nitro-substituted carboxylic acids.
Nitrourea.

O

Octogen [HMX].
Octol [75 percent HMX, 25 percent TNT].
Organic amine nitrates.
Organic nitramines.

P

PBX [RDX and plasticizer].
Pellet powder
Penthrinite composition.
Pentolite.
Perchlorate explosive mixtures.
Peroxide based explosive mixtures.
PETN [nitropentaerythrite, pentaerythrite tetranitrate, pentaerythritol tetranitrate].
Picramic acid and its salts.
Picramide.
Picrate of potassium explosive mixtures.
Picratol.
Picric acid (explosive grade).
Picryl chloride.
Picryl fluoride.
PLX [95% nitromethane, 5% ethylenediamine].
Polynitro aliphatic compounds.
Polyolpolynitrate-nitrocellulose explosive gels.
Potassium chlorate and lead sulfocyanate explosive.
Potassium nitrate explosive mixtures.
Potassium nitroaminotetrazole

R

RDX [cyclonite, hexogen, T4, cyclo-1,3,5-trimethylene-2,4,6-trinitramine; hexahydro-1,3,5-trinitro-S-triazine].

S

Safety fuse.
Salts of organic amino sulfonic acid explosive mixture.
Silver acetylide.
Silver azide.
Silver fulminate.
Silver oxalate explosive mixtures.
Silver styphnate.
Silver tartrate explosive mixtures.
Silver tetrazene.
Slurried explosive mixtures of water, inorganic oxidizing salt, gelling agent, fuel and sensitizer (cap sensitive).
Smokeless powder.
Sodatol.
Sodium amatol.
Sodium dinitro-ortho-cresolate.
Sodium nitrate-potassium nitrate explosive mixture.
Sodium picramate.
Squibs.
Styphinc acid.

T

Tacot [tetranitro-2,3,5,6-dibenzo-1,3a,4,6a-tetrazapentalene].
TATB [triaminotrinitrobenzene].
TEGDN [triethylene glycol dinitrate].
Tetrazene [tetracene, tetrazine, 1(5-tetrazolyl)-4-guanyl tetrazene hydrate].
Tetranitrocarbazole.
Tetryl [2,4,6 tetranitro-N-methylaniline].
Tetrytol.
Thickened inorganic oxidizer salt slurried explosive mixture.
TMETN (trimethylolethane trinitrate).
TNEF [trinitroethyl formal].
TNEOC [trinitroethylorthocarbonate].
TNEOF [trinitroethyl orthoformate].
TNT [trinitrotoluene, trotyl, trilit, triton].
Torpex.
Tridite.
Trimethylol ethyl methane trinitrate composition.
Trimethylolthane trinitrate-nitrocellulose.
Trimonite.
Trinitroanisole.
Trinitrobenzene.
Trinitrobenzoic acid.
Trinitrocresol.
Trinitro-meta-cresol.
Trinitronaphthalene.
Trinitrophenetol.
Trinitrophloroglucinol.
Trinitroresorcinol.
Tritonal.

U

Urea nitrate.

W

Water bearing explosives having salts of oxidizing acids and nitrogen bases, sulfates, or sulfamates (cap sensitive).

X

Xanthamomas hydrophilic colloid explosive mixture.

FOR FURTHER INFORMATION CONTACT:
Explosives Technology Branch, Bureau of Alcohol, Tobacco and Firearms, 1200 Pennsylvania Avenue, NW, Washington, DC 20226 (202-586-7087).

Signed: August 24, 1981.

G. R. Dickerson,
Director.

[FR Doc. 81-25399 Filed 8-31-81; 8:45 am]
BILLING CODE 4810-31-M

PEROXIDES

I. Recognition:

The presence of one of the compounds in Table I is a warning that peroxides can form and a hazard may exist. The readiness with which any of the peroxidizable structures form peroxide is highly dependent on the bonded (attached) chemical groups. For example, an ether with an attached alkyl group is much more hazardous than an ether with an attached aromatic group. Also as the attached hydrocarbon group increases in size the possibility of peroxide formation decreases. Ten or more carbon atoms at a peroxidizable site usually are low risk systems.

The most hazardous compounds - Those that form peroxides without being concentrated, which can accumulate a hazardous level of peroxides simply on storage after exposure to air - are in list A. Compounds forming peroxides that are hazardous only when concentrated, such as distillation or evaporation - are in list B. List C is made up of vinyl monomers that may form peroxides that can initiate explosive polymerization of the bulk monomers, (quantities greater than 500 grams).

II. Detection of Peroxides

The iodide test is based on the oxidation of iodide to iodine in the presence of peroxides.

Method: Add 0.5-1.0 ml of the material to be tested to an equal volume of glacial acetic acid to which has been added 0.1 g of sodium iodide or potassium iodide crystals. A yellow color indicates a low concentration of peroxide in the sample; a brown color indicates a high concentration. A blank determination should be made. Always prepare the iodide-acetic acid mixture at the time the test is made, because air oxidation slowly turns the blank to a brown color.

III. Storage and Handling

All peroxidizable compounds should be stored away from heat and light. Sunlight is an especially good promoter of peroxidation. When handling, use explosive handling procedures, remove to a remote area where it can be safely destroyed, preferably by burning. It is of the utmost importance that

III. Storage and Handling (continued)

the container not be opened. The act of opening the container could detonate peroxide crystals around the container cap or other closure. Containers which show signs of iron oxide or copper oxide should be handled with extra precaution since many metal oxides promote peroxide formation.

IV. Removal of Peroxides

Peroxide impurities in water-insoluble solvents (ether, hydrocarbons, etc.) are easily removed by shaking with a concentrated solution of ferrous salt solution can be prepared either from 60 g of ferrous sulfate, 6 ml of concentrated sulfuric acid, and 110 ml of water, or from 100 g of ferrous sulfate, 42 ml of concentrated hydrochloric acid, and 85 ml of water.

Among the many other methods reported for peroxide removal are treatment with amines, aqueous sodium metabisulfite and stannous chloride, sodium hydroxide, and cerous hydroxide.

TABLE I

Common Compounds That Form Peroxides During Storage

List A—Red Label (Three Months) Peroxide Hazard on Storage	List B—Yellow Label (Twelve Months) Peroxide Hazard on Concentration	List C—Yellow Label (Twelve Months) Hazard Due to Peroxide Initiation of Polymerization*
Isopropyl ether	Ethyl ether	Styrene
Divinyl acetylene	Tetrahydrofuran	Butadiene
Vinylidene chloride	Dioxane	Tetrafluoroethylene
Potassium metal	Acetal	Chlorotrifluoroethylene
Sodium amide	Methyl i-butyl ketone	Vinyl acetylene
	Ethylene glycol di- methyl ether (glyme)	Vinyl acetate
	Vinyl ethers	Vinyl chloride
	Dicyclopentadiene	Vinyl pyridine
	Diacetylene	Chlorobutadiene (Chloroprene)
	Methyl acetylene	
	Cumene	
	Tetrahydronaphthalene	
	Cyclohexene	
	Methylcyclopentane	

*When stored as a liquid, the peroxide-forming potential increases and certain of these monomers (especially butadiene, chloroprene, and tetrafluoroethylene) should then be considered as list A compounds.

COMPOUNDS PRONE TO FORM PEROXIDES

1. Ethers - C-1 through C-5
2. Olefins, chloroolefins, fluoroolefins
3. Vinyl esthers & ethers
4. Dienes
5. Vinylacetylenes
6. Alkylacetylenes
7. Alkanes & cycloalkanes with tertiary H atoms

Formation of peroxides is generally brought about by three processes - storage, concentration and polymerization. Heat and light promote peroxidation during storage. The following lists group chemicals by the type of peroxidation anticipated:

COMMON COMPOUNDS THAT FORM PEROXIDES DURING STORAGE

List A - Red Label (Three Months) Peroxide Hazard on Storage	List B - Yellow Label (Twelve Months) Peroxide Hazard on Concentration	List C - Yellow Label (Twelve Months) Hazard Due to Peroxide Initiation of Polymerization*
Isopropyl ether	Ethyl ether	Styrene
Divinyl acetylene	Tetrahydrofuran	Butadiene
Vinylidene chloride	Dioxane	Tetrafluoroethylene
Potassium metal	Acetal	Chlorotrifluoro- ethylene
Sodium amide	Methyl 1-butyl ketone	Vinyl acetylene
	Ethylene glycol di- methyl ether (glyme)	Vinyl acetate
	Vinyl ethers	Vinyl chloride
	Dicylopentadiene	Vinyl pyridine
	Diocetylene	Chlorobutadiene (Chloroprene)
	Methyl acetylene	
	Cumene	
	Tetrahydronaphthalene	
	Cyclohexene	
	Methylcyclopentane	

*When stored as a liquid, the peroxide-forming potential increases and certain of these monomers (especially butadiene, chloroprene, and tetrafluoroethylene) should then be considered as List A compounds.