COLORADO SCHOOL OF MINES

HAZARDOUS WASTE MANAGEMENT

POLICIES AND PROCEDURES

ADMINISTERED BY THE

ENVIRONMENTAL HEALTH AND SAFETY DEPARTMENT

Last Revision: January 21, 1999

ADMIN RECORD

1/345

AUTHORIZATION TO IMPLEMENT

In accordance with the Institutional Compliance Policy described in Part II of this document, I authorize the Environmental Health and Safety Director to implement these Policies and Procedures concerning management and disposal of hazardous waste.

Robert G Moore
Robert Moore
Vice President Business Affairs

November 20, 1998
Date

11/17/98-Bob/Reports/Rept100C

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I. APPLICABLE REGULATIONS

A. Colorado Hazardous Waste Regulation 6 CCR 1007-3

This regulation governs the management of hazardous waste that is produced by the Colorado School of Mines (CSM). The regulation is administered by the Colorado Department of Public Health and Environment (CDPHE), Hazardous Materials and Waste Management Division (HMWMD). Some important sections of the regulation which are significant in determining how hazardous waste must be managed by the School include the following:

Part 261 - Identifies and classifies waste materials that are defined as "hazardous" or "acutely hazardous" wastes.

Part 262 Subparts B and C - Describe use of the shipping manifest and describe packaging, labeling, marking and placarding requirements for shipment of hazardous waste.

Part 262.34 - Allows the School to accumulate an unlimited quantity of hazardous waste on-site for up to 90 days without a permit.

Parts 262.34(a)(1) and 265 Subpart I - Describe the use and management of hazardous waste containers and require a weekly inspection of container storage areas.

Part 262.34(a)(2),(3) - Require that waste containers be labeled and bear the date when the accumulation period begins.

Part 262.34(d)(5)(C) - Contains reporting and notification requirements in case of a fire, explosion or significant release of hazardous waste.

Part 262.40 - Describes recordkeeping requirements.

Part 262.41 - Describes requirements for submission of a "Biennial Report" to CDPHE.

Part 262.34(c)(1) - Allows School personnel to accumulate waste at or near the point of generation ("satellite accumulation") provided that:

- The location of the waste is under control of the process operator.
- The waste is collected in containers that are used and managed in accordance with 265 Subpart I.
- Containers are labeled and the contents are identified.
- The locations of "satellite" accumulation sites and the location of the central accumulation site are identified in a contingency plan.
- The School conforms with requirements for personnel training, preparedness and

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prevention, and for emergency procedures and contingency planning detailed in 265.16, and 265 Subparts C and D.

Part 265.16 - Describes requirements for personnel training and for maintenance of related documents and records including written job descriptions.

Part 265 Subpart C - Describes requirements for "preparedness and prevention" which include the following provisions:

- Facility operations and maintenance.
- Required equipment.
- Testing and maintenance of equipment.
- Access to communications or alarm systems.
- Required aisle space.
- Arrangements with local authorities.

Part 265 Subpart D - Requires that the School implement a "Contingency Plan" which describes procedures for managing emergencies. Copies of the plan must be distributed to local emergency responders. A copy must also be maintained at the storage facility. Specific provisions of the Contingency Plan include the following:

- The Plan describes arrangements with local emergency responders.
- The Plan contains contact information for the emergency coordinator.
- The Plan includes a list of emergency equipment.
- The Plan includes an evacuation plan for the facility.

Part 265.55 - Describes the duties of the "Emergency Coordinator."

Part 265.56 - Describes emergency procedures and notification requirements.

B. Regulations of the Federal Occupational Safety and Health Administration (OSHA)

CSM is a public institution in the State of Colorado. Therefore, OSHA does not have direct regulatory authority over the School, however the School models its occupational safety program upon OSHA requirements in accordance with Governor's Executive Order DO13889. In addition, the U.S. Environmental Protection Agency (E.P.A.) administers worker protection regulation 40 CFR Part 311. This regulation adopts the aforementioned OSHA regulation and makes the OSHA regulation applicable to state and local government employees who engage in hazardous waste operations and who would otherwise be exempt from OSHA regulation. Therefore, OSHA regulation CFR 1910 Part 120 entitled "Hazardous Waste Operations and Emergency Response" is applicable to the School in matters concerning hazardous waste operations. Important parts of OSHA regulation 29 CFR 1910 Part 120

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include the following:

Part 120(a)(1)(v), (a)(2)(iii)(B) and (a)(2)(iii)(C) – These regulations indicate that provisions in Part 120(p)(8) apply to School hazardous waste workers including students, and apply to emergency response operations which may be undertaken in the School's Hazardous Materials Management Facility (HMMF). In addition, provisions in Part 120(q) apply to members of the School's Chemical Spill Response Team and to operations of the Team.

Part 120(p)(8) - Describes elements of a required "Emergency Response Plan" for hazardous waste workers in connection with operations of the Hazardous Materials Management Facility. The plan is similar to the Contingency Plan required in CDPHE regulation 6 CCR 1007-3 Part 265 Subpart D. The OSHA regulation indicates that duplicate plans are not required and that the Contingency Plan can be integrated into the OSHA prescribed Emergency Response Plan. Specific topics addressed by various subparagraphs of Part 120(p)(8) include the following:

- Training requirements for employees who respond to emergencies at the HMMF.
- The employer must certify that employees have received proper training.
- Site topography, layout and prevailing weather conditions.
- Incident reporting requirements.
- Review, rehearsal and amendment of the plan.
- Installation and use of an alarm system.

C. Regulations of the U.S. Environmental Protection Agency

Superfund, Emergency Planning and Community Right-to-Know Programs, 40 CFR Parts 302 and 355 – These contain requirements to report releases of hazardous waste to the environment and apply to School hazardous waste operations. Important reporting and notification requirements which pertain to releases of hazardous waste include the following:

Parts 302.4, 302.5 and 302.6 - Identify "reportable quantities" of "hazardous substances," discuss how the reporting requirements apply to hazardous waste and describe reporting and written notification requirements.

Part 355.40 - Identifies "reportable quantities" of "extremely hazardous substances" and describes reporting and notification procedures associated with a qualifying release of hazardous waste.

II. COMPLIANCE POLICY

(The following policy was adopted by the CSM Board of Trustees in June 1992)

The Colorado School of Mines is an academic institution devoted to the education and training of future

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professionals in business, mining, industry, and government. That education must include appropriate professional training in related fields of environmental and occupational health and safety. It is incumbent upon the School to set an example for students by both word and action in providing an organizational model of an effective environmental and occupational health and safety program. Therefore, the School will integrate environmental health and safety functions into all institutional operations including teaching, research, physical plant maintenance, and internal administration.

The School will pursue a prudent and reasonable course of risk management which is functionally effective and which optimizes the use of available resources. The School seeks to comply with federal, state, and local requirements pertaining to environmental protection, occupational health and safety, public safety, and building, fire and sanitation codes. The School will provide resources, training, facilities and services dedicated to this purpose. Environmental and occupational health and safety issues will be squarely confronted with the intention of administering such matters in a manner that reflects the highest ethical and professional standards.

III. RESPONSIBILITIES

A. The Institution

The Institution provides resources to sustain the Hazardous Waste Management Program. Senior administrators assist in the acquisition and distribution of funds for this purpose, and act in support of the Environmental Health and Safety Compliance Policy.

B. The Environmental Health and Safety (EHS) Director

The Director provides the University with hazardous waste management services which are modeled upon federal and state regulations. Under the supervision of the Director, the EHS office performs the following waste management functions:

- Provide centralized chemical procurement and distribution services and facilities.
- Provide centralized hazardous waste collection, storage and disposal services and facilities.
- Integrate pollution prevention and waste minimization procedures into chemical procurement and waste management functions.
- Inform the School Administration concerning the status of the waste management program.
- Provide information, training and guidance to individual program participants.
- Contract with private consultants to accomplish waste packing, shipment and disposal.
- Maintain required records and plans. Submit required reports to regulatory agencies.
- Coordinate the on-campus transportation and storage of waste with local providers of emergency

services.

- Provide training, protective equipment and medical surveillance services for hazardous waste workers.
- Serve as the institutional representative in dealings with regulatory agencies.
- Provide emergency response services related to the handling of hazardous waste.

C. Department Heads

Department Heads implement these hazardous waste management policies and procedures within each department. Departments include organizational subunits within Academic Affairs, Business Affairs, Student Life, and Institutional Advancement. Specific responsibilities of the Department Head include the following:

- Inform departmental personnel of program requirements.
- Evaluate teaching laboratory curricula and implement waste minimization practices whenever possible.
- Monitor research proposals and remind principal investigators to consider technical and financial arrangements for hazardous waste management.
- When necessary, provide departmental personnel with chemical storage cabinets to be used for the safe, segregated storage of hazardous waste.
- Implement a checkout procedure for students and employees who are leaving the University. The procedure should require departing personnel to confirm that chemical waste and unused reagents are turned in to the EHS office before responsible individuals leave the University.
- Monitor the general level of cleanliness and order in departmental spaces. Assist the EHS office in maintaining adequate industrial hygiene standards in departmental work areas and laboratories.
- Assist the EHS office in gathering information and conducting inspections of laboratories and chemical storage areas. The Department Head responds in writing to inspection reports submitted by the EHS Director and assists in correcting chemical storage and waste disposal deficiencies.
- Respond to notices from the EHS office concerning training requirements for students and employees who handle chemicals and produce hazardous waste. Arrange training presentations for departmental personnel as required.
- Assist emergency responders in managing hazardous material incidents in departmental areas.

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D. Faculty Supervisors of Laboratories

Faculty Supervisors of laboratories are responsible to prescribe and implement effective waste management procedures within the laboratory. The supervisor ensures that lab personnel are made aware of and comply with these policies and procedures. Specific responsibilities of laboratory supervisors include:

- Keep a current inventory of chemicals. Eliminate "dead storage" of unused chemicals by returning them to the Chemical Storage and Distribution Facility in Coolbaugh Hall. Identify chemicals that have a limited shelf life and remove them from service or storage before expiration of the shelf life.

- Ensure that all containers of chemicals and waste are accurately labeled and that container identification tags are attached to containers at the time each container is placed in service. The name of the responsible person and the date when waste was first placed in the container should be written in on the tag at the time the container is placed in service.

- Prescribe lab procedures which ensure that containers of chemicals and waste are chemically compatible with contents, securely capped and kept in segregated storage which provides for the separation of incompatible materials.

- Cooperate with the Department Head in arranging for annual waste management training for laboratory personnel. The EHS office provides this training upon request.

- When applying for grants, planning future experiments, developing teaching projects, etc., individual researchers and instructors should keep in mind that disposal of waste can be very costly. Sources of funds for waste disposal should be confirmed before plans are finalized.

- In teaching laboratories, the instructor is responsible to devise a system for collecting wastes generated by students. The system should conform with the general guidelines provided in Part X. The instructor should provide specific guidance to students concerning proper disposal of waste. The instructor ensures that waste generated in teaching laboratories is properly managed and is subject to timely collection. Students are responsible to conform with guidance provided by the instructor.

- Implement a checkout procedure that requires departing lab personnel to initiate collection of chemicals and chemical waste before the responsible individual leaves the University.

- Assist the Department Head and emergency responders in managing hazardous material incidents in the laboratory.

E. Individual Faculty Members, Staff Members, and Students Who Generate Hazardous Waste

Individuals who procure or use chemicals which eventually become waste are assigned primary responsibility for ensuring that the waste is properly managed in work areas and laboratories. This responsibility cannot be delegated. Knowledge of and participation in the institutional waste management program is mandatory for persons who generate chemical waste in university teaching or

research facilities and in other areas where chemicals are used. Specific responsibilities of the individual waste generator include:

- The individual waste generator attaches container identification tags to waste containers and fills out the tags when accumulation of waste begins. The name of the individual waste generator and the date when accumulation of waste begins should be entered in the appropriate spaces on the tag. Tags which bear the name of the person responsible for management of the waste and which indicate the date when waste was first collected must be attached to all waste containers. The responsible person also ensures that each waste container is accurately labeled with the chemical identity of the contents.

- The individual waste generator identifies waste material and initiates collection in a timely manner. The individual waste generator submits waste disposal request forms to the EHS office. Waste that is collected at a satellite storage area must be turned over to the EHS office for disposal within six months.

- When an individual generator plans to retire, move, graduate, etc., he/she ensures that leftover chemicals or chemical waste are collected and properly disposed or redistributed before he/she leaves the University.

- The individual generator ensures that waste containers are accurately labeled in accordance with guidance in paragraphs X.A. and X.B. of this document.

- The individual generator ensures that wastes are kept in containers that are equipped with secure screw-on caps and are made of materials that are compatible with contents.

- The individual generator ensures that wastes are stored in secure chemical storage cabinets/locations and that containers of incompatible wastes are effectively segregated.

- The individual generator ensures that incompatible wastes are not mixed in the same container and that strict control is maintained over the addition of material to containers of consolidated waste (see paragraph X.D.).

- The individual generator obtains appropriate waste containers from the EHS supply room in Chauvenet Hall.

- The individual generator inspects each waste container on a weekly basis.

IV. PENALTIES AND ENFORCEMENT

Handling, storage and disposal of chemicals and chemical waste are strictly regulated by numerous federal, state and local laws. Several governmental agencies have regulatory authority over the University in these matters. These agencies include the United States Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC) and the Colorado Department of Public Health and Environment (CDPHE). The governmental unit that has primary regulatory authority over the University in matters concerning hazardous waste management is the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division. This Division administers state regulations concerning hazardous waste management. These regulations are modeled upon federal

regulations administered by EPA. A copy of these regulations is maintained in the EHS office. Compliance inspectors from the Hazardous Materials and Waste Management Division have the legal authority to inspect University facilities and waste management records at any time.

The law imposes civil and criminal penalties for violations of hazardous waste regulations. The institution may be subject to financial and administrative penalties if violations are detected. University employees who violate hazardous waste regulations can be subject to criminal penalties under some circumstances.

A. Cooperation With Federal and State Authorities

All University employees shall cooperate fully with governmental compliance inspectors during investigation or inspection of University waste management practices. The EHS office will assist compliance inspectors in gaining access to University facilities and will make waste management records and reports available for review.

B. Delegation of Inspection and Enforcement Authority to Department Heads

Department Heads are delegated the authority to enforce these waste management policies and procedures within their respective departments.

C. Delegation of Inspection and Enforcement Authority to EHS Personnel

The University Administration has delegated authority to EHS personnel to conduct hazardous waste compliance inspections in University facilities. Results of these inspections may be reported to supervisory personnel in affected areas, Department Heads or to the Vice-President for Business Affairs. The Vice-President for Business Affairs may forward inspection results and recommendations to other Vice Presidents or to the University President.

The University Administration has also delegated internal enforcement authority to EHS personnel in matters concerning compliance with hazardous waste regulations. Internal enforcement action will be taken as a last resort following efforts to elicit cooperative responses from supervisors/administrators. The rigor of enforcement action and the timeliness of the required response will be a function of the level of urgency. A schedule of enforcement activity is keyed to the level of urgency is as follows:

<u>Schedule of Enforcement Activity by EHS Personnel</u>

<u>Phase I - Low Urgency</u>:

- Department Head requested to respond with written plan and timetable within three weeks.

<u>Phase II - Urgent</u>:

- Department Head requested to meet EHS personnel at scene of problem within seven days. The intention is to reach agreement as soon as possible concerning how and when a discrepancy will be resolved.

- EHS gives prior notice to central administration.
- Phase II may be prompted by inadequate departmental response to Phase I.

Phase III - Very Urgent:

- Department Head requested to meet EHS personnel at scene of problem within 24 hours. The intention is for EHS and departmental personnel to resolve the problem immediately.
- EHS gives prior notice to central administration.
- Phase III may be prompted by inadequate departmental response to Phase I or II.
- May be disruptive/inconvenient for departmental personnel.

Phase IV - Extremely Urgent:

- EHS acts unilaterally to resolve a problem immediately.
- Department Head and central administration notified of action after the fact.
- May be very disruptive/highly inconvenient for departmental personnel.
- Phase IV response may be prompted by lack of departmental response to Phase II or III.

D. Investigation of Improper Waste Management Practices

If EHS personnel become aware that hazardous waste is being handled in a willfully negligent manner, the EHS Director will inform the Vice-President for Business Affairs. The Vice-President for Business Affairs may ask for assistance from other senior administrators in investigating the circumstances. In some cases senior administrators may direct that Public Safety officers conduct investigations of improper waste management practices in University facilities.

E. Enforcement of Annual Training Requirement

All University personnel who procure, use, store or handle chemicals and chemical waste must receive annual training. The EHS office keeps a record of attendance at training sessions. The EHS office will not issue chemicals or provide waste collection service to persons who have not received training within a year. (See Part XI.A.)

V. WASTE MINIMIZATION

Appendix A contains a Waste Minimization Plan.

VI. PAYMENT FOR HAZARDOUS WASTE MANAGEMENT SERVICES

The University administration allocates funds to the EHS office to provide the campus with hazardous waste management services. Services funded through the EHS hazardous waste budget include:

- Distribution of forms, container tags, labels and posters.
- Maintenance of three chemical and waste management facilities including the Hazardous Material Management Facility, Industrial Chemical Storage Facility and Chemical Storage and Distribution Facility.
- Operation of a vehicle for waste transportation and chemical spill response.
- Salaries of chemical hygiene/ waste management workers including two classified staff positions and several part-time student employees.
- Personal protective equipment, monitoring instruments, spill control equipment and materials handling equipment.
- Training and medical surveillance for hazardous waste workers and chemical spill response personnel.
- Waste containers for distribution to individual waste generators.
- Services of a consulting waste management company to pack, transport and arrange for disposal of waste.

Waste management services are normally provided to all University departments and personnel at no charge. The only exception is if a funded research project generates waste that costs more than $5,000 per year to pack, ship, and dispose. In such cases, the amount in excess of $5,000 per year should be paid out of the research project budget. Faculty members who submit grant proposals for projects which involve the production of large quantities of regulated waste should check with the EHS office to confirm the availability of funds to pay for waste disposal services. These arrangements should be confirmed before the research contract is signed. The research proposal checklist in Appendix B reminds researchers to plan and budget for waste disposal services associated with funded research projects.

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VII. IDENTIFICATION OF REGULATED WASTE

All solid and liquid waste material that is produced on the University campus is subject to regulation. Some gaseous wastes are also regulated. Regulated forms of waste include airborne waste material. The stringency of the regulation varies according to how the waste is categorized. The following list identifies general categories of regulated waste that may be produced on the University campus.

REGULATED WASTE CATEGORIES

CATEGORY	TYPE OF WASTE	APPLICABLE REGULATION	HOW/WHERE DISPOSED
1	Clean Soil		Sold or disposed on a land surface or at a landfill.
2	Grass Clippings, Tree Limbs		Landfill or composted and recycled.
3	Construction Debris, Concrete/Asphalt		Landfill or recycler.
4	Municipal Waste (household garbage, food waste, packaging material, etc....)		Landfill.
5	Large Items of Junk Equipment Such as Appliances, Car Bodies and Parts, Trailers, Bed Springs and Mattresses, Tanks, etc.		Landfill or recycler.
6	Stationary Source Combustion Products (diesel powered generators, boilers, etc.)		Captured at point of origin and disposed as a hazardous waste or dispersed to the atmosphere.
7	Sanitary Sewer Waste		Sanitary Sewer.
8	Stormwater Runoff		Storm Sewer.
9	Vehicle Exhaust		State Emission Compliance Program. Emissions reduced by providing routine maintenance.
10	Ozone Depleting Chemicals Including Refrigerant Gases		Provide containment. Recycle or dispose as a hazardous waste.
11	"Universal Wastes" including Car Batteries and Motor Oil		Recycle or solidify and bury at a special solid waste landfill.

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REGULATED WASTE CATEGORIES (cont.)

CATEGORY	TYPE OF WASTE	APPLICABLE REGULATION	HOW/WHERE DISPOSED
12	Polychlorinated Bi-Phenyls (PCBs) and Equipment Which May Contain PCBs including Electrical Transformers, Liquid Filled Switches, Capacitors	Toxic Substances Control Act	High temperature incineration.
13	Asbestos, Equipment Components Which Contain Asbestos or "Asbestos Containing Building Material" (ACBM)	National Emission Standards for Hazardous Air Pollutants	Buried as a special solid waste at designated landfills.
14	Infectious Waste Including Animal or Human Body Parts or Fluid and Medical Waste Such as Discarded Syringes		High temperature incineration.
15	"Hazardous Waste" Including Certain Organic Compounds, Metals, Salts, Corrosives, Pesticides and Industrial Process Waste and Material Which May Be Contaminated With Such Waste	6 CCR 1007-3	Incineration, chemical destruction/neutralization, solidification and burial or consumption as fuel.
16	High Toxicity Air Emissions From Laboratories		Captured at point of origin and disposed as a hazardous waste.
17	Various Types of Radioactive Waste Including "Source Material," "Byproduct Material," "Low Level Radioactive Waste" (LLRW) and "Naturally Occurring Radioactive Material" (NORM)	State of Colorado Rules and Regulations Pertaining to Radiation Control Parts 14 and 18	Buried in an appropriate containment cell.

It is important that each of the aforementioned "waste streams" be isolated and managed separately. Handling and disposal methods are different for each waste stream and intermingling of waste categories can create hazards to persons who handle the waste; cause degradation of the environment; create threats to public health; and cause non-compliance with applicable regulations. In general, Plant Facilities is responsible for the management of waste in Categories 1 through 9 in the aforementioned list, and the EHS office is responsible for the management of waste in Categories 11 through 17. Plant Facilities and the EHS office jointly and cooperatively manage the handling of waste refrigerant gases in Category 10. All School personnel assist Plant Facilities and the EHS office in identifying, isolating and segregating these individual waste steams.

These policies and procedures are primarily concerned with management of the "hazardous waste" in Category 15 of the aforementioned list, however the waste collection and disposal service which is provided by the EHS office will accept any of the wastes which are listed in aforementioned Categories 10 through 17.

A. Identification of Hazardous Waste

State Regulation 6 CCR 1007-3 Part 261 contains the legal definition of regulated hazardous waste. In general, the regulation identifies hazardous waste according to two criteria: 1) Hazardous waste may be specifically named on lists which appear in the text of Part 261 of the regulation; 2) Hazardous waste may also be identified by determining if the waste exhibits any one of four distinguishing characteristics. The four characteristics are ignitability, corrosivity, reactivity, and toxicity. These characteristics are fully defined in Part 261 of the regulation. A waste is defined as a "hazardous waste" if it fulfills either of these two criteria.

Determination of the regulatory status of chemical waste can be a complex matter. It is impractical to expect individual waste generators to make such determinations. Therefore waste generators should capture and isolate all chemical waste produced in campus laboratories, workshops, and equipment maintenance areas. This waste should be turned over to the EHS office utilizing the procedure described in Part IX of this document. The EHS office will then categorize waste according to the regulatory definitions in 6 CCR 1007-3 Part 261 and in other applicable regulations. The EHS office will ensure that the waste is managed and disposed in accordance with the appropriate regulation.

VIII. DISPOSAL PROHIBITIONS

The only authorized means of disposal of hazardous waste generated on the campus is via the centralized collection and disposal service provided by the EHS office. Disposal by evaporation, combustion, surface dumping or by dumping in storm or sanitary sewers is prohibited. Unauthorized transportation of hazardous waste on or off the campus is also prohibited. All of the wastes identified in Categories 10 through 17 in the table in Part VII require special handling. Material in any of these waste categories should be segregated and turned over to the EHS office for disposal. It is especially important that these wastes not be disposed in the trash or by dumping into sink or floor drains.

The School has been issued a permit to discharge industrial wastewater into the sanitary sewer. Appendix C is a copy of the permit. The permit imposes strict limits on the concentrations of wastewater contaminants that can be discharged into the sanitary sewer. Any wastes that may violate the permit limitations shall be turned over to the EHS office and may not be discharged into the sanitary sewer.

IX. THE CENTRALIZED WASTE COLLECTION AND DISPOSAL SERVICE

The centralized waste collection and disposal service is the means by which hazardous wastes are removed from laboratories and work areas, transported to the appropriate on-campus storage facility, and prepared for shipment to a permitted disposal facility. The EHS office provides this service in support of teaching and research laboratories and other work areas where regulated materials are present. Utilization of this service is mandatory for generators of hazardous waste on the campus.

A. Collection

Lab personnel initiate pickup and disposal of hazardous waste or redistribution of unused chemicals by submitting the "Request for Chemical Recycling and Waste Disposal" form to the Environmental Health and Safety office in Chauvenet Hall. Lab personnel also utilize container identification tags. Appendix D contains samples of the request form and identification tag. These are distributed at no charge to departmental offices or to individuals who manage regulated materials.

Waste management personnel in the EHS office review the forms and identify high-risk chemicals or waste which may require special handling. Each waste container is categorized according to waste type and chemical compatibility. EHS personnel then pick up the material and transport it to the proper campus facility.

B. Transportation

Hazardous waste is transported by EHS personnel. A specially modified van is used for this purpose. Waste is transported from the point of origin to the appropriate campus management facility. The van is divided into two compartments. The forward compartment contains a variety of spill control equipment and personal protective equipment. The rear compartment is used to contain hazardous waste during transit. Primary waste containers are placed in plastic boxes that are partially filled with inert absorbent material. The absorbent material cushions the primary containers while in transit and reduces the spread of any spilled material. These boxes are closed and loaded into the enclosed rear compartment of the van during transport.

C. Storage

Waste is initially accumulated at numerous satellite storage locations. These are identified in Appendix L. Waste may be kept at these locations for as long as six months. Lab personnel initiate disposal or recycling by submitting a request form. EHS personnel respond to the request and pick up the waste. Recycled chemicals and chemical waste may be delivered to one of three campus facilities that are operated by the EHS office.

1. Chemical Storage and Distribution Facility: Recycled chemicals are returned to the Chemical

Storage and Distribution Facility in Coolbaugh Hall. These materials are offered for use by University personnel at no charge. Availability of the recycled material is advertised on the campus computer network.

2. Hazardous Materials Management Facility: Hazardous waste is stored at the Hazardous Material Management Facility. Primary containers of hazardous waste and highly reactive or toxic waste are kept in segregated storage at the Hazardous Material Management Facility. Asbestos, PCBs and radioactive material are also stored there. Prior to entry into the HMMF, visitors must review the HMMF Safety Orientation Poster. A copy of the poster is included in Appendix P.

3. Industrial Storage and Distribution Facility: Bulk industrial waste and "universal waste" is normally kept in the Industrial Chemical Storage Facility.

As a large quantity generator, the University has a 90-day storage limitation for hazardous waste. Appendix E contains an annotated campus map and schematics of the three storage facilities.

D. Disposal

The EHS office contracts with a private hazardous waste management company to pack and ship the waste for disposal to a permitted disposal facility. Shipment is accomplished so that accumulation time does not exceed the 90-day limit. The EHS office maintains records of waste shipments and certificates of waste destruction. Incineration is the preferred disposal method for most hazardous waste.

X. MANAGEMENT OF WASTE IN LABORATORIES AND WORK AREAS

Participation in the institutional waste management program is mandatory for persons who procure chemicals or who generate regulated waste on the University campus.

A. Satellite Accumulation

Campus laboratories and workshops where hazardous waste is generated are designated as satellite accumulation areas as described in 6 CCR 1007-3 Part 262.34(c)(1). Individuals who are responsible for generation of experimental or process waste streams acquire appropriate containers and container identification tags from the EHS office. When a container is put into service the responsible person must attach a tag which bears the name of the responsible person and the date when waste was first added to the container. The chemical identity of each waste must also be recorded on a label or on the container identification tag. Containers of waste may be stored at satellite accumulation locations for up to six months. Individual waste generators should submit a "Request for Chemical Recycling and Waste Disposal" form to the EHS office to initiate pickup and transport of the waste to the central campus waste storage facility. The EHS office evaluates the contents of waste containers and identifies material that qualifies as hazardous waste in accordance with the definitions in 6 CCR 1007-3 Part 261. EHS personnel attach tags to containers of waste which qualifies as a "hazardous waste." These tags are marked with the date the material was moved to the central storage facility. The tags also identify the contents as hazardous waste. According to regulations which govern accumulation of waste at satellite locations, this waste may be stored at the central storage facility for 90 days. These regulations also

state that up to 55 gallons of hazardous waste or up to one quart of acute hazardous waste may be accumulated at satellite storage locations. When these quantity limits are exceeded, the waste must be moved to the central storage facility within three days and the waste must be shipped for disposal within 90 days.

B. Labeling

Maintenance of accurate labels on chemical containers and waste containers is essential. Container identification tags can be used to record the chemical identity of waste if other labels are not provided.

Tags or labels should bear the specific chemical name of the material - not formulas, common names or trade names. Concentrations of solutions should be indicated. If a waste container holds a mixture, each component of the mixture and its quantity or concentration should be identified.

Some laboratories use several containers for the consolidation of compatible wastes, and these containers may be used jointly by several people. Container labels should indicate the following: the name of each person who has made each addition to the container; the identity of the waste chemical; the quantity of each addition; and the date of each addition.

Labels should be securely fastened to each container and should be clearly legible.

Original labels on containers that still hold original contents should be carefully preserved. On newly acquired chemicals, the procurer's name should be written on the label along with the date that the material was opened. This is especially important for chemicals that have a limited shelf life.

Upon request, the EHS office provides lab personnel with blank stick-on labels for hazardous waste containers. Appendix F is a sample of such a label. Containers with stick-on labels are still required to have waste tags attached.

Lab personnel attach and fill out identification tags to containers of waste at the time containers are placed in service. The date containers are placed in service should be clearly indicated on the container tag. Lab personnel also fill out the "Request for Chemical Recycling and Waste Disposal" form utilizing information taken from the label. If the container is not already labeled, the name of the chemical waste may be written on the identification tag. If a label is already attached to the container, the contents need not be listed on the tag. The name of the chemical waste must be accurately and legibly indicated on either the identification tag or on a label already attached to the container. If the contents are not accurately identified on either of these, the waste will not be collected.

C. Unidentified Waste

The production of unidentified chemical waste is prohibited. If containers of unknown waste are discovered, the EHS office may initiate an investigation or enforcement action as described in Part IV of this document. The presence of unidentified chemical waste is prima-facie evidence of mismanagement of regulated material.

D. Consolidation of Waste

In many teaching and research laboratories it will be necessary to devise a system for consolidating compatible wastes in one or more containers. Such a system should account for the following factors:

- Wastes must be chemically compatible.
- Wastes must be compatible with the container.
- All of the waste chemicals in each container must be identified.

No single system will work for all laboratories, however the following system can be modified to the needs of individual laboratories.

1. Liquid wastes should be segregated according to the following categories:

    1. acids
    2. bases
    3. organics
    4. oxidizers (e.g., organic peroxides, hydrogen peroxide)

    Further refinement of the aforementioned categorization system for liquid waste may be required as follows:

    - Provide additional separation for any of the aforementioned categories which contain metals.
    - Provide additional separation for any of the aforementioned categories which contain material which tends to evolve toxic gases such as cyanide, sulfides, metal hydrides, etc...
    - Provide additional separation for strong oxidizing acids such as perchloric acid, concentrated nitric acid and concentrated sulfuric acid.
    - Provide additional separation for hydrofluoric acid. Store in plastic container.

2. Solid wastes should not be mixed with liquids. Generally, each type of solid waste should be separated. If it is necessary to mix solid waste, the following segregation categories may be used:

    1. Non-corrosive, inorganic materials such as metals and metal salts
    2. Corrosive or reactive solids such as alkaline solids
    3. Solid organic wastes

3. Highly reactive materials such as pyrophoric or water reactive materials should be kept in segregated storage.

4. Containers for consolidated waste:

    1. Individual containers that are used to accumulate small aliquots of compatible waste should

not be larger than 1-gallon and should be equipped with secure screw-on caps.

2. Hard plastic, glass, or metal containers may be used. Container material must be compatible with the contents.

E. Containers

The EHS office provides waste containers free of charge to all campus personnel. Wide varieties of container types and sizes are available. These include glass, plastic and metal containers ranging in size from 100-milliliter vials to 55-gallon drums.

F. Frequency of Waste Collection

Individual waste generators should initiate waste collection in a timely manner which minimizes the time and quantity of waste which accumulates at the point of origin. Waste should not be retained for more than six months at the point of origin. Collection of waste at satellite accumulation locations should be initiated whenever the quantity exceeds 55 gallons of "hazardous waste" or one quart of "acutely hazardous waste."

G. Waste Compressed Gases

Gas suppliers will take back cylinders which have unused contents. For some unusual gases such as cyanogen, methyl bromide, fluorine, hydrogen sulfide, chlorine, etc., special arrangements for disposal may be necessary.

Laboratory personnel initiate disposal of the more common gases by independently returning cylinders to the supplier. Laboratory personnel utilize the School's centralized waste collection and disposal program to dispose of gases that the supplier will not accept.

H. Segregation of Waste Containers

Containers of incompatible wastes should be physically segregated to prevent accidental mixing. A basic system for segregating incompatible waste containers is as follows:

1. Flammable liquids
2. Oxidizers
3. Acids
4. Bases
5. Solids
6. Other (halogenated solvents)

Storage of flammable liquid waste is regulated by fire codes. In accordance with the fire code, not more than ten gallons of flammable waste can be kept in unprotected storage.

I. Explosives

Storage of explosives in campus buildings is prohibited. Explosives are not normally handled via the hazardous waste collection and disposal program.

J. Management of Highly Reactive or Toxic Materials

A major goal of the School's hazardous waste management program is to minimize the amount of hazardous materials in storage. This is especially true of highly reactive or toxic materials. As a rule, the storage of highly reactive or highly toxic materials on an indefinite basis with no specific plan or timetable for use is prohibited. Some categories of dangerous chemicals which are occasionally found in laboratories and chemical storerooms are as follows:

Category	Examples
Alkali Metals	Sodium, Potassium
Pyrophoric Materials	Phosphorus
Organic Peroxides	Benzoyl Peroxide, Methyl Ethyl Ketone Peroxide
Oxidizing Gases	Fluorine, Chlorine, Oxygen
Other Strong Oxidizers	Perchloric Acid, Hydrogen Peroxide
Flammable Gases	Hydrogen, Acetylene
Explosives	Azides, Fulminates, Picric Acid
Other	Hydrofluoric Acid, Metal Hydrides, Cyanide Compounds, Organo-Metallic Compounds

If materials such as these are kept in a laboratory, there should be a specific intention and timetable for utilizing the quantity that is present. Otherwise, lab personnel should initiate collection and disposal.

K. Management of Chemicals with Limited Shelf Lives

Some organic laboratory chemicals deteriorate over time to form explosive peroxides. Lab personnel should be vigilant in ensuring that these materials are properly handled and are subject to timely disposal. Three categories of organic chemicals which tend to form peroxides are as follows:

Peroxide Hazard on Storage

Isopropyl ether
Divinyl acetylene
Vinylidene chloride
Potassium metal
Sodium amide

Peroxide Hazard on Concentration

Diethyl ether
Tetrahydrofuran
Dioxane
Acetal
Ethylene glycol dimethyl ether (Glyme)
Vinyl ethers
Dicyclopentadiene
Diacetylene
Methyl acetylene
Decahydronaphthalene (Decalin)
Tetrahydronaphthalene (Tetralin)
Cyclohexene
Diethylene glycol dimethyl ether (Diglyme)

Hazardous Due to Peroxide Initiation of Rapid Polymerization

Methyl methacrylate
Styrene
Acrylic acid
Acrylonitrile
Butadiene
Vinylidene chloride
Tetrafluoroethylene
Chlorotrifluoroethylene
Vinyl acetylene
Vinyl chloride
Vinyl pyridine
Chloroprene

L. Picric Acid

Picric acid and picric acid waste solutions should be thoroughly hydrated and kept in segregated storage. Dry picric acid is a shock sensitive high explosive.

XI. TRAINING

A. Annual Training Requirement

All campus personnel who procure, use, store or handle chemicals which eventually become chemical waste must receive annual training. This training is provided by EHS personnel. The EHS office keeps a list of persons who have received training within the year. Upon receipt of requests for waste disposal services or requests to procure chemicals from the Central Storage and Distribution Facility, EHS

personnel check the current training list to determine if the requestor has received training within the year. If the requestor has received training within the year, the EHS office provides the desired service. If the requestor has not received training within the year, the EHS office informs the requestor that the desired service will not be provided. Appendix G contains a sample notification form which communicates denial of services to persons who have not received annual training.

B. Training Outline

Appendix H is an outline of the training presentation that is provided by EHS personnel.

C. Training Notification Forms

Appendix I contains standard notification forms which are sent to Department Heads and incoming graduate students at the beginning of each semester. These forms communicate the requirement that all campus personnel who procure chemicals or generate chemical waste must receive the annual training.

D. Training of Hazardous Waste Workers

EHS personnel who collect, transport and handle hazardous waste receive an initial 40 hours of formal training and 8 hours of refresher training each year. This training is provided in accordance with OSHA and EPA regulations. Student employees also receive extensive on-the-job training from the professional staff. Personnel training records are maintained for at least three years. Job descriptions for hazardous waste management personnel are in Appendix N.

XII. MEDICAL SURVEILLANCE

In accordance with OSHA regulations, hazardous waste workers who are employed by the EHS office are included in a medical surveillance program. Lab personnel who handle certain high risk chemicals or chemical waste may also be included in the medical surveillance program. Many of these high risk chemicals are identified in OSHA Regulation 29 CFR 1910 Subparts G and Z.

XIII. EMERGENCY PROCEDURES

A. Chemical Spill Response Team

The University maintains a chemical spill response team. The team is comprised of EHS personnel and volunteers from several campus departments. The team responds to small-scale chemical spills that may occur in chemical or waste storage facilities, laboratories, and work areas. The local fire department is informed of all incidents that are managed by the spill response team. If a spill incident

requires additional support, the spill response team requests assistance from the local fire department. The senior fire officer on the scene has jurisdictional authority during chemical emergencies on University premises. Appendix J contains a complete description of the organization and functions of the chemical spill response team.

B. Communication of Emergency Procedures to Faculty, Staff, and Students

Emergency response procedures are described to University personnel during the annual training sessions provided by the EHS office. These procedures are also described in a poster that is required to be mounted by the telephone in each campus laboratory. Appendix K is a depiction of the poster.

C. Emergency Procedures and Contingency Plan

Appendix L contains a copy of the plan.

D. Preparedness and Prevention Plan

Appendix L contains a copy of the plan.

E. Hazardous Material Discharge Notification Guidelines

Appendix M contains a copy of the guidelines.

XIV. GENERATOR STATUS

The University functions as a "large quantity generator," according to the definition in Part 262 of the State Hazardous Waste Regulations.

The State Health Department has been notified of the University's status as a large quantity generator.

The University's status as a large quantity generator requires that waste cannot be stored on site for longer than 90 days. The EHS office ensures that this storage time limitation is not exceeded.

XV. GENERATOR SITE BOUNDARY

Appendix E contains a map that depicts the boundaries of the campus generator site. The campus consists of a single "generator site" as defined in state and federal regulation.
Hazardous waste that is produced at satellite storage locations is transported to the Hazardous Material Management Facility (HMMF). This secure facility is operated by the EHS office and is located in the Plant Facilities' equipment yard at 1318 Maple Street, Golden, CO. A location map and schematic of the facility is in Appendix E. EHS personnel store and pack waste for shipment at this facility.

XVI. GENERATOR IDENTIFICATION NUMBER: COD982597320

The Environmental Protection Agency has assigned a generator identification number to the University. The number is COD982597320.

XVII. BIENNIAL REPORT

As a large quantity generator, the University is required to submit a biennial hazardous waste report to the State Health Department. The EHS office submits the report on behalf of the University. A copy of the report is contained in Appendix O.

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WASTE MINIMIZATION PLAN
FOR
COLORADO SCHOOL OF MINES

Prepared by the
Environmental Health & Safety Department
Robert MacPherson, Director

Revised Januiary 12, 1998

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WASTE MINIMIZATION PLAN

Policy Statement

"CSM is committed to educating students to become good stewards of the earth and its resources. It is committed to the mitigation of environmental damage caused by the production and utilization of minerals, energy, and materials, and to the development of processes that will minimize such damage in the future." (from CSM Mission Statement)

Consistent with the School's overall mission, CSM will maintain a Waste Minimization Plan for campus activities in order to minimize or avoid the creation of hazardous waste.

Regulatory Background

1976 - Federal Resource Conservation and Recovery Act (RCRA); the law which authorized EPA to control hazardous waste from the "cradle-to-grave."

1990 - Federal Pollution Prevention Act; a law to focus industry, government, and public attention on reducing the amount of pollution through source reduction, recycling, conservation. Generators of hazardous waste are required to have a written Waste Minimization Plan.

1992 - Colorado Pollution Prevention Act makes pollution prevention the "environmental management tool of first choice."

Responsibilities

Environmental Health & Safety Department

- Develop and maintain waste minimization programs
- Operate centralized chemical procurement and waste disposal services
- Manage recycling activities

Laboratory Supervisors/Principal Investigators

- Oversee activities to minimize waste generation in work areas
- Scale down experiments and demonstrations to smallest practical level

Students, Faculty, Staff

- Follow established procedures to minimize waste generation
- Participate in recycling programs

Elements of the CSM Waste Minimization Plan

Following are the elements of the CSM Waste Minimization Plan and the associated tasks which have been undertaken to minimize and/or avoid the generation of hazardous waste.

1. Support by top management of the organization

The CSM Administration and Board of Trustees have recognized the need to keep pace with changing environmental health and safety regulations. As specified in the CSM Mission Statement, the top managerial bodies of CSM have directed and supported efforts to minimize waste generated by the school. This leadership has given support and funding for several programs, some of which are summarized in the next section.

2. Continuation of waste minimization plan by the EH&S Department

The EHS Department develops and maintains programs which encourage minimization of campus wastes and which foster pollution prevention attitudes among students, faculty and staff. Some of these programs are following:

- Centralized Chemical and Storage Distribution

  The Centralized Chemical Storage and Distribution Program was approved by the Board of Trustees in June 1992. The program has included construction of a Chemical Storage and Distribution Facility (CSDF) and hiring of a technician to manage its operation.

  All requests for chemicals to be used on campus are submitted to the CSDF. Requests are filled from existing stock whenever practical. All unused chemicals are returned the CSDF for redistribution to the entire campus. This reduces quantities of chemicals which need to be ordered and the resulting quantities which require eventual disposal (often as hazardous waste). The centralization of chemical procurement and recycling has provided an important control point to ensure that initial acquisition of reagents and raw materials is limited to amounts actually needed.

- Centralized Waste Management

  The Centralized Waste Management program works hand in hand with the Centralized Chemical Storage and Distribution program to ensure maximum use/reuse of all chemicals and minimum generation of subsequent wastes. The Centralized Waste Disposal Program is designed in accordance with federal and state regulations concerning hazardous waste and is the mechanism by which the School achieves compliance with these regulations. Elements of the program include centralized collection, storage and disposal service to support teaching and research activities. The EHS Department provides information and guidance to users of chemicals to ensure regulatory compliance and to minimize waste generation.

- Recycling Programs

  The EHS Department administers recycling programs for a variety of materials used on campus. In addition to the chemical recycling and redistribution activities of the above-described CSDF, additional potential wastes are closely evaluated for recycling/reuse opportunities. Recycling programs have been established for such materials as paper, oil, antifreeze, metals, batteries, containers (drums), cardboard, telephone books, toner cartridges, and wood pallets.

- Scale down of processes, experiments, demonstrations

  Campus personnel (faculty members, post-doctoral fellows, graduate students) are encouraged to carefully consider waste generation before the start of teaching or research activities. Special consideration should be given to the size required to achieve desired results. Researchers and instructors are encouraged to scale down chemical processes and experiments and/or consider alternative methods to reduce quantities of wastes generated. In some cases funding has been provided for small apparatus (micro glassware) to achieve waste minimization goals.

- Emergency spill response

  The EHS Department oversees a spill response program which includes on-going training of responders, maintenance of an emergency vehicle, keeping of adequate supplies and equipment. The spill response team would be called whenever spilled or leaking materials require special cleanup or control. One of the goals of the spill response team is to minimize the quantity of waste during the performance of its function.

3. Maintenance of accounting system(s) to provide "cradle to grave" tracking of raw materials and wastes

In-coming materials are received at the Central Chemical Storage and Distribution Facility, where data are input to a computer database. Individual containers are affixed with unique bar-code identification numbers. Containers are tracked throughout their use cycle on campus until ultimate disposal through the campus waste management program..

Materials which are submitted as waste to the Centralized Waste Management program are identified with unique identification numbers. Relevant information about each waste is maintained in a computer database to achieve complete tracking from point of generation through ultimate disposal.

4. Periodic assessment of the school's waste minimization efforts and implementation of recommendations resulting from such assessments

Waste minimization efforts are evaluated periodically in EH&S Department staff meetings. The staff offer information about current and pending chemical acquisitions, wastes being generated, results from recycling activities, and suggestions for improved waste minimization. Following the assessment of present and proposed waste minimization efforts, and considering other factors (costs, personnel, practicality), the Department determines which minimization opportunities to pursue.

Periodic reports of chemical procurement, waste generation, and recycling quantities are prepared by EH&S personnel. These reports are used by the Department for assessment of the School's waste minimization efforts.

5. Allocation, where practical, of the true costs of waste management to activities responsible for generation of waste, rather than charging such costs to overhead.

Where practical, the true costs of waste management are allocated to the activities which generate the waste. In practice, it has been shown that most wastes are produced in such very small quantities that direct allocation of disposal costs is usually not indicated. Activities which generate larger quantities of waste are often charged directly for waste management costs, so that responsible individuals may be aware of the monetary consequences of such projects.

6. Encouragement of technology transfer within the school and with other outside persons, institutions, associations and government agencies.

Waste minimization is encouraged within the school and with outside persons and organizations. The EH&S Department consults with faculty, staff and students regarding methods to minimize wastes from their activities. In related training sessions (general safety, hazardous materials, hazard communication), conducted by the EH&S Department for School personnel, waste minimization techniques and possibilities are offered and encouraged.

Contact outside the School is made primarily by EH&S staff through attendance at and organization of seminars which deal, at least in part, with waste minimization. Chemical reuse/recycling opportunities are often considered with outside organizations, with the School as the supplier or recipient.

COLORADO SCHOOL OF MINES
RESEARCH PROPOSAL HEALTH & SAFETY CHECKLIST

1. Have you planned to provide health/safety services to protect lab workers?

OSHA has enacted a laboratory safety standard which imposes requirements to provide written plans, training, chemical information references, exposure monitoring and medical surveillance for lab workers.

2. Do you have adequate storage facilities for research materials?

The Fire Code requires that incompatible chemicals must be stored in segregated storage compartments and that flammable liquids must be stored in approved storage cabinets. The Fire Code also limits the volume of chemicals which can be stored/handled.

3. Will your storage requirements compromise the use of paths to exits?

The Fire Code prohibits the storage of chemicals, gas cylinders or equipment in a path to an exit. Similarly, adequate exit/escape routes must be provided and may not be obstructed. Storage of combustible materials in stairwells or mechanical rooms is also prohibited.

4. Will the arrangement/modification of your lab compromise the fire resistive capability of the structure?

The Fire Code and Building Code prohibit penetration/modification of fire resistive doors, walls, ceiling, etc.. Similarly, construction of partitions, walls, doors and utility outlets must conform to code requirements.

5. Is your lab adequately ventilated?

OSHA prohibits the release of toxic airborne materials in areas which are not adequately ventilated. The hood design and air velocity of ventilation systems should conform with modern standards. If highly toxic materials (radionuclides, cadmium, chromium, beryllium, thallium, lead, etc.) are used, ventilation system exhaust should be filtered to preclude release of the material to the environment. EPA and OSHA regulate the release of human carcinogens and other toxics to the environment.

6. Are you adequately prepared to handle/store highly reactive or toxic materials?

Storage and use of highly toxic materials, explosives, azides, picric acid, perchloric acid, peroxidizable organics, strong oxidizers, alkali metals, other water/air reactives may require special facilities and management practices.

7. Will you possess reportable quantities of regulated materials?

The location and quantity of certain chemicals must be annually reported to local agencies in accordance with the EPA's "Community Right-to-Know" regulation.

8. Will you generate infectious waste (including syringes, body fluid, animal parts), handle controlled organisms, or perform recombinant DNA research?

The National Institutes of Health (NIH) provides guidelines for the handling of pathological organisms and genetic research materials. Special containment facilities are required for such organisms. The State regulates the disposal of infectious waste.

9. Will you utilize radioactive materials or equipment?

Radioactive materials (including natural mineral samples) and radiation producing equipment (including X-ray machines) must be listed on the School's Radioactive Materials License. State and Federal regulations establish strict limits for radiation exposure and release of radionuclides to the environment.

10. Will you discharge waste water to the sewer?

The School has a permit to discharge waste water to the sewer. This permit establishes very strict discharges limits for metals, corrosives, organics and cyanide. Discharge limits for metals are extremely restrictive. Storm sewer discharges are also regulated.

11. Have you planned for disposal of waste?

EPA strictly regulates the accumulation and disposal of hazardous waste. The School maintains a certain regulatory status as a waste generator. Production of large amounts of waste or production of more than 1 Kg of "acute" waste changes the generator status of the School, and may put the School out of compliance with EPA regulations. Cost for disposal of regulated waste is extremely high.

12. Will you utilize a laser or other equipment or procedures which subject lab personnel to significant exposure to physical agents including vibration, noise, heat, electromagnetic fields and other forms of nonionizing radiation?

Threshold limit values for occupational exposure to physical agents are established by OSHA and ACGIH. OSHA prescribes safety procedures for use of lasers.

13. Will you utilize custom built, high pressure vessels; robots; industrial vehicles; or equipment with rotating parts, belts, gears, pulleys or high pressure hydraulic systems?

OSHA prescribes safety equipment and procedures associated with use of such equipment.

14. Will you be digging holes or drilling wells?

OSHA prescribes shoring requirement for trenches. Check with Blue Stake to ensure that you will not penetrate buried utilities. Environmental regulations may require that bore holes must be capped or filled. Abandoned or unattended mine openings must be sealed.

Revised. 11/14/91

CITY OF GOLDEN, COLORADO
WASTEWATER CONTRIBUTION PERMIT NUMBER 97-003
(For Flows into Coors General Wastewater Treatment Plant)

PURSUANT to the terms and conditions of the Wastewater Pretreatment Requirements of the City of Golden, Colorado, Chapter 13.13 of the Golden Revised Ordinances of 1965, and also with any applicable provisions of Federal or State law or regulation; permission is hereby granted to:

NAME: **Colorado School of Mines,**

LOCATED AT: **Colorado School of Mines Campus, Golden, Colorado,**

hereinafter referred to as the "Permittee", to discharge into the City of Golden Sanitary Sewer System from the facilities and through the outfalls identified, and in accordance with the terms and conditions set forth as Attachment A to this permit, which Attachment is incorporated herein.

Compliance with this permit does not relieve the permittee of its obligation to comply with any or all applicable pretreatment regulations, standards or requirements under local, State, and Federal laws, including any such regulations, standards, requirements, or laws that may become effective during the term of this permit.

Noncompliance with any term or condition of this permit shall constitute a violation of Chapter 13.13, Wastewater Pretreatment Ordinance of the City of Golden. For permit information contact the Pretreatment Coordinator at 384-8182.

This permit shall become effective on November 1, 1997, and shall expire at midnight on October 31, 2002.

Issued by: _____
City Manager

Issued this 31 day of October, 1997.

Reviewed by: _____
Pretreatment Coordinator

Attachment A - Terms and Conditions, Wastewater Contribution Permit # 97-003

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PART 1 DESCRIPTION OF OUTFALLS

During the period of November 1, 1997 to October 31, 2002, the permittee is authorized to discharge industrial wastewater to the City of Golden sanitary sewer system from the following outfalls, subject to the conditions defined in this permit.

OUTFALL NUMBER -	DESCRIPTION OF MONITORING POINT/LOCATION
001	Coolbaugh Hall (Chemistry/Geochemistry Building), at the manhole approximately ten feet off the north end of the loading dock on the north side of the building.
002	Hill Hall (Metallurgy Building), at the sample port covered by a brass cap, 3 feet west of the dilution tank and 20 feet from the north entrance on the north side of the building adjacent to 14th Street.
003	Alderson Hall (Chemical Engineering and Petroleum Refining Building), where two sanitary sewer lines (6-inch and 4-inch) exit the south wall of the building in Room B004, located under the CE High Bay Lab accessed from first floor north entrance.
004	Plant Facilities (including Plant Facilities shops and offices, Military Science, Warehouse, Earth Mechanics Institute, Student Development Center, Volk Gymnasium, Arthur Lakes Library, Morgan/Thomas/Bradford/Randall Dormitories, Student Center, and various private residences) at the manhole at the center of the intersection of 13th Street and Maple Street.
005	Meyer Hall (Physics Building), where the 6-inch sanitary sewer line from Meyer Hall enters manhole located approximately thirty feet northeast from the east entrance between Green Center and Meyer Hall.
006	Brown Hall (Mining and Engineering Building), at the manhole for the interceptor tank in the first floor, Room 160, approximately twenty five feet west of the entrance.
007	Berthoud Hall (Geology Building), at the steel access door to the interceptor, Room 127, east wing of the first floor.
008	Chauvenet Hall (Environmental Sciences Building), where the 4-inch sanitary sewer line exits Chauvenet Hall in a room under the east stairwell by the east entrance.
009	Green Center (Computer Science and Seismology), at the manhole for the interceptor tank, Room B98A, south side of the basement in the center of the room.

PART 2 MONITORING FACILITIES

The permittee shall allow the Pretreatment Coordinator or his/her duly authorized representative(s) to independently utilize these facilities to collect samples or take measurements or readings. The permittee shall also provide these representatives with any assistance or information as needed.

PART 3 SELF MONITORING

A. SELF MONITORING REQUIREMENTS

At a minimum, the permittee is required to perform collection and analyses of wastewater samples with the frequency and type of measurement indicated. Samples and measurements shall be representative of the discharge during normal operation.

FOR OUTFALL NUMBERS 001, 002, 003, 004, 005, 006, 007, 008, and 009: Sample each outfall quarterly using automatic samplers. The autosampler(s) will be required to take a 24-hour composite on hourly intervals from each outfall. All outfalls should be collected at the same time, or as close together in time as possible. When the autosampler bottles are collected from the outfalls, additional grab samples will be collected for pH analysis. The autosample bottles will then be proportioned into a composite bottle, and the grab samples will be analyzed for pH. Proportion volumes are based on each outfall's relative contribution to the total flow using the most current annual average flow rates listed below:

Outfall	Hall Name	1996 Average Flow (gdp) Flow	% of Total
001	Coolbaugh	9234	9
002	Hill	25320	24
003	Alderson	5508	5
004	Plant Facilities*	34767	33
005	Meyer	7417	7
006	Brown	5111	5
007	Berthoud	10586	10
008	Chauvenet	429	1
009	Green Center	5948	6
TOTAL		**104320**	**100**

* Plant facilities sampling point includes wastewater flows from Morgan Hall, Thomas Hall, Bradford Hall, Randall Hall, Gym, Student Center, ROTC, the Library, and a small residential contribution.

Total final sample volume can be chosen as needed, as long as the proportions from the outfalls remain the same. The final composites will be analyzed for the parameters below, except pH, which will have eight reportable values. Compliance to the permit limits shall be determined from the final composite bottle

PARAMETER	MONITORING FREQUENCY(a)	SAMPLE TYPE (b)
Copper, Total	quarterly	24-hour composite
Mercury, Total	quarterly	24-hour composite
Silver, Total	quarterly	24-hour composite
pH	quarterly	grab

(a) Quarterly sampling periods are per calender quarter.

(b) A "24-hour composite" sample is composed of (24) constant volume discreet sample aliquots

collected at constant time intervals (1 hour). A "grab" sample is a single "dip and take" sample collected at a representative point in the discharge system.

B. INCREASED SAMPLING IN RESPONSE TO NONCOMPLIANCE

If sampling performed by the permittee indicates a violation of any discharge limitation, the permittee shall repeat the sampling and analysis only for the parameter(s) in violation, with the completer auto-sampler composite protocol from Part 3 (A) according to following criteria. Repeat sample(s) for any noncomplying parameter(s) listed in Part 4.A below shall be initiated within 48 hours after a violation has been discovered or on the first available work day that is representative of normal operations. After collecting the first required repeat sample(s), the permittee shall resume the self-monitoring frequencies defined in Part 3.A above, unless otherwise notified in writing by the Pretreatment Coordinator. The City reserves the right to require temporarily increased monitoring frequencies under this section. Repeat samples are not required if the City performs sampling at least once per month, or if the City performs sampling between the time the permittee performs its initial sampling and the time it receives the results of that sampling. It is the responsibility of the permittee to ascertain if the City did conduct a monitoring event which voids its requirement to resample. Failure to conduct resampling under these terms is considered a violation of this permit.

C. REPRESENTATIVE SAMPLING

Samples and measurements taken as required herein shall be representative of the volume and nature of the wastewater discharge during normal facility operation. All samples shall be taken at the monitoring points specified in this permit and, unless specified, before the effluent joins or is diluted by any other wastestream, body of water, or substance. All equipment used for sampling and analysis must be routinely calibrated, inspected, and maintained to ensure its accuracy. Monitoring points or methods shall not be changed without prior notification and written approval of the City.

D. SAMPLING PROCEDURES

Sampling and sample handling procedures shall conform to the requirements cited in 40 CFR Part 136, and amendments thereto, and the most recent edition of Standard Methods for the Examination of Water and Wastewater, published by the American Public Health Association, the American Water Works Association and the Water Pollution Control Federation.

E. TEST PROCEDURES

Test procedures for the analysis of pollutants required by this permit shall conform to the standard analytical methods cited in Table 1 of 40 CFR Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants Under The Clean Water Act, or otherwise approved by EPA, or as specified in this permit.

F. FLOW MEASUREMENTS

If flow measurement is required by this permit, the appropriate flow measurement devices and methods consistent with approved scientific practices shall be selected and used to ensure accuracy and reliability. These devices shall be routinely calibrated and maintained. Devices selected shall be capable of measuring flows with a maximum

deviation of less than 10 percent from true discharge rates.

G. ADDITIONAL MONITORING

If the permittee monitors any pollutant more frequently than required by this permit, using sampling and test procedures identified in sections D and E above, the results of this monitoring shall be included in the permitttee's periodic compliance reports.

PART 4 EFFLUENT LIMITATIONS

A. SPECIFIC EFFLUENT LIMITATIONS

Effective immediately, the permittee shall not exceed the following effluent limitations.

• FOR THE COMPOSITE BOTTLE CREATED FROM OUTFALL NUMBERS 001, 002, 003, 004, 005, 006, 007, 008, AND 009:

POLLUTANT	DAILY MAXIMUM (lbs./day) (a)
Copper, Total	2.7891 lbs./day
Mercury, Total	0.0011 lbs./day (b)
Silver, Total	0.0078 lbs./day (b)

• FOR OUTFALL NUMBERS 001, 002, 003, 004, 005, 006, 007, 008, AND 009:

POLLUTANT

pH The pH as measured in standard units shall remain above 5.0(a).

(a) Any single analysis and/or measurement beyond this limitation shall be considered a violation of the conditions of this permit. The Daily Maximum Limits shall remain constant throughout the calendar year. The quarterly conversion from concentration to mass-flow limits shall be calculated as follows:

Quarter Sampled	Concentration Value (mg/L) * 8.34 * flow factor (mgd) = lbs./day value
1st Quarter	0.082 mgd
2nd Quarter	0.098 mgd
3rd Quarter	0.139 mgd
4th Quarter	0.099 mgd

(b) Any mass discharge below this level shall be considered a "de minimus" discharge. CSM has requested and the City has granted a de minimus exemption to the zero discharge limits persuant to 13.13.060. Calculations are shown on the fact sheet.

B. **GENERAL DISCHARGE LIMITATIONS**

The following wastes are prohibited from discharge into the City of Golden Sanitary Sewer System.

a) Any liquids, solids or gases which are, or may be, sufficient either alone or by interaction with other substances to cause a fire, explosion, hazard, or be injurious in any other way to the MWWS or to the operation of the WWTF or to any person, including but not limited to, wastestreams with a closed-cup flashpoint of less than 187°F using the test methods specified in 40 CFR 261.21. In addition, at no time, shall any reading on an explosion hazard meter, at the point of discharge into the MWWS (or at any point in the MWWS) be more than ten percent (10%) of the Lower Explosive Limit (LEL) of the meter.

b) Solid or viscous substances which may cause obstruction to the flow in the MWWS or other interference with the operation of the WWTF such as, but not limited to: grease, garbage with particles greater than one-half inch (1/2") in any dimension, animal guts or tissues, paunch manure, bones, hair, hides or fleshings, entrails, whole blood, feathers, ashes, cinders, sand, spent lime, stone or marble dust, metal, glass, straw, wood, metal, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastics, tar, asphalt residues from refining or processing of fuel or lubricating oil, mud or glass grinding or polishing wastes, petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause Interference or Pass Through.

c) Any wastewater having a pH less than 5.0 or wastewater having any other corrosive property capable of causing damage or hazard to structures, equipment, and/or persons.

d) Any wastewater containing toxic pollutants and/or hazardous wastes as defined by RCRA, whether or not they are considered to be hazardous after entering the treatment plant, in sufficient quantity, either singly or by interaction with other pollutants, so as to injure or interfere with any wastewater treatment process, constitute a hazard to humans or animals, create a toxic effect in the receiving waters of the WWTF, or exceed the limitation set forth in a National Categorical Pretreatment Standard.

e) Any corrosive, noxious or malodorous liquids, gases, or solids which either singly or by interaction with other wastes may cause damage to the system, nuisance or hazard to life, or may prevent entry into the MWWS or WWTF for maintenance and repair.

f) Any substance which may cause the WWTF's effluent or any other product of the WWTF (such as residues, sludges or scum) to be unsuitable for reclamation processes. In no case shall a substance discharged to the MWWS cause the WWTF to be in non-compliance with sludge use or disposal criteria, guidelines or regulations developed under Section 405 of the Act; any criteria, guidelines, or regulations affecting sludge use or disposal developed pursuant to the Solid Waste Disposal Act, the Resource Conservation and Recovery Act, the Clean Air Act, the Toxic Substances Control Act, State or local criteria, or any other more stringent guidelines or regulations which are applicable to sludge management.

g) Any substances which may cause the city or WWTF to violate the NPDES permits or the receiving water quality standards.

h) Any wastewater with color not removed in the treatment process, or others that are either highly colored or may become highly colored by reacting with any other wastes or wastewater.

i) Any wastewater having a temperature that may inhibit biological activity in the WWTF

resulting in Interference, but in no case wastewater containing heat in such amounts that the temperature at the introduction into the WWTF exceeds 40oC (104oF). Where practicable, this shall be implemented by applying the 40oC (104oF) temperature limit at the discharge point to the MWWS.

j) Any pollutants, including oxygen demanding pollutants (such as BOD) released at a flow and/or pollutant concentration which may cause Pass Through or Interference to the WWTF. In no case shall a slug discharge have a flow rate or contain concentrations or quantities of pollutants that exceed for any time period longer than fifteen (15) minutes more than five (5) times the normal average twenty-four (24) hour concentration, quantities, or flow during normal operation.

k) Any wastewater containing any radioactive wastes or isotopes of such halflife or concentration as may exceed limits established by the city manager in compliance with applicable Coors General Wastewater Treatment Plant, state or federal regulations.

l) Any wastewater which may causes a hazard to human life or creates a nuisance or be or create a hazard to the MWWS or WWTF.

m) Any trucked or hauled waste, including but not limited to, holding tank waste, septic tank pumpage, night soil, sludge, or other material from sewage or industrial treatment plants or water treatment plants.

n) Stormwater drainage unless otherwise prohibited from being discharged into waters of the state or found by the city engineer to be necessary to be discharged into the sanitary sewers for public health, safety or welfare. No stormwater shall be discharged into the sanitary sewer unless approved by the city.

These general discharge prohibitions are contained in Section 13.13.040 of the City of Golden Revised Ordinances of 1965 and unless otherwise provided shall govern all discharges to the City of Golden sanitary sewer system during the term of this permit.

PART 5 REPORTING REQUIREMENTS FOR PERMITTEE

All reports required by this permit shall be submitted to:

Pretreatment Coordinator
City of Golden Public Works
1445 Tenth Street
Golden, Colorado 80401

within the time periods stated in the permit.

All oral notifications required by this permit shall be directed to the Pretreatment Coordinator at 384-8182. If the permittee is unable to reach the Pretreatment Coordinator, oral notification shall be directed to the Environmental Services Lab Manager at 384-8180 (or pager number 821-0052).

A. PERIODIC COMPLIANCE REPORTS

Monitoring results obtained shall be summarized and reported on a written Periodic Compliance Report form, supplied by the City, once per quarter. The reports are due on the last day of the month following the subject quarter. The first report shall contain the sampling event from November and December 1997 and be due on January 31, 1998.

Subsequent sampling shall follow normal calendar quarters. The report shall indicate the nature and concentration of all pollutants in the effluent for which sampling and analyses were performed during the preceding quarter.

B. **NONCOMPLIANCE NOTIFICATION**

If the results of the permittee's monitoring indicate that a violation of this permit has occurred, the permittee shall provide the City oral notification within 24 hours of becoming aware of the violation and shall repeat the sampling and analysis within 48 hours or on the first available work day that is representative of normal operations, as required under Part 3.B.1 of this permit. The results of this second analysis shall be submitted in writing to the City as soon as possible, but no later than 30 days after the violation first occurred. The permittee shall give advance written notice to the City of any planned changes in the permitted facilities or any planned activities which may result in noncompliance with permit requirements.

C. **SPECIAL ANNUAL REPORT**

The permittee shall submit a compiled annual report to the City, as an attachment to the Periodic Compliance Report that is due January 31, describing any mercury spills that have been reported during the previous year (see Part 6 below). The report shall also indicate any clean-up work done as the result of these spills.

D. **ADDITIONAL NOTIFICATION OF DISCHARGE OF RADIONUCLIDES**

If at any time there is a planned discharge of radionuclide wastes to the sanitary sewer system the City shall require notification of and review of the material list prior to commencing discharge.

PART 6 ACCIDENTAL DISCHARGE PREVENTION AND REPORTING

The permittee shall provide adequate physical structures and operational procedures to prevent the accidental discharge of prohibited, regulated, toxic or hazardous materials to the sanitary sewer. The permittee is required to modify chemical storage methods or locations, construct secondary containment facilities, seal floor drains, change housekeeping procedures, and make any other changes necessary to prevent accidental spills from reaching the sewer system.

The permittee shall post a notice on a bulletin board or other prominent place advising employees whom to call in the event of an accidental discharge. The permittee shall advise all employees who may cause, suffer, or become aware of an accidental discharge of the emergency notification procedure.

In the event of an accidental or unusual discharge of substances regulated or prohibited by the City of Golden Revised Ordinances of 1965 or by this permit, or in the event of a slug load, bypass, upset, overflow, or spill that may enter the public sewer, the permittee shall immediately telephone and notify the City of Golden Department of Environmental Quality and Services. Within 5 days after commencement of an accidental discharge the permittee shall submit to the City a written report with the following information:

1. Description of the upset, bypass, spill, overflow, slug load or accidental discharge including type, concentration, and volume of substance.

2. Description of the date, time, location, and duration of the waste discharged.

3. Cause of the discharge and the impact on the permittee's compliance status.

4. All steps taken or to be taken to reduce and/or prevent recurrence of discharge.

Such notification shall not relieve the permittee of any expense, loss, damage, or other liability which may be incurred as a result of damage to the City's sewer system,wastewater treatment plant, personnel, fish kills, or any other damage to persons or property, nor shall such notification relieve the permittee of any fines, civil penalties, or liability which may be imposed by the City of Golden, State, or EPA.

PART 7 GENERAL CONDITIONS

A. PERMIT NONCOMPLIANCE

All discharges authorized herein must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of Section 13.13 of the City of Golden Revised Ordinance. Such a violation may result in the immediate suspension and/or revocation of this permit and the immediate shutoff or severance of its sewer connection and the imposition of civil and/or criminal penalties as provided for in the City Ordinance, the State of Colorado's Pretreatment Regulations, the Federal Water Pollution Control Act, or EPA's General Pretreatment Regulations.

1. Current Federal Penalties for Falsification of Reports include:

Section 309(c)(4) of the Federal Water Pollution Control Act, also known as the Clean Water Act, as amended, 33 U.S.C. 1251, et seq., provides that any person who knowingly makes any false statement, representation or certification in any record or other document submitted or required to be maintained under this permit, including monitoring and compliance/noncompliance reports or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required under this permit shall, upon the first conviction, be punished by a fine of up to $10,000 per violation, or by imprisonment for not more than two years, or by both.

2. Current Civil/Criminal Penalties for Violation of Permit Conditions include:

Section 13.13.240 of the City of Golden Revised Ordinance provides for civil or criminal penalties for any person who violates a permit condition of up to $1,000.00 per day for each violation/offense. (Note: "Person" is defined in the Golden Revised Ordinance Section 13.13.010(w).) Each day on which a violation shall occur or continue shall be deemed a separate and distinct offense.

3. Current Golden Revised Ordinances of 1965 include the following provisions for Suspension and Severance of Service:

The City may suspend sewer service and/or this permit and, if necessary, sever the sewer connection to stop an actual or threatened discharge which presents or may present an

imminent or substantial endangerment to the health or welfare of persons, to the environment, causes interference to the treatment plant, or causes the City or the Adolph Coors Company to violate any condition of their respective NPDES permits. The permittee's failure to comply with administrative orders issued by the City, or other State or Federal agency, is also cause for suspending sewer service, severing the sewer connection, or suspending this permit.

4. Civil and Criminal Liability

Nothing in this permit shall be construed so as to relieve the permittee from civil and/or criminal penalties for noncompliance.

5. Duty to Mitigate Adverse Impacts.

The permittee shall take all reasonable steps to minimize or correct any adverse impacts to the City's sewer system, the Wastewater Treatment Plant, and/or the environment that result from noncompliance with this permit. This includes any accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

6. Upset Conditions

An "upset" means an exceptional incident in which there is an unintentional and temporary noncompliance with the effluent limitations of the permit because of factors beyond the reasonable control of the permittee. An upset condition does not include noncompliance caused by operational error, improperly designed or inadequate treatment facilities, lack of preventative maintenance, lack of adequate funding, or careless or improper operations.

If an upset in operations is experienced that places the permittee in a temporary state of noncompliance with the provisions of either this permit or the Golden Revised Ordinances, the permittee shall orally inform the City within 24 hours of becoming aware of the upset. A written follow-up report of the upset shall be filed by the permittee with the City within 5 days. The report shall specify:

a) A description of the upset, the cause(s) thereof, and the upset's impact on the permittee's compliance status;
b) The duration of noncompliance, including exact dates and times of noncompliance, and if not corrected, the anticipated time the noncompliance is expected to continue;
c) All steps taken or to be taken to reduce, eliminate, and prevent recurrence of such an upset; and
d) Information on whether the facility was being operated in a prudent and workmanlike manner at the time of the upset.

A documented and verified upset may constitute an affirmative defense for an enforcement action brought against the permittee for noncompliance. The permittee has the burden of proof to provide evidence and demonstrate that none of the factors specifically listed above were responsible for the noncompliance. An upset does not constitute an affirmative defense in any action to recover actual damages.

7. Need to Halt or Reduce Not a Defense

It shall not be a defense for a permittee in an enforcement action to claim that it would have been necessary to halt or reduce the permitted activity to maintain compliance with the conditions of this permit.

8. Specific Performance
This permit shall be specifically enforceable by any party hereto.

B. FEDERAL AND/OR STATE LAWS

Nothing in this permit shall be construed so as to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities or penalties established pursuant to any applicable Federal and/or State law or regulation.

C. FACILITIES OPERATIONS

1. Changes in Operations

The permittee shall notify the City ninety (90) days prior to any significant changes in plant or pretreatment system operations that are likely to change wastewater characteristics or constituents.

2. Dilution Prohibition

The permittee shall not increase the use of potable or process water or, in any way, attempt to dilute an effluent as a partial or complete substitute for adequate treatment to achieve compliance with the limitations contained in this permit.

3. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner that prevents such materials from entering the City sewer system. The permittee is responsible to assure its compliance with Section 405 of the Clean Water Act, Subtitles C and D of the Resource Conservation and Recovery Act, and the "Rules and Regulations Pertaining to Hazardous Waste" issued by the Colorado Department of Health (6 CCR 1007-3, Part 260, et seq.). The Hazardous Materials and Waste Management Division of CDPH&E can be contacted for additional help at 692-3320.

4. Termination of Operations

If the permittee ceases the operation of its facilities which generate non-domestic wastewater or toxic pollutants, the permittee shall submit to the City a closure plan which specifies treatment, storage, and disposal activities for all accumulated process chemicals and wastewaters. Such closure plan shall comply with all applicable local, State, and Federal laws and regulations.

D. RECORDS MANAGEMENT

1. Record Keeping Requirements

The permittee shall retain for a minimum of 3 years records of all monitoring information including records that pertain to matters that are the subject of special orders or enforcement activity brought by the City. This period of retention shall be extended during the course of any unresolved litigation under this permit until all enforcement activities have concluded and all periods of limitation with respect to any and all appeals have expired, or when requested in writing by the City. Such records shall include the following information for all samples:

(a) The date, exact place, time, method and type of sample and the name of the person(s) taking the sample.

(b) The dates analyses were performed.

(c) The laboratory and the name of person that performed the analyses

(d) The analytical techniques/methods used.

(e) The results of such analyses.

(f) The maintenance, calibration, and other log sheets for all sampling and measuring equipment or devices.

(g) All records of removed substances. This shall include a listing of types and volumes of solids, sludges, filter backwashes, any non-domestic wastes, or any RCRA hazardous wastes disposed of by the permittee through means other than the City sewer system. The permittee must also record the dates of waste pickup and the name(s) of the firm(s) handling these wastes and submit copies of manifests, bills of lading, receipts, or other such documentation of waste disposal.

2. Duty to Provide Information

The permittee shall furnish to the City, within a reasonable time, any information which the City may request to determine whether cause exists for modifying, revoking and

reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also, upon request, furnish to the City copies of any records required to be kept by this permit.

3. Availability of Reports

Except for data determined to be confidential, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the City. As required by Federal regulation, effluent data shall not be considered confidential information.

4. Signatory Requirements

All reports or information submitted pursuant to the requirements of this permit must contain the following certification statement and must be signed and certified by an authorized representative of the permittee, as follows:

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

b.) If the permittee is a corporation:

(1) A responsible officer of the corporation, specifically the president, secretary, treasurer or vice president of the corporation in charge of the principal business activity , or any other person who performs similar policy or decision making functions for the corporation or:

(2) The manager of one or more manufacturing, production or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), only if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

c.) By a general partner if the permittee is a partnership or by the proprietor if the permittee is a sole proprietorship.

d.) By a duly authorized representative of the individual designated in a. or b. above if the authorization is made in writing. Written authorization must specify an individual or position having overall responsibility for the facility from which discharge originates and must be submitted to the City.

e.) If authorization is no longer accurate because a different individual or position

has responsibility for the overall operation of the facility or environmental matters for the company, a new authorization must be submitted to the City prior to or with any reports to be signed by an authorized representative.

E. RIGHT OF ENTRY

The permittee shall allow the Environmental Manager or his/her duly authorized representative(s) bearing proper credentials and identification to:

1. Enter the permittee's premises for the purpose of inspection, observation, measurement, sampling, and testing to determine compliance with the provisions of this permit.

2. Have access to, examine and copy, at reasonable times, any record that must be kept under the conditions of this permit.

F. PERMIT INFORMATION

1. Appeals Procedure

Pursuant to Section 13.13.110 of the City of Golden Revised Ordinances, the permittee may request a hearing within 30 days of notification of issuance of this permit. Failure to request a hearing within the 30 days is deemed a waiver by the applicant of his/her right to challenge the terms of this permit. In the case of an appeal of any conditions of this permit, the applicant shall have the burden of establishing that any of the conditions imposed herein are unnecessary, inappropriate, or otherwise undesirable. In its request, the applicant must indicate the specific permit condition(s) objected to, the reasons for this objection, and the alternative condition(s), if any, it seeks to be placed in this permit.

2. Permit Modification, Suspension, or Revocation

This permit may be modified, suspended or revoked in whole or in part with cause in accordance with the provisions of Section 13.13 of the City of Golden Ordinance. Causes that could lead to modifying, suspending, or revoking this permit include, but are not limited to the following:

(a) Violation of any term or condition of this permit.

(b) Misrepresentation, falsification or failure to disclose fully all relevant facts in either the permit application or any required report.

(c) Promulgation of any new, additional, revised, or more stringent pretreatment or effluent limitations by the City or State or Federal agencies.

(d) Changes in the process(es) used by the permittee or changes in the volume or

character of the process discharges(s), or failure to meet the effluent limitation.

(e) Changes in design or the capability of the receiving sewage treatment plant.

(f) To correct typographical or other errors in the permit.

(g) Failure to pay fines, meet compliance schedules, or refusal of reasonable access to the facility.

(h) Information indicating that the permitted discharge poses a threat to the City's collection system, the Wastewater Treatment Plant, City or plant personnel, or the receiving waters.

(i) Upon request of the permittee, provided that such request does not create a violation of any applicable requirements, standards, laws, rules, or regulations.

3. Nontransferability

This permit is issued to the permittee for a specific operation. It cannot be reassigned, transferred or sold to a new user, different premises or a new or changed operation.

4. Duty to Reapply

The permittee is responsible for filing an application for reissuance of the permit a minimum of one hundred and eighty (180) days prior to the expiration date of the permit.

5. Expired Permits

An expired permit will continue to be effective and enforceable until the permit is reissued if:

(a) The permittee has submitted a complete permit application at least one hundred and eighty (180) days prior to the expiration date of the user's existing permit, and

(b) The failure to reissue the permit, prior to expiration of the previous permit, is not due to any act or failure to act on the part of the permittee.

G. PROPERTY RIGHTS

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges nor does it authorize any injury to private or any invasion of personal rights, nor any violation of Federal, State, or municipal laws and regulations.

H. SEVERABILITY

The provisions of this permit are severable and if any provisions of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

I. ANNUAL NEWSPAPER PUBLICATION

The permittee is hereby informed that the City must annually publish a list of all industrial users which were in significant noncompliance with applicable pretreatment requirements, as defined at 40 CFR 403.8(f)(2)(vii), at least once during the twelve (12) previous months, in the newspaper with the largest daily circulation within the City.

	A	B	C	D	E	F	G	H
1				CSM LIMIT CALCULATIONS				
2				pounds/day based on largest (3rd)				
3				quarter's water meter flow data				
4	96 average	Q1 94	Q2 94	Q3 94	Q4 94		% of 8 csm	
5	9234	5869	9184	16521	5364	Coolbaugh	9	
6	5508	2587	5772	10521	3153	Alderson	5	
7	25320	23927	24863	28340	24153	Hill	24	
8	7417	9556	6943	7478	5692	Meyer	7	
9	5111	1628	5272	10457	3088	Brown	5	
10	429	206	352	521	637	Chauvinet	1	
11	10586	9907	8932	11903	11604	Berthoud	10	
12	34767	25987	30196	42430	40468	Pl. Fac.*	33	
13	5948	1836	6421	10989	4549	Green Ctr.	6	
14	TOTALS	81503	97935	139160	98708		100	
15	104320	8 csm flows yearly ave.						
16	322000	total ind. flow						
17	32.3975	% of total ind. flow				Limits in #/d		
18					2.7891	csm HL Cu (#/d) = A22*E19/100		
19					6.4536	MAIL Cu (#/d)		
20	139160	8 csm flows max quarter			0.0078	csm HL Ag (#/d) = A22*E21/100		
21	322000	total ind. flow			0.0180	MAIL Ag (#/d)		
22	43.2174	% of total ind. flow			0.0011	csm HL Hg (#/d) = A22*E23/100		
23					0.0025	MAIL Hg (#/d)		
24					#VALUE!	csm HL CN (#/d) = A22*E25/100		
25					delete	MAIL CN (#/d)		
26								
27	*Pl. Fac. = Morgan+Thomas+Bradford+Randall+Gym+Library(s)+Student Center+ROTC+Plant Facilities+500(for residential)							
28								
29			Flows in gpd					
30		Q1	Q2	Q3	Q4			
31		81503	97935	139160	98708			
32								
33		81503	97935	139160	98708			
34								
35		81503	97935	139160	98708			
36								
37		81503	97935	139160	98708			
38								
39								
40								
41			limits in PPM				ppm	
42		Q1	Q2	Q3	Q4	average	Currently	%increase
43	Cu	4.1010	3.4129	2.4018	3.3862	3.3255	1.01	229.25
44								
45	Ag	0.0114	0.0095	0.0067	0.0094	0.0093	0.0032	189.85
46								
47	Hg	0.0016	0.0013	0.0009	0.0013	0.0013	0.0003	329.41
48								
49	CN	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	n/a	n/a
50								
51								
52								

55

PERIODIC COMPLIANCE REPORT

CSM - 9 OUTFALL COMPOSITE SAMPLE

1st Quarter 19_____

Date		Reported Value (mg/L)	quarterly flow (mgd)	conversion	Value (#/d)	Limit (#/d)
_____	Cu	_____	0.082	8.34	_____	2.7891
_____	Hg	_____	0.082	8.34	_____	0.0011
_____	Ag	_____	0.082	8.34	_____	0.0078

pH Only:	Outfall:	001	002	003	004	005	006	007	008	009	
	pH	_____	_____	_____	_____	_____	_____	_____	_____	_____	>5.0

If the permittee has monitored any pollutant more frequently than required by this permit, using sampling and test procedures identified in the permit, the results of this monitorong must be included as an attachment to this report. (See Part 3.G of the permit.)

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

Signature _____ Date

Submit report to: Pretreatment Coordinator, Environmental Services, Public Works Dept.
City of Golden, 1445 10th Street, Golden, Colorado 80401

p:\labs\pretreat\csm\csm95pcr.xls

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PERIODIC COMPLIANCE REPORT

CSM - 9 OUTFALL COMPOSITE SAMPLE

2nd Quarter 19_____

Date		Reported Value (mg/L)	quarterly flow (mgd)	conversion	Value (#/d)	Limit (#/d)
_____	Cu	_____	0.098	8.34	_____	2.7891
_____	Hg	_____	0.098	8.34	_____	0.0011
_____	Ag	_____	0.098	8.34	_____	0.0078

pH Only:	Outfall:	001	002	003	004	005	006	007	008	009	
	pH	_____	_____	_____	_____	_____	_____	_____	_____	_____	>5.0

If the permittee has monitored any pollutant more frequently than required by this permit, using sampling and test procedures identified in the permit, the results of this monitorong must be included as an attachment to this report. (See Part 3.G of the permit.)

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

_____

Signature Date

Submit report to: Pretreatment Coordinator, Environmental Services, Public Works Dept.
City of Golden, 1445 10th Street, Golden, Colorado 80401

p:\labs\pretreat\csm\csm95pcr.xls

PERIODIC COMPLIANCE REPORT

CSM - 9 OUTFALL COMPOSITE SAMPLE

3rd Quarter 19_____

Date		Reported Value (mg/L)	quarterly flow (mgd)	conversion	Value (#/d)	Limit (#/d)
_____	Cu	_____	0.139	8.34	_____	2.7891
_____	Hg	_____	0.139	8.34	_____	0.0011
_____	Ag	_____	0.139	8.34	_____	0.0078

pH Only:	Outfall:	001	002	003	004	005	006	007	008	009	
	pH	_____	_____	_____	_____	_____	_____	_____	_____	_____	>5.0

If the permittee has monitored any pollutant more frequently than required by this permit, using sampling and test procedures identified in the permit, the results of this monitorong must be included as an attachment to this report. (See Part 3.G of the permit.)

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

_____

Signature Date

Submit report to: Pretreatment Coordinator, Environmental Services, Public Works Dept.
City of Golden, 1445 10th Street, Golden, Colorado 80401

p:\labs\pretreat\csm\csm95pcr.xls

PERIODIC COMPLIANCE REPORT

CSM - 9 OUTFALL COMPOSITE SAMPLE

4th Quarter 19_____

Date		Reported Value (mg/L)	quarterly flow (mgd)	conversion	Value (#/d)	Limit (#/d)
_____	Cu	_____	0.099	8.34	_____	2.7891
_____	Hg	_____	0.099	8.34	_____	0.0011
_____	Ag	_____	0.099	8.34	_____	0.0078

pH Only:	Outfall:	001	002	003	004	005	006	007	008	009	
	pH	_____	_____	_____	_____	_____	_____	_____	_____	_____	>5.0

If the permittee has monitored any pollutant more frequently than required by this permit, using sampling and test procedures identified in the permit, the results of this monitorong must be included as an attachment to this report. (See Part 3.G of the permit.)

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

Signature _____ Date

Submit report to: Pretreatment Coordinator, Environmental Services, Public Works Dept.
City of Golden, 1445 10th Street, Golden, Colorado 80401

p:\labs\pretreat\csm\csm95pcr.xls

- Read instructions on back before filling out. The information on this form must be accurate, complete and legible. Improperly filled out forms will not be accepted. Inaccurate information could cause regulatory violation, environmental degradation or severe safety hazards to persons who will handle this material.

COLORADO SCHOOL OF MINES ENVIRONMENTAL HEALTH AND SAFETY PROGRAM

REQUEST FOR CHEMICAL RECYCLING AND WASTE DISPOSAL

- Submit completed forms to:
  Environmental Health and Safety Office
  Phone: 273-3316
  Call with questions or requests for assistance

① **GENERATOR INFORMATION**

DEPARTMENT: _____

BUILDING: _____

NAME OF PRINCIPAL INVESTIGATOR, MAJOR PROFESSOR OR LABORATORY SUPERVISOR: _____

NAME OF PREPARER: _____

LOCATION OF WASTE TO BE COLLECTED (Room No.): _____

② **GENERATOR'S CERTIFICATION:**

Date: _____ Phone No.: _____

I certify that the contents of the waste containers listed on this form are accurately identified.

Printed Name: _____ Signature: _____

③ CONTAINER NO. (Correspond with no. on container tag.)	E.H.S. OFFICE USE		④ SPECIFIC CHEMICAL NAME/IDENTITY (If a mixture - list all constituents. Write chemical name - not formulas, common names or tradenames. Indicate concentration of solutions or percentages by weight of each component of a mixture.)	E.H.S. OFFICE USE		⑤ LIQUID/ SOLID/ GAS	⑥ QUANTITY OF WASTE in Kilograms (Kg.)	⑦ CONTAINER SIZE AND TYPE (Glass, metal, plastic, etc. Volume in Liters.)	⑧ FOR REUSE/ RECYCLING? Y/N
	T.W.	Comp.		Consol.	Empty				

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GUIDELINES FOR INITIATING COLLECTION OF UNUSED CHEMICALS OR HAZARDOUS WASTE

General

- Protection of the environment begins here and now - with you, the waste producer. You can make a personal contribution to this effort by taking the time to participate in the waste disposal program. It's ethical, and it's the law.
- All solvents or other chemical waste produced in laboratories should be assumed to be legally regulated "hazardous waste" unless otherwise determined by the EHS Office. Do not dump chemicals down the drain.
- Lab personnel initiate pickup and disposal of hazardous waste or redistribution of unused chemicals by submitting this form to the Environmental Health and Safety (EHS) Office in Chauvenet Hall; phone 273-3316. Lab personnel also must fill out container identification tags and attach them to each container which is offered for disposal or redistribution. Each container must be accurately labeled concerning contents. The EHS Office responds to the request, removes the waste and arranges for disposal at an authorized disposal site. Material which is still usable will be advertised for redistribution to other campus laboratories.
- **Waste containers must be in good condition, compatible with contents, and equipped with secure screw-on caps.**
- The EHS Office provides forms, tags, blank labels, and a limited number of waste containers to requesting laboratories.

Who Fills Out The Forms, Tags, and Maintains Container Labels.

- **Persons who have procured or used the waste material should arrange for disposal.** Lab supervisors or occupants of the lab should accomplish this task if the original procurer is unavailable. Waste disposal should not be postponed nor should responsibility for disposal be delegated to temporary helpers, departmental technicians or clerical workers.

Tags and Labels.

- Each waste container must be accurately labeled concerning contents. Give the specific chemical name; not chemical formulas, common names or tradenames. If the material is a mixture, list each constituent separately. Indicate concentrations of solutions or percentages by weight of each component of a mixture.
- A completed container identification tag must be attached to each waste container. The number on the tag must correspond with the number indicated in column one of this form (reverse). The container tag may serve as a label of contents, if no other label is provided. Contents must be indicated on either the tag or on another label which is also affixed to the container.

Filling Out This Form (reverse)

1. **Generator Information** - complete as required.
2. **GENERATOR'S CERTIFICATION** - FILL IN CURRENT DATE. READ STATEMENT - PRINT NAME LEGIBLY AND SIGN. UNSIGNED FORMS WILL BE RETURNED. NAME OF CERTIFIER MUST BE ON FILE AT EHS OFFICE AS HAVING COMPLETED GENERATOR TRAINING. As a user of hazardous materials, I understand that I am responsible for the storage, use, handling, packaging, labeling and disposal of these materials. I also understand that as a user of hazardous materials, participation in the CSM Hazardous Materials Management and Disposal Program is mandatory. I declare that I have accurately and fully listed the contents of these waste containers.
3. **Container Number** - identify each container listed on the form by indicating the container number displayed on the container tag.
4. **Specific Chemical Name/Identity** - give the specific chemical name - not **formulas**, common names or trade names. If the material is a mixture, list each constituent separately. Indicate concentrations of solutions or percentages by weight of each component of a mixture.
5. **Liquid/Solid/Gas** - complete as required.
6. **Quantity of Waste** - the originator must determine and indicate the metric weight of the waste. Liters, gallons, pounds, ounces, etc., are not acceptable.
7. **Enter Container Type** (glass, metal, plastic, etc.) **and Size** (metric volume: 1 liter, 250 ml, etc.).
8. **Offered for Reuse/Recycling?** - pure, unused chemicals (particularly those with unbroken container seals) are likely candidates for reuse. The originator indicates with a **yes** if it is thought that the material will be of value to another campus lab. Answer **no** it the material cannot be used.

SAMPLE CONTAINER IDENTIFICATION TAG

REGULATED WASTE

Mismanagement of this waste may be punishable by civil and criminal penalties.

Container #

Barcode #

WHO is responsible for this container?

Name:_____

The above-named person must:

- Ensure that contents are chemically compatible and accurately identified.
- Keep the container securely capped.
- Conduct weekly inspection of container for safety/security.
- Initiate disposal within 6 months of the start of waste accumulation.

WHEN was waste first put into this container?

Date:_____

WHAT is the chemical identity of this waste?

Chemical Name	*Qty./Conc.*

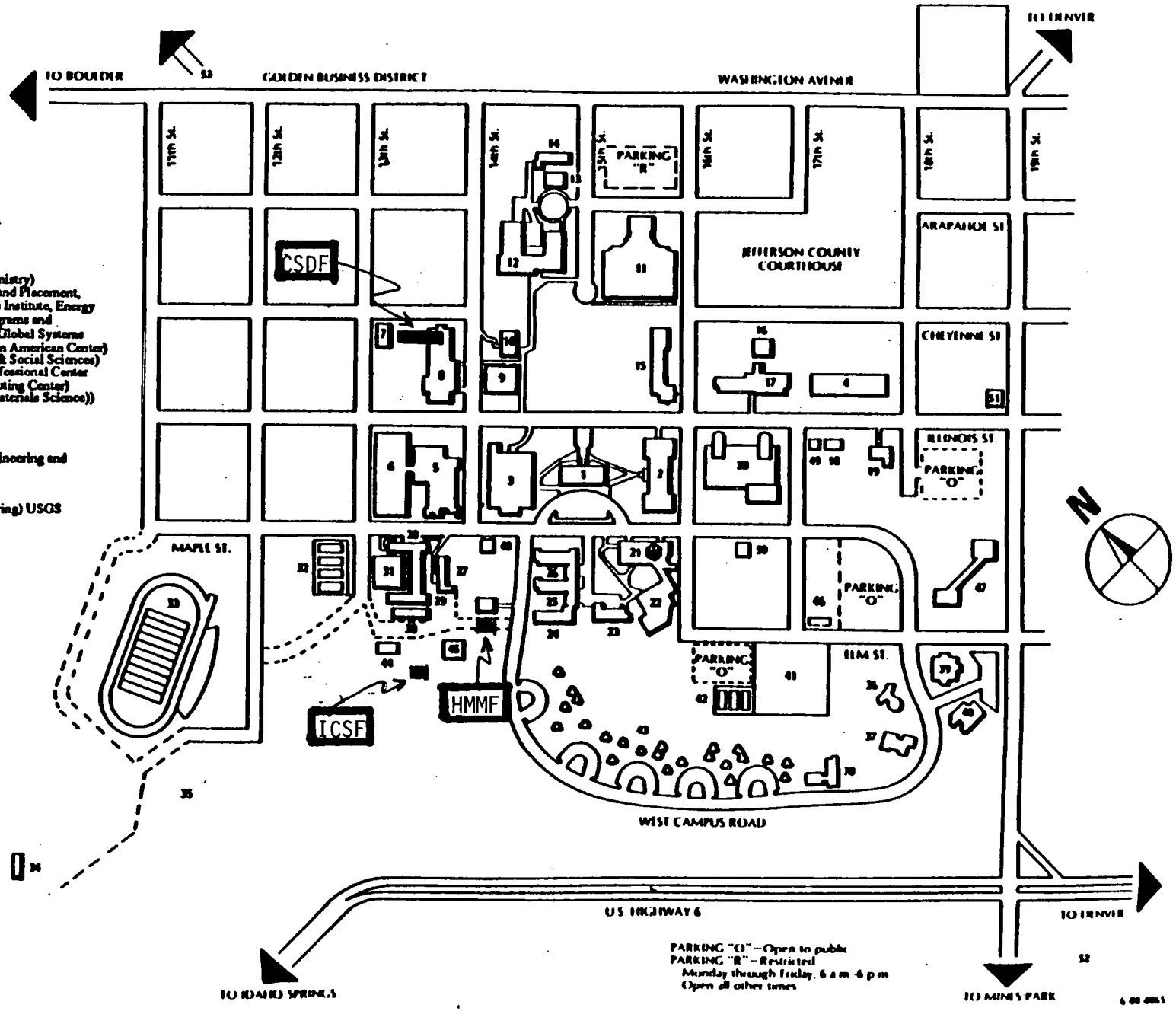
(cont. on reverse)

CAMPUS GUIDE

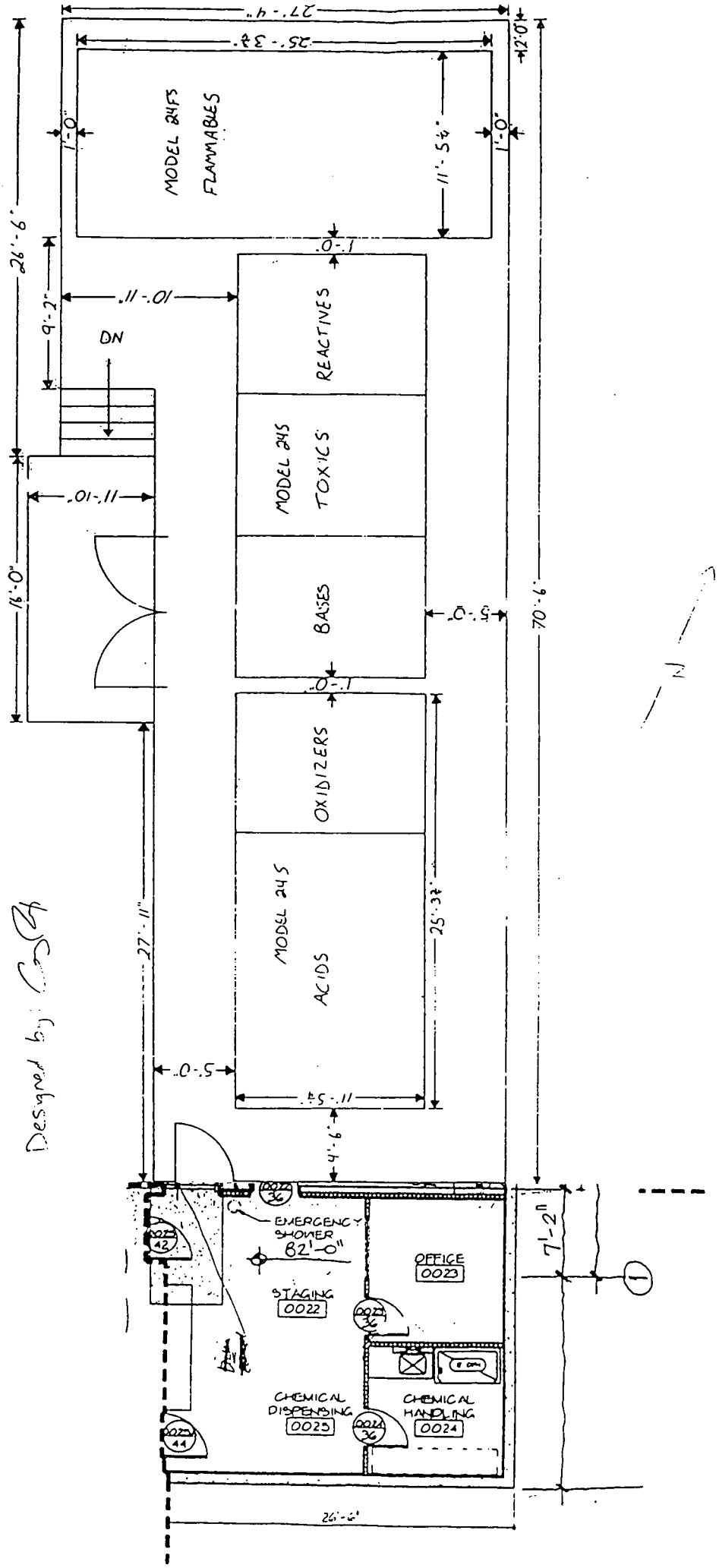
COLORADO SCHOOL OF MINES

KEY TO FACILITIES

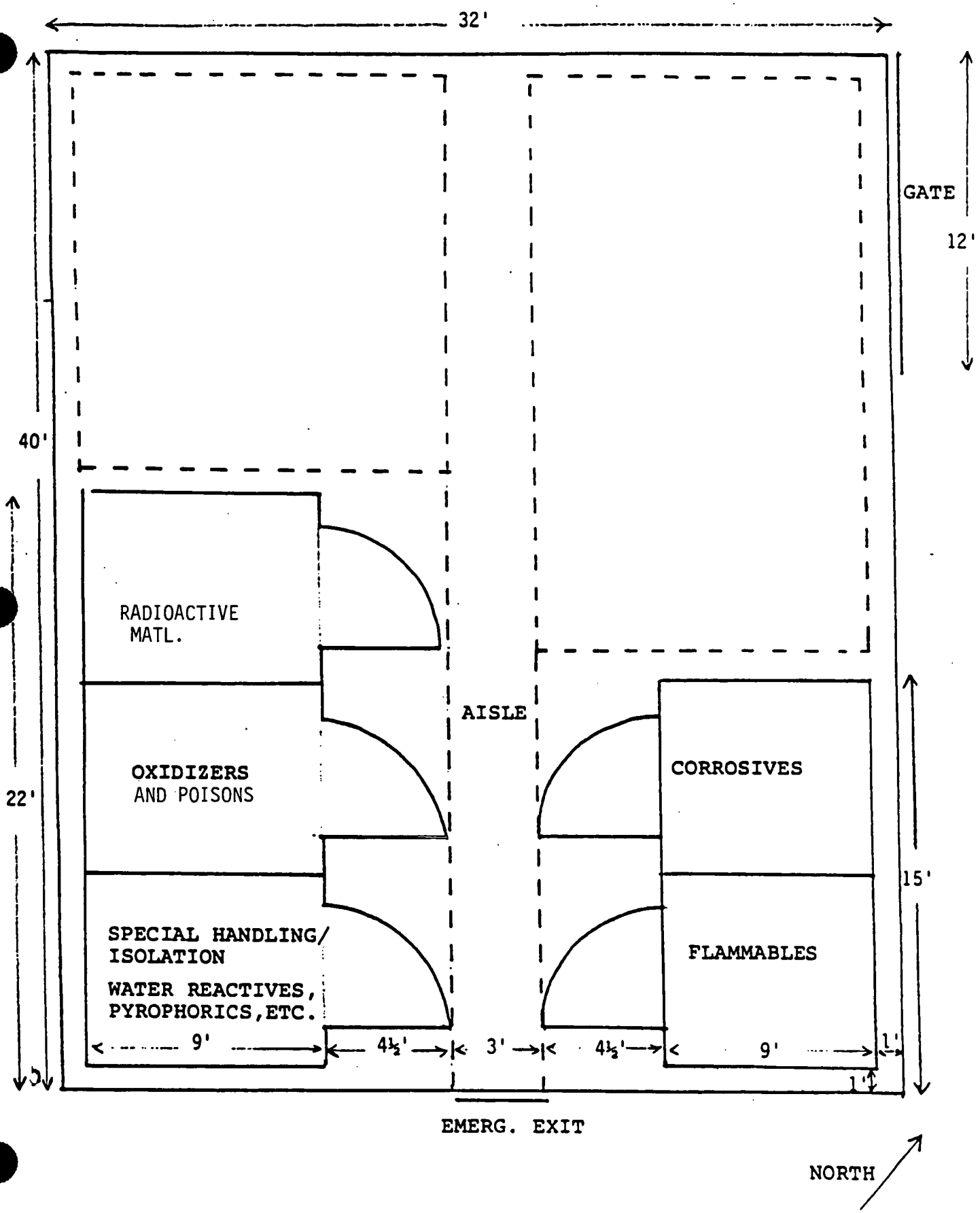
1. Guggenheim Hall (Administration)
2. Berthoud Hall (Geology, Museum)
3. Arthur Lakes Library
4. U.S.G.S. Offices and Laboratories
5. Russell H. Volk Gymnasium
6. Steinhauer Field House
7. Power Plant
8. Coolbaugh Hall (Chemistry and Geochemistry)
9. Chauvenet Hall (Cooperative Education and Placement, Environmental Science, Earth Mechanics Institute, Energy and Minerals Field Institute, Special Programs and Continuing Education, EPICS, Dept. of Global Systems and Cultures, International Students, Latin American Center)
10. Stratton Hall (Mathematics, Humanities & Social Sciences)
11. Cecil H. and Ida Green Graduate and Professional Center (Geophysics, Mineral Economics, Computing Center)
12. Nathaniel P. Hill Hall (Metallurgy and Materials Science))
13. Engineering Hall
14. Publications Center
15. Paul Meyer Hall (Physics)
16. Unit Operations Laboratory
17. Aldenson Hall (Petroleum, Chemical Engineering and Petroleum Refining)
18. Alpha Tau Omega
19. President's Home
20. George R. Brown Hall (Mining, Engineering) USGS Soils Lab (1/1/87)
21. Ben H. Parker Student Center, Bookstore
22. Dining Hall
23. Randall Hall
24. Bradford Hall
25. Thomas Hall
26. Morgan Hall (Mathematics)
27. Plant Facilities
28. Plant Facilities
29. Military
30. Plant Facilities
31. Warehouse
32. Tennis Courts
33. Brooks Field
34. Hoisting Laboratory
35. Rocky Field
36. Sigma Nu
37. Kappa Sigma
38. Beta Theta Pi
39. Sigma Alpha Epsilon
40. Sigma Phi Epsilon
41. Nils A. Swenson Intramural Field
42. Tennis Courts
43. Prospector Village
44. Carpenter Shop
45. EMI Drilling Laboratory
46. Infirmary
47. Twin Towers Residence Hall (Admissions, CSM Alumni Assn., CSM Foundation, Inc.)
48. Student Development Center (Affirmative Action, Internal Auditor)
49. Alpha Tau Omega
50. Agape House
51. CSM Credit Union
52. Survey Field



CSDF SCHEMATIC

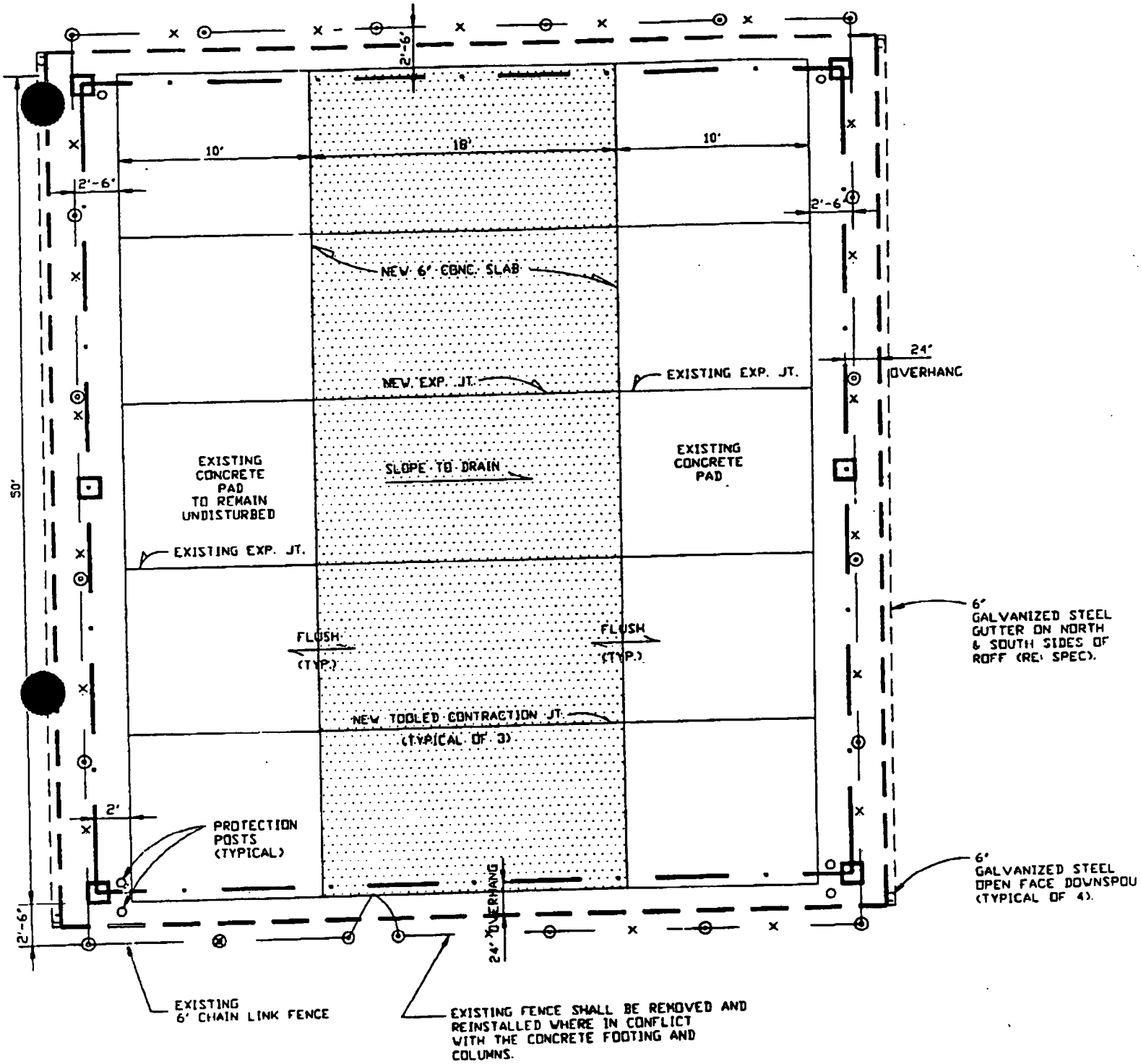


HAZARDOUS MATERIALS MANAGEMENT FACILITY



105

ICSF SCHEMATIC



PLAN

SCALE: 1/8" = 1'-0"

NORTH

Lele

REGULATED WASTE

NAME OF EACH CONTRIBUTOR	DATE OF EACH ADDITION	SPECIFIC CHEMICAL NAME/IDENTITY IF A MIXTURE — LIST ALL CONSTITUENTS. WRITE CHEMICAL NAME — NOT FORMULAS, COMMON NAMES OR TRADENAMES. INDICATE CONCENTRATIONS OF SOLUTIONS OR PERCENTAGES BY WT. OF EACH COMPONENT OF A MIXTURE.	QUANTITY EXPRESSED AS METRIC WT.
		TOTAL QTY. OF CONTENTS (METRIC WT.) ▣	

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COLORADO SCHOOL OF MINES

Environmental Health and Safety (EHS)

Date: _____

TO: _____

FROM: Linn Havelick, Environmental Health Manager, EHS

SUBJECT: Chemical Requisition/Hazardous Waste Disposal

In order to ensure institutional compliance with federal and state regulations concerning management and accountability for handling of regulated materials, the EHS office administers a policy which requires campus personnel to receive training concerning hazardous materials handling procedures.

Only designated faculty, graduate students and classified staff members are authorized to procure hazardous materials or to generate federally regulated hazardous waste. Authorization is granted following attendance at a brief hazardous materials training presentation. **All campus personnel must attend the training presentation once a year in order to maintain authorization to generate hazardous waste or to procure regulated materials.** This training is offered to each department once a semester.

Our records indicate that you have not received this training within the last year. Therefore, we are unable to respond to your request for hazardous waste disposal services.

If you wish to become an authorized hazardous materials handler, you should contact your Department Head to arrange attendance at the next regularly scheduled training session, or you can arrange an individual training session with Bob MacPherson (ext. 3573). You may also contact another person in your department who is an authorized Hazardous Materials Handler and ask that person to submit this request on your behalf. Persons who agree to act on your behalf assume a significant responsibility to ensure that you handle regulated materials in accordance with federal law and University policy.

RAM/ge

Attachment

cc: Department Head
Faculty Advisor

11/17/98-Bobmemos/Memo364

L8

ESSENTIAL KNOWLEDGE FOR CSM LAB WORKERS CONCERNING CHEMICAL PROCUREMENT AND DISPOSAL

Emergency Information

- Chemical Spills. The Environmental Health and Safety (EHS) office provides a chemical spill cleanup service. Lab personnel are encouraged to seek assistance from the EHS office if leaks or spills are detected. There is no penalty for reporting spills.

- Building Evacuation. Lab personnel should sound the fire alarm and leave the building if there is a risk of fire, explosion or exposure to toxic chemicals in a laboratory. The person who sounds the alarm should meet police/fire officials as they arrive and explain the circumstances.

- Emergency Information Poster. The EHS office maintains a supply of emergency information posters. These should be posted by telephones in each campus laboratory. Call the EHS office at 3316 for posters.

- Emergency Contact Information. The attached list of emergency contact phone numbers should be kept by telephones in each campus laboratory. Call the EHS office at 3316 for additional copies.

Procurement of Chemicals

- Who/Where/How. All chemicals must be procured through the Chemical Storage and Distribution Facility in Coolbaugh Hall. The facility is operated by the Environmental Health and Safety (EHS) office. Contact Facility Manager John Elliott at x3555 for service. Only "authorized" campus personnel can procure chemicals. Authorization is granted on a yearly basis following attendance at an annual training session.

- Material Safety Data Sheets (MSDSs). MSDSs for each chemical should be posted on a clipboard outside each lab or chemical storage area. All lab personnel must be trained concerning hazardous properties of chemicals in the lab and must have ready access to MSDSs. MSDSs can be obtained from the EHS office or from the Internet (see On-Line Procurement Services below).

- On-Line Procurement Services. Information on all chemicals on the campus has been entered into a computerized inventory. Access to the campus inventory and instructions concerning how to place an order are available via the campus computer network. The searchable inventory lists the location, grade, quantity, manufacturer, price and owner of each reagent. MSDSs are also available on the campus computer network. Access these on-line services by finding the CSM Home Page. Then follow the menu from *Administration* to *Support Services* to *Chemical Stores*.

Waste Minimization

- Chemical Recycling. The "dead storage" of large stocks of unused reagents in departmental storage spaces and laboratories is prohibited. If there is no specific reason for keeping chemicals on hand in a laboratory, the chemicals should be returned to the Chemical Storage and Distribution Facility. Returned chemicals may be reserved for use only by the originating department or individual, or may be offered for use by other departments and individuals at no charge. The availability of these "free" chemicals is advertised in the on-line chemical inventory. This recycling process reduces cost, waste, lab hazards and environmental damage caused by procurement of excess quantities of chemical reagents. Call John Elliott at x3555 for help in returning unused chemicals.

- Alternative Materials. Hazardous waste is expensive to manage and poses threats to the environment. Researchers and lab instructors are encouraged to design experiments in a way that utilizes the least toxic and most environmentally benign reagents.

- Volume Reduction. CSM produces 10-20 thousand kg of hazardous waste each year. Much of this is in the form of dilute solutions. Researchers and lab instructors are encouraged to design experiments in a way that minimizes waste volume. The adoption of modern "micro" analytical techniques is strongly encouraged.

Waste Disposal

- Responsibility. Management of chemical waste which is accumulated in campus laboratories and workshops is the responsibility of the person who produces the waste. This responsibility cannot be delegated. Civil and criminal penalties may be assessed for mismanagement of chemical waste which results in violation of state or federal law.

- Disposal Prohibitions. Chemical waste must never be disposed in the sewer, by evaporation or in the trash. Sewer discharges from the School are closely scrutinized. Every three months, 24-hour composite samples are taken from 10 sampling points in campus sewers. These samples are checked for compliance with stringent concentration limits for several potential contaminants. The consequences for noncompliance are severe. Please capture all chemical waste and allow no drain discharges of reagents, organic solvents, corrosives or metals.

- Identification of Waste. All chemical waste containers must be labeled with an accurate description of contents. Storage of unlabeled waste is a violation of federal law. The safety of numerous persons who later handle the waste is dependent upon accurate labeling by lab personnel who originate the waste.

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- Containers. The EHS office (Phone 3316) provides waste containers to all lab personnel. All kinds of containers are available at no charge. Waste containers in labs must be effectively sealed with screw-on caps.

- Accumulation of Waste. The responsible person must attach container identification tags to each waste container at the time when waste is first placed in the container. The name of the responsible person and the date when the container first entered service must be written on the tag in the appropriate spaces. Duties of the responsible person include the following:

  - Ensure that wastes are segregated according to chemical compatibility.
  - Ensure that containers are chemically compatible with contents.
  - Ensure that all wastes which are placed in each container are accurately identified.
  - Ensure that containers are in good condition and are securely capped/sealed.
  - Conduct a weekly inspection of waste containers to ensure their safety and security.
  - Initiate collection and disposal of accumulated waste at least every six months. The quantity of accumulated waste may never exceed 55 gallons. If the waste is highly toxic or reactive, the accumulated quantity may not exceed one quart.

- How to Initiate Disposal. The responsible person fills out a Disposal Request Form and sends it to the EHS office in the departmental mail. The forms are available at the EHS office (Phone 3316). EHS personnel will pick up the waste from the laboratory and ensure that it is properly disposed.

Graduation and Termination of Employment

- Chemical Clean-Out. Students or employees who are leaving the university and who have chemicals or waste in their possession must ensure that these materials are inventoried and properly disposed before they depart. Abandonment of hazardous materials and waste may constitute a crime. Such incidents may be investigated by police officers. Departments should implement a check-out procedure which ensures that departing students and employees properly dispose of waste and turn in unused chemicals to the Chemical Storage and Distribution Facility in Coolbaugh Hall.

HAZARDOUS MATERIALS EMERGENCY INFORMATION

Hazardous Materials Management Facility (HMMF) Emergency Coordinators

Environmental Health and Safety (EHS) Office
Colorado School of Mines (CSM), Chauvenet Hall, RM 194
Golden, CO 80401

Phone: 303-273-3316

Contact	Phone Number	Home
Linn Havelick (Primary) Environmental Health Manager	Office: 303-273-3998 Pager: 303-851-3266	[redacted]
Bob MacPherson (Alternate) Director, EHS	Office: 303-273-3573 Pager: 303-855-0759	[redacted]

EMERGENCY PHONE NUMBERS: EHS Office Phone = 303-273-3316

1.	Bob MacPherson, Director Environmental Health & Safety	Home: [redacted] Pager:
2.	Linn Havelick Environmental Health Manager	Home: Pager:
3.	Dick Porter CSM Safety Officer	Home: Pager:
4.	John Elliott Chemical Hygiene Manager	Home: Pager:
5.	CSM Public Safety Office	911 or 303-273-3333
6.	Golden Fire Department	911 or 303-384-8092
7.	Golden Police Department	911 or 303-384-8045
8.	Ambulance	911 or 303-572-9111
9.	Jefferson County Sheriff	911 or 303-277-0211
10.	JEFFCO Hazardous Materials Specialist - Glenn Grove	303-277-0211 (24 Hours)
11.	JEFFCO Emergency Management Coordinator - James Ellis	303-271-8519 (Office Hours)
12.	JEFFCO Emergency Preparedness Office	303-271-8215 (Office Hours)
13.	Chair, JEFFCO Local Emergency Planning Committee - Tim Gablehouse	303-572-0050 (Office Hours)
14.	Chair, Clear Creek County Local Emergency Planning Committee - Garland Baker	303-679-2349 (Office Hours) 303-679-2393 (24 Hours)
15.	CDPHE Emergency Management Unit	303-692-3020 (Gen Info) = Bus. Hrs.
16.	CDPHE Radiation Control Division	303-692-3030 = Business Hours
17.	CDPHE Environmental Emergency Response Line (all CDPHE divisions)	303-756-4455 (24 hours)
18.	EPA Emergency Response Line	800-227-8914 or
19.	EPA Emergency Spill No.	303-293-1788 (24 hours)
20.	Rocky Mountain Poison Center	303-629-1123
21.	National Response Center	800-424-8802
22.	Chemical Transportation Emergency Center (CHEMTREC)	800-424-9300

11/3/98-Gendocs/EmerNos

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COLORADO SCHOOL OF MINES

Environmental Health and Safety (EHS)

Date: _____

MEMO TO: Department Heads

FROM: Bob MacPherson, Director, EHS

SUBJECT: Hazardous Material User Training

It is School policy that knowledge of and participation in the School's Hazardous Materials Management Program is mandatory for persons who procure or use chemicals which eventually become waste. Only designated faculty, students and classified staff members are authorized to procure chemicals and generate federally regulated hazardous waste on the CSM campus. Authorization to procure chemicals and generate waste is granted on a year-to-year basis, following attendance at an annual training session.

Graduate students and classified staff members must attend a 20 minute presentation once a year in order to maintain authorization to procure chemicals or generate regulated waste. At the request of Department Heads the EHS office provides this training each semester for individual departments. These sessions are scheduled by Department Heads at times and locations which are convenient to departmental personnel. Please call me at x3573 to arrange a time for me to come to your department and provide this training.

In order to accommodate the busy schedules of faculty members, we are offering alternative methods by which faculty members can comply with the annual training requirement. These alternatives are as follows:

1. Faculty members are welcome to attend the aforementioned 20 minute presentation which is made available each semester by the EHS office. The Department Head schedules this training.

2. At the invitation of the Department Head, an EHS staff member will attend a regularly scheduled departmental faculty meeting and provide abbreviated hazardous waste training. The abbreviated training session takes about 10 minutes and covers the topics in the attachment.

3. The Department Head or a qualified departmental designee can provide training to faculty members. The training must cover the topics in the attachment. The Department Head should then notify the EHS office concerning who attended the training and the date it was provided.

The EHS office maintains records of attendance at hazardous materials training presentations and keeps a current list of campus personnel who are authorized to handle regulated materials. The EHS office will not provide chemical procurement or waste disposal services to persons who have not received this training within a year.

Police officers may investigate mishandling of hazardous waste by unauthorized persons. Civil and criminal charges may be brought against individuals who violate state and federal environmental law.

RAM/ge

Attachment

cc: Vice President, Business Affairs
Vice President, Academic Affairs

11/17/98-Bob/Memos/Memo365

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NOTICE CONCERNING MANDATORY SAFETY TRAINING
FOR NEW GRADUATE STUDENTS

Many graduate students at the Colorado School of Mines independently utilize highly regulated materials and potentially hazardous equipment during their course of study and research. These materials and equipment include: highly toxic, flammable, corrosive or reactive gases and chemical reagents; federally regulated hazardous waste; radioisotopes; x-ray machines; and wood and metal working machinery. In order to protect the environment and ensure the safety of individual students and occupants of buildings where these materials and equipment are housed, the School requires incoming graduate students to attend an introductory safety seminar which is provided each semester by the CSM Environmental Health and Safety (EHS) office. The only graduate students who are excused from this training are those who will study economics, math or computer science. All other new graduate students must attend the seminar on one of the dates listed below. Engineering students who will not use chemicals or generate hazardous waste will be excused at the end of the first 30 minute training segment. Other students who may utilize radioactive material, chemicals, compressed gases or generate chemical waste must attend the entire seminar. The seminar lasts for about one and a half hours. Snacks and drinks are provided. The entire seminar is provided twice on separate dates at the beginning of each semester. These optional dates are offered so that all incoming graduate students have an opportunity to attend. No sign-up or reservation is required. The seminar schedule for the spring semester, 1997 is:

	DATE	TIME	PLACE
1.	January 8 (Wed)	5-6:40 PM	Petroleum Hall, Green Center
2.	January 14 (Tues)	3-4:40 PM	Petroleum Hall, Green Center

Students who fail to attend the seminar on one of the above dates will be notified in writing by the Dean of Graduate Studies that they are not authorized to procure, use, store or handle chemicals on University premises. In addition, these students will not be authorized to use wood or metal working machinery, radiation-producing equipment (x-ray machines), radioisotopes or generate regulated chemical waste. A copy of this notification letter will be sent to the student's Department Head and Faculty Advisor. The EHS office operates the central chemical procurement and distribution service and the chemical waste disposal service for the campus. The EHS office will not respond to requests for these services from students who do not attend the seminar. Please call the EHS Director at phone number (303) 273-3573 if you have questions concerning the requirement for you to attend.

Sincerely,

Arthur Kidnay
Dean, Graduate Studies and Research

Bob MacPherson
Director, Environmental Health & Safety

10/24/96-Gendoc/Notice

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COLORADO SCHOOL OF MINES

EMERGENCY RESPONSE PLAN

Revised: November 1998

11/20/98-Bob/Reports/Rept108A

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ATTACHMENTS:

No. 1 Hazardous Materials Emergency Information Poster

No. 2 Hazardous Materials Information Poster Associated with Operation of the Hazardous Material Management Facility (HMMF)

No. 3 Building Fire Safety Characteristics Record Form

No. 4 Standard Operating Procedures

No. 5 Chemical Spill Response Equipment Inventory

No. 6 Decontamination Procedures

No. 7 Letter of Appointment to Serve on the CSM Hazardous Material Response Team

No. 8 Hazardous Material Response Team Training Record

No. 9 Sample Examinations Administered During Response Team Training

I. APPLICABLE REGULATIONS

A. Regulations of the Federal Occupational Safety and Health Administration (OSHA) — Since the School is a public institution in the State of Colorado, OSHA does not normally have direct regulatory authority over the School, however the School models its occupational safety program upon OSHA requirements in accordance with a Governor's Executive Order. In addition, the U.S. Environmental Protection Agency (E.P.A.) administers worker protection regulation 40 CFR Part 311. This regulation adopts the aforementioned OSHA regulation and makes the OSHA regulation applicable to state and local government employees who engage in hazardous waste operations and who would otherwise be exempt from OSHA regulation. Therefore, OSHA regulations CFR 1910 Part 120 entitled "Hazardous Waste Operations and Emergency Response" are applicable to the School in matters concerning the operations of the School's Chemical Spill Response Team. Relevant parts of OSHA regulation 29 CFR 1910 Part 120 include the following:

Part 120(a)(1)(v), (a)(2)(iii)(B) and (a)(2)(iii)(C) — Indicate that provisions in Part 120(q) apply to operations of the School's Chemical Spill Response Team.

Part 120(q)(1), (2) — Require the implementation of an "Emergency Response Plan." Important elements of the plan include the following:

- Pre-emergency planning and coordination with outside parties.
- Personnel roles, lines of authority, training and communication.
- Emergency recognition and prevention.
- Safe distances and places of refuge.
- Site security and control.
- Evacuation routes and procedures.
- Decontamination.
- Emergency medical treatment and first aid.
- Critique of response and follow-up.
- Personal Protective Equipment (PPE) and emergency equipment.

Part 120(q)(3) — Specifies procedures for managing emergencies. Specified procedures include the following:

- Utilize the "Incident Command System" (ICS) in organzing the chain-of-command at an incident.

- Ensure the use of appropriate PPE.

- Provide "situational" training to skilled support personnel (i.e...Plant Facilities technicians).

Part 120(q)(5), 6 — Specify training requirements for Chemical Spill Response Team members and identify four levels of training and experience including:

- First Responder — 8 hours of training; respond defensively to release incidents.

- Hazardous Material Technician — 24 hours of training; approach the point-of-release to control or stop the release.

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- Hazardous Materials Specialist — 24 hours of training at the technician level; have special expertise and direct knowledge of spilled substances; approach the point-of-release to control or stop the release.

- Incident Commanders — 24 hours of training; assume on-scene control of release incidents in accordance with the incident command system.

Part 120(q)(7) — Describes qualifications to teach spill response training subjects.

Part 120(q)(8) — Requires spill response personnel to receive annual refresher training.

Part 120(q)(9) — Requires spill response personnel to participate in a Medical Surveillance Program.

Part 120(q)(11) — Requires that spill response personnel receive training concerning Hazard Communication (1910.1200), Respiratory Protection (1910.134) and Emergency Action Plan (1910.38(a)).

B. Regulations Concerning Reporting and Written Notification of Significant Releases of Regulated Materials.

- Regulations of the U.S. Environmental Protection Agency Entitled "Superfund, Emergency Planning and Community Right-to-Know Programs," 40 CFR Parts 302 and 355 — Contain requirements to report releases of hazardous materials to the environment. Important reporting and notification requirements which pertain to releases of hazardous materials include the following:

  Part 302.4, 302.5 and 302.6 — Identify "reportable quantities" of "hazardous substances," and describe reporting and written notification requirements.

  Part 355.40 — Identifies "reportable quantities" of "extremely hazardous substances" and describes reporting and notification procedures.

- Colorado Hazardous Waste Regulation 6 CCR 1007-3 —

  Part 262.34(d)(5)(C) — Contains reporting and notification requirements in the event of a hazardous waste fire, explosion or significant release of hazardous waste.

  Part 265.56 — Describes reporting and notification requirements which should appear in the "Contingency Plan" and which apply to releases of hazardous waste.

- Colorado Rules and Regulations Pertaining to Radiation Control —

  Parts 4.52 and 4.53 — Describe reporting and notification requirements pertaining to incidents, releases or personnel exposures to radioactive materials.

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II. CSM HAZARDOUS MATERIAL RESPONSE TEAM — MISSION STATEMENT:

It is recognized that the presence of laboratories and research facilities at the Colorado School of Mines create some potential chemical hazards which are unique within the local community. In some circumstances it is difficult for local emergency responders to maintain familiarity with potential hazardous materials threats on the campus due to the extreme variety of chemicals which are present. Continuous changes of campus personnel and equipment, and variations of quantities, types, and locations of hazardous materials which are associated with the conduct of ongoing research at the School also tend to create difficulty for local emergency responders. In recognition of these circumstances, the Colorado school of Mines has created an in-house Hazardous Material Response team. This team receives appropriate training which qualifies them as a "Hazmat Team" as defined in OSHA Regulations CFR 1910.120(1) (4) and SARA Section 126(e).

The emphasis in training has been to enable team members to diagnose the hazards associated with the great variety of chemicals which are found in research laboratories. Quick comprehension of the hazardous properties of a spilled chemical can then suggest a remedial response which is effective and appropriately scaled. This mode of training differs somewhat from more conventional "Hazmat" training which necessary addresses problems related to the logistics of large-scale spills and broad precautions which are associated with spills of unknown materials.

The CSM Hazardous Material Response Team is intended to supplant but not replace the hazardous material response services which are already provided by the Golden Fire Department and the Jefferson County Hazardous Materials Response Team. Generally, the CSM Team will be utilized in cases which involve relatively small amounts of research materials which are released in CSM facilities. The team has been trained and equipped for the specific purpose of responding to incidents involving small quantities of the very wide variety of chemicals which are found in CSM research facilities. It is intended that the team will provide a service to both the Golden Fire Department and to the School by ensuring the availability of a response which is appropriate to the unique circumstances which prevail in school research facilities.

All functions of the team will be closely coordinated with the Golden Fire Department. If the fire department responds to a hazardous material incident on the campus, or if the School's team asks for the fire department's assistance, the fire chief or his designated representative is recognized as the scene commander. Upon request, the CSM team will also advise and assist the Golden Police and Fire Departments during hazardous materials incidents in the community. The CSM team and its equipment are dedicated to mutual support activities in cooperation with the City of Golden and Jefferson County.

III. PERSONNEL ASSIGNMENTS/LINES OF AUTHORITY:

The Director of Environmental Health and Safety (EHS) for the School is the administrative director of the CSM Hazardous Materials Response Team. The EHS Director reports to members of the central school administration. Designated Incident Commanders provide on-scene operational supervision during hazardous materials incidents.

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Other members of the team are trained volunteer staff members who may be associated with any organizational unit on campus.

During actual incidents, the Incident Commander will coordinate team activities with the department head and building or laboratory occupants. The department head retains responsibility for giving directions to building occupants concerning matters such as evacuation, maintaining safe distances, shutdown of laboratory equipment or experiments, etc.. . The Incident Commander will assist and consult with the department head on these matters during emergencies. In the absence of a department head or laboratory supervisor, the Incident Commander will assume responsibility for giving direction to building occupants.

In the event that life-threatening circumstances are evident, Public Safety Officers are empowered to exercise police powers in controlling the activities of persons on the scene.

In the event that the fire department responds to an incident, the senior fire officer on the scene will be recognized as the authority in charge. The Incident Commander and the department head will assist and consult with the fire officer in charge until the situation is resolved.

IV EMERGENCY ALERTING/COMMUNICATIONS:

All members of the CSM Hazardous Material Response Team carry portable radios which are equipped with the Golden police and fire frequencies, and the frequency for the Colorado State Patrol. On all occasions when the team is called to evaluate or cleanup a spill, the Golden fire and police dispatcher will be notified. If assistance is not required, the dispatcher will be so informed. If assistance is required, the dispatcher will be asked to alert the Golden Fire Department. IN all cases, the dispatcher will be notified when the situation is resolved.

Laboratory personnel are informed of who to call in an emergency by way of information disseminated in Attachment 1. This information has been distributed to each laboratory supervisor and department head on the campus with accompanying instructions to post the information in each department office and by each laboratory and hallway phone. In some cases, information concerning a potential chemical emergency may be transmitted to Plant Facilities or to the Public Safety Office. Plant facilities personnel and public safety officers have been instructed to refer to the information in Attachment 2 if emergency calls are received. Attachment 2 is conspicuously posted in the plant facilities office and in the public safety office.

V. PRE-EMERGENCY PLANNING:

A. Building Pre-Fire Planning/Inspection–The University Safety Officer conducts fire safety inspections of campus buildings. Information concerning fire safety characteristics of each building is being compiled on the form depicted in Attachment 3. This information will be distributed to the Golden Fire Department. A book containing fire safety characteristics sheets for all campus buildings will be carried in the environmental health services van. This information will serve as an important reference during a chemical emergency.

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B. Laboratory Inspection-The University Safety Officer conducts safety inspections of campus laboratories. Changes in laboratory functions are reported to spill team members by the University Safety Officer.

C. Community Right to Know-The EHS Director is aware of SARA Title III requirements which apply to the School. The School has notified the State Emergency Planning Commission that it is regulated by some elements of SARA Title III. The EHS Director is prepared to issue notification of releases of hazardous materials as required by these regulations (see Emergency Alerting/Communications on Page 2). The Chemical Hygiene Manager maintains a comprehensive library of Material Safety Data Sheets (MSDS's) for hazardous materials on the campus. This plan is written in accordance with guidance in SARA Title III, Section 126(e).

D. Hazardous Materials Management Facility-The School maintains a Hazardous Materials Management Facility (HMMF) which is primarily used for the storage of hazardous waste. Establishment of this facility has been coordinated with local providers of emergency services. Records concerning the types and quantities of materials in the facility are maintained by the Environmental Health Manager. An Emergency Procedures and Contingency Plan/Preparedness and Prevention Plan has been formulated and has been distributed to local providers of emergency services. A manual entitled Hazardous Waste Management Policies and Procedures has also been formulated. This document establishes procedures for the safe storage, handling and disposal of hazardous waste.

E. Coordination with City Police/Fire Departments-This plan will be submitted to the Golden Fire Chief for review. As indicated earlier in the Hazardous Material Response Team mission statement, it is intended that the functions of the Team will be closely coordinated with the local police and fire departments. The city emergency dispatcher will be notified by radio if the team is activated in response to an incident. The dispatcher will also be notified if assistance is required or if the incident has been satisfactorily resolved.

If the fire department responds to an on-campus incident, the senior fire officer on the scene is recognized as the authority in charge. The Incident Commander will serve as the School's representative in charge vis-a-vis the fire department, and will coordinate activities of school personnel during an incident. The Incident Commander and other CSM Hazardous Material Response Team members will also assist and consult with the senior fire officer in charge during an incident.

F. Dissemination of Emergency Information-The city dispatcher will be notified whenever the School's Hazardous Material Response Team is activated. The Incident Commander and the department head in the affected area will provide guidance to persons in the area concerning maintenance of safe distances and/or evacuation. The Incident Commander will communicate with Plant Facilities if building systems are affected or need to be adjusted during the incident. (In some cases, it may be necessary to shut down gas, electricity, or ventilation in a building where a chemical release has occurred.)

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If a chemical spill or release is of such magnitude that a large-scale evacuation is necessary, the Incident Commander and CSM Public Safety Officers will initiate evacuation of the affected portion of the campus. The Incident Commander will advise and consult with the senior fire officer on the scene concerning evacuation of city residences or business areas in the vicinity of the campus. City police and fire personnel will initiate evacuation of residences and businesses.

The EHS Director will inform senior school administrators concerning the incident.

The EHS Director will accomplish notification of local, state and federal agencies as required by various state and federal regulations.

G. Prevention--Prevention of chemical emergencies is largely a matter of education. A main function of the EHS office is to provide such education. This is done in a variety of ways including: a) development and dissemination of written policies, procedures, notices, warnings, etc.. ; b) provision of safety related classroom instruction, seminars, etc..; c) conduct inspections and follow-up to ensure that discrepancies are resolved; d) dissemination of Material Safety Data Sheets (MSDS's). In some cases the potential for chemical releases is managed by way of the installation of specialized equipment such as gas monitors, storage cabinets or local exhaust systems. The EHS office recommends the installation of such equipment as appropriate.

VI. EMERGENCY RESPONSE PROCEDURES:

A. Recognition--Recognition of a chemical emergency is ensured when laboratory personnel are thoroughly knowledgeable concerning the hazardous characteristics of chemicals which they use and store. It is a primary duty of EHS personnel, department heads, faculty members and laboratory supervisors to remind laboratory personnel that familiarity with hazardous characteristics of chemicals is essential. In particular, laboratory personnel should be aware of the following chemical characteristics:

1. Flammability

2. Toxicity (carcinogenicity)

3. Reactivity (incompatibilities)

4. Corrosivity

5. Shelf Life

6. Probable routes of entry into the body and related physical properties of the chemical such as vapor pressure, solubility, boiling point, vapor density, etc.

7. Warning properties (odor, eye irritation, etc.)

EHS personnel can provide such information to any laboratory worker for most chemicals which are used or stored on the campus. EHS personnel will research hazardous properties of a chemical if such information is not readily available.

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The CSM Hazardous Materials Response Team is available to assist any student, staff member, or faculty member to evaluate or cleanup a spill of a chemical regardless of what the chemical is or how much has been spilled. Laboratory personnel are strongly encouraged to ask for assistance in cleaning up even the most minor spill. This policy will ensure that laboratory personnel do not attempt to cleanup spills without the proper personal protective gear, or without effective adsorbate, neutralizers, etc.. . A main purpose of providing this response service is to ensure that a response of appropriate scale is available so that laboratory workers need not be reluctant to ask for assistance. The team is well equipped to quickly and safely cleanup spills which, for the unprepared laboratory worker, could be dangerous and time-consuming..

Department heads and laboratory personnel are encouraged to err on the side of safety when making decision concerning how to respond to chemical incidents. If the situation is unclear, department heads or laboratory personnel should call the EHS office and ask for an assessment.

In the event of significant spills which pose an imminent threat of fire/explosion or poisoning, or in those circumstances where an immediate evacuation seems advisable, lab personnel should: 1) sound the fire alarm to initiate an evacuation; 2) call the fire department; 3) call CSM Public Safety (Public Safety will notify the EHS office)

B. Emergency Evaluation Criteria--When the CSM Hazardous Materials Response team is called to a spill site, the Incident Commander must evaluate the hazard and devise a spill control and cleanup strategy. The Incident Commander must also decide whether or not the CSM Team is capable of accomplishing the task. In some cases, it will be wise to initiate an evacuation and call for assistance from the fire department. The fire department scene commander will need to make a similar assessment, and may choose to ask for assistance form the Jefferson County Hazardous Materials Response Team.

The following criteria will be utilized to determine a course of action:

1. Identification of the material: If the material can be accurately identified and the hazardous properties of material can be ascertained, the Incident Commander can make well-informed decisions concerning spill cleanup strategies, and concerning the advisability of calling for assistance from the fire department. In most cases, observation of container labels or conversation with lab personnel will ensure accurate identification of the spilled material. If the material cannot be immediately identified, the Incident Commander may choose to do some onsite testing to narrow the range of possibilities. Such testing might include tests for pH, and flammability. The material could also be monitored with a portable gas monitor which detects H_2S, CO, O_2 and % LEL. Colorimetric detection tubes can be similarly used to identify the material.

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2. Identification of hazardous characteristics of the material: The Incident Commander will ascertain the properties of a spilled material which have a bearing on the following general hazardous characteristics:

   - Flammability
   - Reactivity
   - Toxicity
   - Corrosivity

   Important properties which are indicators of these characteristics are as follows:

   - Physical state--liquid, solid or gas
   - Vapor pressure/boiling point
   - Limits of Flammability (LEL/UEL)
   - Carcinogenicity, mutagenicity, teratogenicity
   - pH
   - LD_{50} and TLV

   The aforementioned properties are determined by referring to technical references which are maintained in the EHS office. Several critical reference volumes are also carried in the spill response vehicle. The immediate availability of these references on the scene makes for an accurate and timely assessment.

3. Scope of the problem: Utilizing information discussed in Item 2 above, the Incident Commander will be able to determine the nature of any health or safety threats which may be posed by the spilled material. A scale of possible responses to a chemical incident is as follows:

   Priority 1 Situation--imminent threat of large-scale explosion, fire, or spread of toxic vapors in concentrations above IDLH (Immediately Dangerous to Life or Health) level. Response:

   a. evacuate building(s), control access to scene perimeter,
   b. notify police and fire departments and ask for assistance,
   c. take timely emergency response action (i.e.--don SCBA and encapsulation suite; shut off gas valve; shut down ventilation system; remove incompatible reactive material from area of spill; etc.),
   d. coordinate with fire department on the scene,
   e. coordinate with school administrators and CSM Public Safety in maintaining control of scene; cancellation of classes, notification of persons in nearby buildings; establishment of command centers; etc.,
   f. notify federal and state agencies as required.

   Priority 2 Situation--Moderate threat of small-scale fire, explosion, or spread of toxic vapors in isolated portions of a building. Response:

   a. evacuate building or affected portion of building,
   b. notify fire department and ask for on-scene assistance/back-up,
   c. take timely emergency response action,
   d. coordinate with fire department and school officials,
   e. notify federal and state agencies as required.

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Priority 3 Situation--Small-scale spill (less than a gallon) of a toxic or corrosive material with no accompanying threat of fire or explosion (measured percent of LEL below 20%). Response:

a. isolate and secure affected portion of room (shut down ventilation system),
b. notify fire department and ask for fire department to "standby",
c. clean-up spill/coordinate with school officials,
d. follow-up communications with fire department.

Priority 4 Situation--Small-scale spill of a relatively benign material with no threat of fire or explosion. Response:

a. secure affected area,
b. notify fire department--no assistance required,
c. accomplish clean-up,
d. follow-up communications with fire department.

C. Selection of Personal Protective Equipment-

1. Respiratory Protection:

a. Self-contained Breathing Apparatus (SCBA) will be used when any of the following conditions prevail:

- respiratory exposure to a hazardous gas or vapor may exceed IDLH levels;
- respiratory exposure to a hazardous gas or vapor may exceed TLV/PEL limits established by ACGIH, OSHA or NIOSH;
- the atmosphere is determined to be oxygen deficient (less than 19.5%);
- potential for skin absorption of a toxic vapor, gas or liquid requires the use of a whole-body encapsulation suite;
- respiratory exposure to a hazardous gas or vapor may exceed the capture capability of negative pressure respirator cartridges;
- during initial investigation of the scene of a spill or release, where there is substantial doubt concerning the identity and concentration of a significantly hazardous air contaminant.

b. Full-face negative pressure respirators may be used when any of the following conditions prevail:

- respiratory exposure to a hazardous gas or vapor may exceed the TLV level but is still within the capture capability of the cartridge;
- the gas or vapor is not present in sufficient concentrations to be toxic via skin contact,
- the incident involves potential exposure to splashing liquids, vapors or gases which are corrosive or irritating to the eyes (i.e., ammonia, acetic acid, etc.);
- the atmosphere is not oxygen deficient.

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c. Half-mask negative pressure respirators may be used when any of the following conditions prevail:

- respiratory exposure to a hazardous gas or vapor may exceed the TLV level but is still within the capture capability of the cartridge;
- the gas or vapor is not present in sufficient concentrations to be toxic via skin contact;
- the incident does not involve potential exposure to splashing liquids, vapors or gases which are corrosive or irritating to the eyes;
- the atmosphere is not oxygen deficient.

d. Paper masks may be used in connection with nontoxic nuisance dust.

2. Eye Protection:

a. Chemical splash goggles will be utilized whenever there is a potential for eye exposure to corrosive or irritating liquids;

b. Full-face shields will be used in connection with chemical splash goggles whenever there is a p potential for eye or face exposure to splashes of highly corrosive materials (concentrated acid).

3. Protective Clothing: Protective clothing will be selected in accordance with recommendations and permeability data contained in the reference volume entitled Guideline for the Selection of Personal Protective Clothing. Supplementary policies concerning use of protective clothing are as follows:

a. Saranex whole-body encapsulation suits will be used in connection with SCBA's when the incident involves brief exposures to atmospheres which contain hazardous gases or vapors which are present in sufficient concentrations to be toxic via skin absorption.

b. Saranex overalls will be used when the incident involves the potential contact with splashes of corrosive liquids.

c. Tyvek overalls may be used to protect clothing from gross contact with relatively benign liquids or particulates.

d. Gloves--Permeability data contained in the aforementioned reference volume will be used to select gloves from among the following variety which are carried in the spill response vehicle:

- neoprene
- nitrile
- polyvinyl alcohol
- butyl
- latex
- leather

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e. Boots--Polyethylene boots and disposal plastic shoe covers (booties) are carried in the spill response vehicle to protect against exposures to toxic/corrosive liquids.

D. Spill Cleanup Strategies/Equipment-

1. Formulation of the cleanup strategy will be a derivation of judgements achieved during the initial emergency evaluation (see section VI B). Some critical points of decision which lead to the formulation of a strategy are as follows:

   a. Identification of the released material,

   b. Identification of the chemical properties of the released material as they pertain to the following hazards:

      - flammability
      - toxicity
      - reactivity
      - corrosivity

   c. Determination as to the probability of fire, explosion, or poisoning,

   d. Determination as to whether an evacuation is required,

   e. Determination as to whether the fire department should be asked to respond,

   f. Selection of proper personal protective equipment.

2. Spills involving the production of flammable or toxic gases and vapors are of special concern. Areas where such spills have occurred may need to be isolated. Access to such areas may be controlled by Public Safety Officers, warning signs, barricades, etc.. . If flammable gases or vapors are present, the Incident Commander may deenergize electrical equipment in the area. Plant Facilities electricians may be requested to deenergize certain circuits or selected areas in a building.

   The density of a gas or vapor will determine how the material may drift inside a building. For example, vapors or gases which are heavier than air may collect at the bottom of a stairwell. Vapor gases which are lighter than air may stratify near the ceiling . The Incident Commander will assess the probability that accumulations of concentrated gas or vapor may be present in the area and will take precautionary action suggested by the circumstances.

   A combustible gas indicator will be used during these assessments. Opening of windows and doors and use of ventilating fans may be advisable. Building mechanical systems may be manually adjusted to admit a maximum amount of outside air (vice recirculation) to purge a building of gaseous contaminants.

3. In some cases, a leak of a gas or a spill of a cryogenic liquid may cause the displacement of air. An oxygen deficient atmosphere could result. When such

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circumstances are evident, the Incident Commander will test the air in the suspect location with an oxygen detector. If less than 19.5% oxygen is present, the team will utilize SCBA's to enter the area and will keep bystanders at a safe distance.

4. When a chemical spill occurs, the response team will quickly check to see if there is danger that the spilled material may come in contact with an incompatible material. Contact between strong reducers and strong oxidizers is especially dangerous. Similarly, acids and bases are incompatible. Immediate steps will be taken to prevent or minimize contact between incompatible materials. Removal of other chemical containers in the vicinity of a spill is a primary means of ensuring that contact between incompatible materials is prevented.

5. Spills of liquids are initially contained by forming a dike around the spill area with the proper adsorbant. Once the spill is contained, the adsorbant is poured directly onto the spilled liquid and mixed. In the case of acids or bases, mixing and addition of adsorbant/neutralizer continues until the color indicator in the adsorbant indicates that the corrosive material is neutralized.

   In the case of volative organic liquids, it is important to pour the organic adsorbant onto the spill as soon as possible since the adsorbant will prevent the release of potentially flammable or toxic vapors.

   Once the liquid is adsorbed, the solidified material is bagged and handled as hazardous waste (if the material qualifies as regulated hazardous waste).

6. Attachment 5 is an inventory list of chemical spill control equipment and personal protective equipment which is maintained by the EHS office. Critical items on the list are kept in readiness in the spill response vehicle.

E. Ventilation--In the event that dangerous concentrations of flammable or toxic vapors or gases are present, an important initial response action will be to ventilate the affected area. This can be done by opening doors and windows and by utilizing existing local exhaust systems such as fume hoods. In the event that unwanted vapors or gases have entered the building HVAC system, it may be necessary to manually set the mechanical system to admit a maximum percentage of outside air. In this manner the air in the building can be "purged" as rapidly as possible.

F. Safe Distances/Evacuation--for large scale leaks or spills, the response team will refer to USDOT Publication P5880.4, Emergency Response Guidebook for recommended evacuation distances.

   In situations where there is a risk of fire or explosion, an evacuation of the affected building will be ordered. Evacuees will be directed to a place of refuge which will be well away from windows and doors in the threatened building . Campus Public Safety Officers, Golden Police, and School Administrators may participate in controlling access to the affected building.

G. Site Security and Control--In the event that a building or area is subject to an evacuation order, the senior administrator(s) in the affected area(s) will assist in providing instructions and information to faculty, staff and students. The Incident Commander will function as the on-scene coordinator for the School and will be the

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School's representative vis-a-vis the fire department. Golden Police and Campus Public Safety Officers may be enlisted to control access to danger areas. Police barricades, barricade tape, and warning signs may be used to help control access.

In the event of a significant large-scale incident, senior school administrators may establish a central command post in the Board Room in Guggenheim Hall. Persons who would staff a central command post include the School President, Vice Presidents, Deans, Director of Public Affairs and Director of Plant Facilities.

A tactical command post would also be established near the actual site of the emergency. The senior fire officer on the scene will direct the establishment of a tactical command post. In the absence of direction from a senior fire officer, the Incident Commander may direct the establishment of tactical command post . Persons who would staff a tactical command post include city police and fire officers, Incident Commander, EHS Director, CSM Public Safety Officers, academic department head sin the affected building, utility company representatives, and Plant Facilities supervisory personnel.

Communications among CSM Public Safety Officers, Incident Commander, and city police and fire officers will be via portable radio. Communications between the tactical command post and the control command post will be via telephone. The Incident Commander is the main communications contact at the tactical command post. The Plant Facilities Director will coordinate internal communications at the central command post . The Director of Public Affairs will coordinate external communications including release of information to the press.

H. Decontamination--The Incident Commander will evaluate the risks associated with the spilled/released material and will develop plans for decontamination as the situation requires. In the event that decontamination of personal protective equipment is advisable, a decontamination station will be established. The station will be equipped with water sprayers, brushes, soap and two containment tubs. The first tub will serve as a wash tub and the second as a rinse tub. Gloves and boots and SCBA apparatus may be washed and retained. Outer gloves, booties, TYVEK/SARANEX suits and respirator cartridges will be discarded. Wash and rinse water may be retained and treated as hazardous waste as required. The need for decontamination of buildings, building interiors, equipment, ventilating systems or soil will be evaluated on a case-by-case basis. If such decontamination is within the capability of school personnel or the School's contract environmental management firm, the decontamination work will be immediately undertaken utilizing these resources. Otherwise, the EHS Director may contract with an environmental management firm to perform the decontamination project.

Decontamination procedures will generally conform with the guidance in Attachment 6.

I. Emergency Medical Treatment and First Aid--Members of the CSM Hazardous Material Response Team are trained in CPR and first aid. Team members will utilize a first aid kit which is carried in the spill response vehicle.

In the event that emergency medical assistance is required, the response team will call for emergency medical technicians and ambulance service using portable radios.

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If chemical exposure presents a risk of chronic toxic effects, the EHS Director will ask exposed persons to undergo a medical examination by the School's contract occupational health physician. Biological testing and/or inclusion in a medical surveillance program may be desirable.

(Members of the Hazardous Material Response Team already participate in a routine medical surveillance program.)

J. Members of the Spill Response Team have developed "Standard Operating Procedures" (SOPs) for dealing with a variety of hazardous materials incidents. These SOPs serve as important references for the Incident Commander during hazardous materials incidents. Attachment 4 contains copies of the SOPs.

VII. TRAINING:

In accordance with OSHA Regulations CFR 29 Part 1910.120 and SARA Title III Section 126(e), all members of the Hazardous Material Response Team receive 40 hours of initial instruction and at least two hours of additional instruction per month. The Incident Commander provides supervision to other team members at all spill incidents so that supervised field experience is acquired . Training is oriented to account for the unique circumstances evident in chemical research laboratories.

Qualified membership in the Hazardous Material Response Team is certified in writing. Attachment 7 is a sample certification letter which is placed in the personnel file of each team member.

The EHS office maintains records which document monthly training . Attachment 8 is a sample training record. The effectiveness of training is confirmed by the administration of periodic examinations. Attachment 9 contains sample examinations which have been administered to response team members.

VIII. MEDICAL SURVEILLANCE:

The EHS office contracts with an occupational health physician who provides annual medical examinations and related medical surveillance services for members of the response team. Each member of the Team receives an initial examination, annual examinations thereafter, and a termination examination at the conclusion of service on the response team. The EHS office maintains records of results of medical examinations. The medical surveillance program conforms with requirements in 29 CFR Part 1910.120(f) and (1) (4).

IX. EQUIPMENT INVENTORY AND MAINTENANCE

Attachment 5 enumerates the spill response equipment which is maintained for the use of the Hazardous Material Response Team. The Environmental Health Manager is responsible for maintenance of equipment and for maintaining adequate supplies of consumable material.

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X. INCIDENT CRITIQUES:

The CSM Hazardous Material Response Team will critique every incident in which the team is activated. Critiques may take place during monthly training periods.

Serious incidents which pose significant hazards, "near miss" incidents, or incidents in which significant tactical errors are made will merit a timely formal review. Persons in the affected laboratory, department or building may be invited to attend these review sessions.

If incidents involve outside agencies such as the city police or fire departments, Jefferson County Hazardous Material Response Team, etc., participating agencies will be invited to attend incident critiques. EHS personnel will attend incident critiques which may be sponsored by other agencies.

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HAZARDOUS MATERIALS EMERGENCY INFORMATION

(Post by Laboratory Telephones)

Chemical Spills: The Environmental Health and Safety (EHS) Office provides a chemical spill response service. EHS personnel are properly equipped to assist lab workers in cleaning up small-scale chemical spills. Call the EHS office any time for an evaluation, information or spill cleanup assistance. In the event of significant spills which pose an imminent threat of fire/explosion or poisoning, or in those circumstances where an immediate evacuation seems advisable, lab personnel should: 1) sound the fire alarm to initiate an evacuation; 2) call the Fire Department; 3) call CSM Public Safety (Public Safety will notify the EHS Office).

ALL occupants must evacuate campus buildings whenever:

1. The fire alarm sounds.
2. An order to evacuate is given by the Fire Officer in charge, EHS Office personnel, Public Safety Officers, or the Department Head.

Exercise of Authority: If the Fire Department responds to an incident in a campus building, the Senior Fire Officer on the scene is in command. All School personnel shall take direction from the Senior Fire Officer. During such events, EHS personnel are the School's on-scene representatives and coordinate activities with fire authorities. If the Fire Department is not involved, EHS personnel are in charge and will coordinate with senior administrators in the building to resolve the problem.

CSM Public Safety Officers are invested with police powers and may exercise command authority during emergencies.

Chemical Exposure/Chronic Illness: Lab personnel should be familiar with the hazardous characteristics of chemicals in the lab. Call the EHS Office for information concerning flammability, toxicity, reactivity, etc., of chemicals and recommended safe handling procedures. If physical symptoms appear which may be related to chemical exposure, call the EHS Office for an evaluation.

Hazardous Waste: The School provides a centralized hazardous waste collection and disposal service. Call the EHS Office for information. All chemical waste generated in laboratories is presumed to be "Regulated Hazardous Waste" unless determined otherwise by EHS personnel or other knowledgeable person. DO NOT DUMP CHEMICALS DOWN THE DRAIN OR IN THE TRASH. Participation in the School's Hazardous Waste Program is mandatory for all campus personnel who generate chemical waste. Collection, transport or disposal of regulated waste by any other method is prohibited.

EMERGENCY PHONE NUMBERS

EHS Office	273-3316
CSM Public Safety Office	278-0757 273-3333
Golden Fire Department	9-911
Golden Police Department	9-911
Ambulance	9-911
Rocky Mountain Poison Center	629-1123

HAZARDOUS MATERIALS EMERGENCY INFORMATION

Hazardous Materials Management Facility (HMMF) Emergency Coordinators

Environmental Health and Safety (EHS) Office
Colorado School of Mines (CSM), Chauvenet Hall, RM 194
Golden, CO 80401

Phone: 303-273-3316

Contact	Phone Number	Home
Linn Havelick (Primary) Environmental Health Manager	Office: 303-273-3998 Pager: 303-851-3266	[redacted]
Bob MacPherson (Alternate) Director, EHS	Office: 303-273-3573 Pager: 303-855-0759	[redacted]

EMERGENCY PHONE NUMBERS: EHS Office Phone = 303-273-3316

1.	Bob MacPherson, Director Environmental Health & Safety	Home: Pager:
2.	Linn Havelick Environmental Health Manager	Home: Pager:
3.	Dick Porter CSM Safety Officer	Home: Pager:
4.	John Elliott Chemical Hygiene Manager	Home: Pager:
5.	CSM Public Safety Office	911 or 303-273-3333
6.	Golden Fire Department	911 or 303-384-8092
7.	Golden Police Department	911 or 303-384-8045
8.	Ambulance	911 or 303-572-9111
9.	Jefferson County Sheriff	911 or 303-277-0211
10.	JEFFCO Hazardous Materials Specialist - Glenn Grove	303-277-0211 (24 Hours)
11.	JEFFCO Emergency Management Coordinator - James Ellis	303-271-8519 (Office Hours)
12.	JEFFCO Emergency Preparedness Office	303-271-8215 (Office Hours)
13.	Chair, JEFFCO Local Emergency Planning Committee - Tim Gablehouse	303-572-0050 (Office Hours)
14.	Chair, Clear Creek County Local Emergency Planning Committee - Garland Baker	303-679-2349 (Office Hours) 303-679-2393 (24 Hours)
15.	CDPHE Emergency Management Unit	303-692-3020 (Gen Info) = Bus. Hrs.
16.	CDPHE Radiation Control Division	303-692-3030 = Business Hours
17.	CDPHE Environmental Emergency Response Line (all CDPHE divisions)	303-756-4455 (24 hours)
18.	EPA Emergency Response Line	800-227-8914 or
19.	EPA Emergency Spill No.	303-293-1788 (24 hours)
20.	Rocky Mountain Poison Center	303-629-1123
21.	National Response Center	800-424-8802
22.	Chemical Transportation Emergency Center (CHEMTREC)	800-424-9300

11/3/98-Gendocs/EmerNos

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BUILDING FIRE SAFETY CHARACTERISTICS

BUILDING: _____ LAST REVISION _____
DATE CONSTRUCTED: _____
SQUARE FEET: _____
NUMBER OF STORIES: _____
BASEMENT: _____
TYPE OF CONSTRUCTION: _____
DESCRIBE OCCUPANCY: _____

HYDRANTS/FIRELANES:

SPRINKLERS: _____
(A) TYPE: _____
(B) AREA SPRINKLERED: _____
(C) FIRE DEPT. CONNECTION: _____
(D) CONTROL VALVE LOCATION: _____
(E) FLOW SWITCHES/WATER MOTOR ALARM: _____
STANDPIPE: _____
(A) TYPE: _____
(B) LOCATION IN BUILDING: _____
(C) FIRE DEPT. CONNECTION: _____
FIRE ALARM:
(A) PANEL LOCATION: _____
(B) FEATURES: _____
(C) HEAT/SMOKE DETECTORS: _____
(D) SPRINKLER FLOW SWITCHES: _____
ELEVATORS: _____
EMERGENCY POWER: _____
UNDERGROUND STORAGE TANKS: _____
MAIN ELECTRIC PANEL LOCATION: _____
P.C.B.'S: _____
GAS/GAS SHUTOFF LOCATION: _____
ASBESTOS: _____
SPECIAL FEATURES/HAZARDS: _____

SPILL RESPONSE
STANDARD PROCEDURE - INITIAL

Injured Persons

Remove injured persons to safe area.
Administer first aid as required.
Call emergency medical help if necessary (9-911).

Evacuation Zone

Direct all non-essential personnel out of spill area.
Set up physical and/or human barriers to prevent entry.
Consider immediate chemical and physical hazards.
Assess potential hazards - vapors, fire, explosion.

Security

Call Public Safety when needed (3333).
Use officers for evacuation, security, and communication.

Area Stabilization

Stop or slow source of continuing spill.
Isolate and minimize spill area. Seal drains.
Remove incompatibles.
Shut off electrical power, gas service, water supply.

Backup Support

Summon other spill team members as needed (EHS office ext. 3316). Refer to plastic card in your wallet.
Notify Golden Fire Department and/or Jeffco Hazmat when necessary (9-911).

Evaluation

Determine relevant information about the spill:
- What material or materials are involved?
- What is size of spill - present and potential?
- Are there aggravating factors?
- Does person in charge need to be contacted?

Determine personnel needed for appropriate spill response.
Determine equipment and PPE requirements.
Consider ultimate disposal and decontamination factors.

SOP - Air and Water Reactive Materials

CAUTION: Spills of air and water reactive materials commonly involve fires. A conventional fire started by a small quantity of an air/water reactive material, if sufficiently advanced, may make it advisable to use conventional fire fighting techniques (water sprays etc.). While this may aggravate the reaction of the air/water reactive material, it may lessen the overall danger and damage. Spills of air/water reactives commonly produce very toxic and/or corrosive products. These may be in gaseous or liquid form. Hence it is critical to exclude non-essential personnel from the area (including the down-wind breathing zone). Extensive PPE may be needed to approach the spill. Characteristics of a/w reactives vary widely. Specific knowledge of the spilled material may permit lessening of the precautions contained in these procedures which were designed for any spill of this kind.

EQUIPMENT:

1. SCBA
2. Fully encapsulating (Level A) suit
3. Graphite powder
4. Plastic shovel and brush
5. Class D fire extinguisher
6. Dry sand or earth
7. Chemical resistive boots and gloves
8. Metal bucket or drum

ACTION:

All Spills:

1. Move injured personnel to a well ventilated area. Remove contaminated clothing and flush contacted skin with generous amounts of water.
2. Establish a generous exclusion zone with special attention to air flow and potential downwind exposure. Close windows and turn off the ventilation system.
3. If the quantity of spilled material is significant or if it is already on fire, activate a manual fire alarm to evacuate the building and have someone call 9-911 to advise the Fire Department that an air/water reactive material is involved. Have that person meet the responding fire crew to further advise them of the presence of this material.
4. Remove flammable materials from the vicinity of the spill.

Spills Without Fire:

1. The emphasis should be on stopping further spillage and removing spilled material to a safe location. Keep in mind that even though fire is not present, toxic, corrosive or flammable gases may be evolving from the spill due to reaction with the air or moisture in the air. Also, flames may erupt unexpectedly and you should be prepared to deal with them immediately if that occurs. Take care to avoid any potential source of ignition while collecting or moving spilled material. If cleanup is delayed, an inverted metal bucket or drum placed CAREFULLY over a small spill (so that no sparks are produced which might ignite flammable gases) may prevent additional fires being started by the spattering of burning materials if a reaction starts.

2, If removal of spilled material is impossible or is delayed, application of a smothering agent, including DRY: graphite powder (except for lithium), sand or earth, may be appropriate.

Spills With Fire:

1. Wearing SCBA (and Level A suit if appropriate) use a class D extinguisher to knock down flames taking care to not spread the burning material with the pressurized stream. After putting out the flames or if a Class D extinguisher is not available, smother the material with DRY: graphite powder (except for lithium fires), sand or earth. An inverted metal bucket or drum placed over a small spill may help prevent additional fires caused by spattering of reacting material. If the fire is unlikely to spread, it may be best to allow it to burn down without approaching.
2. If the burning material is a liquid or a gas, and it is possible to eliminate the source by closing a valve or otherwise isolating the fire from the fuel source, do so as quickly as possible.
3. Knock down smoke with a water spray ONLY if it can be done without the water contacting the spill.

REMOVAL:

Material that is not burning may be removed from the building in a metal bucket or drum that is partially filled with a DRY, non-flammable smothering agent such as sand or earth, with additional smothering agent covering the air/water reactive material. Remove to a safe area, such as (depending on weather) a parking lot and cover with plastic. It is suggested that some technique be employed to maximize the distance between the bucket and personnel removing it (such as suspending the bucket between to persons on a pole.

SOP - Halogenated organics

CAUTION: Severe inhalation hazard. Moderate contact hazard. Volatile organics may accumulate in confined spaces.

EQUIPMENT:

1. Full body suits (Kappler CPF III or equivalent)
2. Gloves (both inner and outer). Refer to glove chart in van for selection.
3. Rubber boots
4. Full-face respirators with combination gas cartridges for organics and particulates (yellow/purple in color)
5. Absorbant squares, rolled mats for pickup of organics (**white material** , not gray)
6. Container(s) for absorbed spill material - bags, 5 gallon pails, drums

ACTION:

All Spills

1. Tend to injured personnel. Move to fresh air. Remove contaminated clothing immediately and then flush affected body parts with water for at least 15 minutes. Seek medical attention.
2. Isolate area with hazardous material tape. Establish walkways and decon area as necessary. Don't spread the problem with your feet.
3. Contain spill as indicated by the situation. Plug floor and sink drains if necessary. Dike large liquid spill area with absorbant or soil. Do not put water on leak or spill area.
4. With flat scrapers and/or absorbant mats very carefully pick up as much spill material as possible. Transfer to clean dry containers. If spill is solid, sweep up and transfer to clean dry container.
5. Repeat Step 4 with additional absorbant mats and/or paper towels until absorption is complete. Transfer the used absorbants to waste containers.
6. Ventilate area until approved for occupancy.

Medium/Large Spills

1. Secure area. Evacuate area and limit access by the general public. Call Public Safety or Golden Police Department for additional assistance.
2. Stabilize the area. Ventilate, remove aggravating hazards, isolate incompatible materials, disconnect power, plug drains. Do not allow water to contact the spilled material.
3. Assemble needed equipment and personnel. Contact other spill team members through the EHS secretary, Public Safety or Golden P.D. Contact Golden F.D. or Jeffco Hazmat if required.
4. Organize stepwise response action. Assign tasks to spill team members, use outside support when necessary, set up decon zone.
5. Contain, absorb and pick up spilled halogenated organics, transferring to clean, dry containers. Repeat absorption with additional absorbant squares and/or paper towels until job is complete. Remove used absorbant for proper disposal.
6. Decontaminate all surfaces by wiping with absorbant material.
7. Remove portable equipment for decontamination at appropriate site.
8. Decontaminate team members and secure protective equipment for cleanup or disposal as indicated.
9. Inform coordinator when spill cleanup is finished. Ventilate area until approved for occupancy. Inform occupants when re-entry is authorized. Advise them of any equipment removed and of any remaining cautions.

11/19/98

SOP - Elemental Mercury Spill

CAUTION: This SOP applies to elemental mercury spills. For cleanup of mercury containing powders consult the Toxic Powders Spill SOP; for containing liquids consult the Corrosive Liquids SOPs. **Also, any source of heat near elemental mercury requires special protections against mercury vapor.**

EQUIPMENT: (Check HMMF and then van)

1. Mercury vacuum (located in the special handling compartment of the HMMF)
2. Mercury vacuum attachments (located in white 5- gallon bucket next to vacuum)
3. Mercury indicator powder (located in white 5- gallon bucket next to vacuum)
4. Tyvek suits (full bunny suits)
5. Gloves (both inner and outer, consult glove chart in van for proper glove selection)
6. Half-face respirators with mercury cartridges (olive drab in color)
7. Goggles or safety glasses
8. Plastic bags for debris

ACTION:

All Spills

1. Tend to injured personnel- move to well ventilated area, place personnel on poly or in decon unit, remove contaminated clothing immediately and bag in plastic bags. **(Do not flush with water.)** Follow up with medical evaluation.
2. Isolate area with hazardous material tape - establish walkways & decon area as necessary. **Don't spread the problem with your feet.**.
3. **Plug all floor drains and sink drains**.
4. Vacuum all surfaces from the edge of the spill area toward the center of the spill. Periodically hold hose above vacuum and shake. Do not vacuum liquids with the mercury vacuum. If liquids are involved use the wet/dry mercury vacuum. (Located in the HMMF)
5. Clean all drains that might be contaminated. (Use wet/dry vac or empty by hand)
6. After all surfaces have been vacuumed and all visible mercury cleaned up sprinkle mercury indicator powder on floor and counter surfaces (light dusting). Leave area isolated over night.
7. Return next morning and check if indicator powder has discolored. If mercury indicator powder has not discolored vacuum up powder and release area.
8. If indicator powder has discolored repeat clean up steps 2 thru 5.

SPECIAL MEASURES:

If the mercury spill is in an area of hot surfaces the area needs to be isolated from all surrounding air space and ventilated directly to the outdoors. This can be accomplished with the confined space ventilator located in the carpentry shop.

SOP - Hydrofluoric Acid

CAUTION: Hydrofluoric Acid is extremely corrosive and exposure to it via contact or inhalation can cause devastating injury or death, and there may be no immediate pain to indicate that an exposure has occurred. Hydrofluoric Acid corrodes **most** materials to some degree (with the exception of lead, wax, **polyethylene** and platinum) and produces potentially explosive hydrogen gas when in contact with many metals. Be **extremely** careful - Do not become a victum.

EQUIPMENT: (Check van, HMMF and CSDF - in that order)

1. Acid resistant full-body (hood and feet) suit such as Kappler CPF-3 or Saranex
2. Full-face respirator with acid gas (yellow) cartridge or SCBA
3. Acid resistant gloves and under-gloves such as nitrile and silver shield
4. Acid resistant boots and poly bags as under-boots
5. Poly waste disposal bags
6. Fire extinguisher
7. Calcium gluconate tube(s)
8. Plastic Buckets (2) for neutralizing solution and rinse water
9. Sponges or absorbent pads for wipe-down
10. Duct tape for sealing disposal bags and protective clothing
11. Adsorbents: pads, kitty litter
12. Acid neutralizing powders
13. Perimeter (warning) tape
14. Fan(s)
15. Plastic Shovel

ACTION: (Never respond **alone** to an HF spill - Get help)

1. Put on appropriate PPE **before** entering area.
1. Remove injured parties from scene to fresh air
2. Give appropriate first aid (not necessarily in this order):
   A. Remove contaminated clothing
   B. Flush contact areas with water for at least 15 min and apply calcium gluconate paste to affected skin (re-apply every 15 min.)
   C. Give rescue breathing or CPR if necessary.
3. Exclude public and ventilate area (Caution to exclude public from exhaust area).
4. If spreading, contain spill with absorbent pads, kitty litter, vermiculite or dirt and prevent entry into floor drains.
5. Establish walkways and decon area to avoid spread of contamination
6. Remove contacted metal or organics to safe area (i.e. outside) bagged for later decontamination.
7. Soak up excess liquid with absorbants and bag in poly hazmat bags.
8. Wash down (w/sponge or absorb. pads) contaminated surfaces until pH is neutral and rinse. Minimize liquid and retain all rinse water.
9. Continue to ventilate area and exclude public until atmosphere is clear.
10. Decontaminate personnel and bag PPE for decontamination or disposal as needed.

SPECIAL NOTE: Be alert for fire during clean-up and look for absorbent surfaces or cracks which may retain HF residue and pose an on-going hazard.

SOP - Concentrated sulfuric acid

CAUTION: Severe contact and inhalation hazard. Violent reaction with water. Flammable and/or poisonous gases may accumulate in confined spaces. May ignite other combustible materials (wood, paper, oil, etc.). Runoff to sewer may create fire or explosion hazard.

EQUIPMENT:

1. Full body suits (Kappler CPF III or equivalent)
2. Gloves (both inner and outer). Refer to glove chart in van for selection.
3. Rubber boots
4. Full-face respirators with combination gas cartridges for organic vapor/acid gas/ particulates (yellow/purple in color)
5. Flat shovels and scrapers for pickup of the acid
6. Neutralizer for acid spill, limestore, slaked (hydrated) lime, sodium bicarbonate
7. Container(s) for neutralized material
8. Broom, shovel, dustpan, etc. for pickup of neutralized material

ACTION:

All Spills

1. Tend to injured personnel. Move to fresh air. Remove contaminated clothing immediately and then flush affected body parts with water for at least 15 minutes. Seek medical attention.
2. Isolate area with hazardous material tape. Establish walkways nd decon area as necessary. Don't spread the problem with your feet.
3. Contain spill as indicated by the situation. Plug floor and sink drains. Dike the spill area with absorbant or soil. Do not put water on leak or spill area.
4. With flat scrapers and very carefully pick up as much acid as possible. Transfer to clean dry containers. [Do not use absorbant mats on concentrated sulfuric acid.]
5. After Step 4, cautiously apply neutralizing absorbant or solution to the spilled acid. Neutralization will generate considerable heat. Apply enough absorbant to completely neutralize and solidify the spilled material. Transfer the neutral solid to containers using scoops, shovels, dust pans.

Medium/Large Spills

1. Secure area. Evacuate area and limit access by the general public. Call Public Safety or Golden Police Department for additional assistance.
2. Stabilize the area. Ventilate, remove aggravating hazards, isolate incompatible materials, disconnect power, plug drains. Do not allow water to contact the spilled material.
3. Assemble needed equipment and personnel. Contact other spill team members through the EHS secretary, Public Safety or Golden P.D. Contact Golden F.D. or Jeffco Hazmat if required.
4. Organize stepwise response action. Assign tasks to spill team members, use outside support when necessary, set up decon zone.
5. Contain and pick up spilled acid, transferring to clean, dry containers. After pickup of as much of the bulk liquid as possible, apply neutralizing solid to the affected area. Collect and remove used absorbant for proper disposal.
6. Decontaminate surfaces with neutralizing solution until pH is neutral.
7. Remove portable equipment for decontamination at appropriate site.
8. Decontaminate team members and secure protective equipment for cleanup or disposal as indicated.
9. Inform coordinator when spill cleanup is finished. Inform occupants when re-entry is authorized. Advise them of any equipment removed and of any remaining cautions.

SOP - Common Acid Spill

CAUTION: *Hydrofluoric Acid, Red Fuming Nitric Acid and Concentrated Sulfuric Acid* require special precautions and/or procedures. Check references specific to the material involved before proceeding.

EQUIPMENT:

1. Absorbent squares & rolled mats (gray).
2. Hazmat bags.
3. Neutralizer.
4. Tyvek suits.
5. Gloves (Check glove chart in van for appropriate choice.)
6. Full-face repirators & Acid Gas cartridges (*Yellow/Purple*).
7. Rubber boots.
8. Plastic buckets and sponges for neutralizing solution.

ACTION:

All Spills

1. Tend to injured personnel. Move to fresh air. Remove contaminated clothing immediately and then flush affected body parts with water for at least 15 minutes. Seek medical attention.
2. Isolate area with hazardous material tape. Establish walkways and decon area as necessary. Don't spread the problem with your feet.
3. Contain spill as indicated by the situation. Plug floor and sink drains if necessary. Dike large liquid spill area with absorbant or soil. Do not put water on leak or spill area.
4. With flat scrapers and/or absorbant mats very carefully pick up as much spill material as possible. Transfer to clean dry containers. If spill is solid, sweep up and transfer to clean dry container.
5. Repeat Step 4 with additional absorbant mats and/or paper towels until absorption is complete. Transfer the used absorbants to waste containers.
6. Ventilate area until approved for occupancy.

Medium/Large Spills

1. Secure area. Evacuate area and limit access by the general public. Call Public Safety or Golden Police Department for additional assistance.
2. Stabilize the area. Ventilate, remove aggravating hazards, isolate incompatible materials, disconnect power, plug drains. Do not allow water to contact the spilled material.
3. Assemble needed equipment and personnel. Contact other spill team members through the EHS office, Public Safety or Golden P.D. Contact Golden F.D. or Jeffco Hazmat if required.
4. Organize stepwise response action. Assign tasks to spill team members, use outside support when necessary, set up decon zone.
5. Contain, absorb and pick up spilled acids, transferring to clean, dry containers. Repeat absorption with additional absorbant squares and/or paper towels until job is complete. Remove used absorbant for proper disposal.
6. Decontaminate all surfaces by wiping with neutralizer, then clean, dry paper towels.
7. Remove portable equipment for decontamination at appropriate site.
8. Decontaminate team members and secure protective equipment for cleanup or disposal as indicated.
9. Inform coordinator when spill cleanup is finished. Ventilate area until approved for occupancy. Inform occupants when re-entry is authorized. Advise them of any equipment removed and of any remaining cautions.

SOP - Bases

CAUTION: Severe contact hazard with all concentrated bases. Volatile bases such as ammonia, ammonium hydroxide and amines present inhalation hazard and may accumulate in confined spaces. Concentrated bases may react violently with water. Ammonia and amines are extremely poisonous. Slight fire danger and moderate explosion danger with ammonia.

EQUIPMENT:

1. Full body suits (Kappler CPF III or equivalent)
2. Gloves (both inner and outer). Refer to glove chart in van for selection.
3. Rubber boots
4. Full-face respirators with combination gas cartridges for ammonia and particulates (green/purple in color)
5. Flat shovels, scrapers, absorbant squares, rolled mats for pickup of liquid base (**gray material** not white)
6. Broom, shovel, dustpan, etc. for pickup of solid base
7. Neutralizer for spill of bases
8. Container(s) for spill and neutralized material - bags, 5 gallon pails, drums

ACTION:

All Spills

1. Tend to injured personnel. Move to fresh air. Remove contaminated clothing immediately and then flush affected body parts with water for at least 15 minutes. Seek medical attention.
2. Isolate area with hazardous material tape. Establish walkways and decon area as necessary. Don't spread the problem with your feet.
3. Contain spill as indicated by the situation. Plug floor and sink drains if necessary. Dike large liquid spill area with absorbant or soil. Do not put water on leak or spill area.
4. With flat scrapers and/or absorbant mats very carefully pick up as much liquid base as possible. Transfer to clean dry containers. If spill is solid, sweep up and transfer to clean dry container.
5. After Step 4, cautiously apply neutralizing liquid (weak acid) to the spilled base. Neutralization may generate considerable heat. Absorb the neutralized material with additional absorbant squares and/or paper towels. Transfer the used absorbants to waste containers.

Medium/Large Spills

1. Secure area. Evacuate area and limit access by the general public. Call Public Safety or Golden Police Department for additional assistance.
2. Stabilize the area. Ventilate, remove aggravating hazards, isolate incompatible materials, disconnect power, plug drains. Do not allow water to contact the spilled material.
3. Assemble needed equipment and personnel. Contact other spill team members through the EHS secretary, Public Safety or Golden P.D. Contact Golden F.D. or Jeffco Hazmat if required.
4. Organize stepwise response action. Assign tasks to spill team members, use outside support when necessary, set up decon zone.
5. Contain, absorb and pick up spilled base, transferring to clean, dry containers. After pickup of as much of the bulk liquid as possible, apply neutralizing solution to the affected area. Collect neutral mixture with additional absorbing material. Remove used absorbant for proper disposal.
6. Decontaminate all surfaces with neutralizing solution until pH is neutral.
7. Remove portable equipment for decontamination at appropriate site.
8. Decontaminate team members and secure protective equipment for cleanup or disposal as indicated.
9. Inform coordinator when spill cleanup is finished. Inform occupants when re-entry is authorized. Advise them of any equipment removed and of any remaining cautions.

SOP - Organic Liquid Spill (Low Flashpoint)

CAUTION: Many organic liquids/vapors are known carcinogens and/or skin irritants.

EQUIPMENT:

1. Absorbent squares & rolled mats (**white**).
2. Hazmat bags.
3. Tyvek suits.
4. Gloves (Check glove chart in van for appropriate choice; double gloves advised.)
5. Full-face respirators & Organic Vapor cartridges (*Black*).
6. Rubber boots.
7. Plastic buckets for used absorbent material.
8. Combustible Gas Indicator.

ACTION: *First find out what material was spilled.*

All Spills

1. Use Combustible Gas Indicator to check for concentration of vapors. If concentration is between LEL and UEL **DO NOT ENTER**. In that case evacuate and isolate surrounding area, ventilate affected area, eliminate possible sources of ignition.
2. Tend to injured personnel. Move to fresh air. Remove contaminated clothing immediately and then flush affected body parts with water for at least 15 minutes. Seek medical attention.
3. Isolate area with hazardous material tape. Establish walkways and decon area as necessary. Don't spread the problem with your feet.
4. Ventilate area to reduce fire/explosion hazard; eliminate ignition sources.
5. Contain spill as indicated by the situation. Plug floor and sink drains if necessary. Dike large liquid spill area with absorbent material or soil.
6. With absorbent mats very carefully pick up as much spill material as possible. Transfer to clean dry containers.
7. Repeat Step 4 with additional absorbent mats and/or paper towels until absorption is complete. Transfer the used absorbents to waste containers.
8. Ventilate area until approved for occupancy.

Medium/Large Spills

1. Secure area. Evacuate area and limit access by the general public. Call Public Safety or Golden Police Department for additional assistance.
2. Stabilize the area. Ventilate, remove aggravating hazards, isolate incompatible materials, disconnect power, plug drains.
3. Assemble needed equipment and personnel. Contact other spill team members through the EHS secretary, Public Safety or Golden P.D. Contact Golden F.D. or Jeffco Hazmat if required.
4. Organize stepwise response action. Assign tasks to spill team members, use outside support when necessary, set up decon zone.
5. Contain, absorb and pick up spilled liquids, transferring to clean, dry containers. Repeat absorption with additional absorbent squares and/or paper towels until job is complete. Remove used absorbent for proper disposal
6. Remove portable equipment for decontamination at appropriate site.
7. Decontaminate team members and secure protective equipment for cleanup or disposal as indicated.
8. Inform coordinator when spill cleanup is finished. Ventilate area until approved for occupancy. Inform occupants when re-entry is authorized. Advise them of any equipment removed and of any remaining cautions.

SOP - Organic Liquid Spill (High Flashpoint)

CAUTION: Many organic liquids/vapors are known carcinogens and/or skin irritants.

EQUIPMENT:

1. Absorbent squares & rolled mats (**white**).
2. Hazmat bags.
3. Tyvek suits.
4. Gloves (Check glove chart in van for appropriate choice; double gloves advised.)
5. Full-face respirators & Organic Vapor cartridges (*Black*).
6. Rubber boots.
7. Plastic buckets for used absorbent material.

ACTION: *First find out what material was spilled.*

All Spills

1. Tend to injured personnel. Move to fresh air. Remove contaminated clothing immediately and then flush affected body parts with water for at least 15 minutes. Seek medical attention.
2. Isolate area with hazardous material tape. Establish walkways and decon area as necessary. Don't spread the problem with your feet.
3. Contain spill as indicated by the situation. Plug floor and sink drains if necessary. Dike large liquid spill area with absorbent material or soil.
4. With flat scrapers and/or absorbent mats very carefully pick up as much spill material as possible. Transfer to clean dry containers.
5. Repeat Step 4 with additional absorbent mats and/or paper towels until absorption is complete. Transfer the used absorbents to waste containers.
6. Ventilate area until approved for occupancy.

Medium/Large Spills

1. Secure area. Evacuate area and limit access by the general public. Call Public Safety or Golden Police Department for additional assistance.
2. Stabilize the area. Ventilate, remove aggravating hazards, isolate incompatible materials, disconnect power, plug drains.
3. Assemble needed equipment and personnel. Contact other spill team members through the EHS secretary, Public Safety or Golden P.D. Contact Golden F.D. or Jeffco Hazmat if required.
4. Organize stepwise response action. Assign tasks to spill team members, use outside support when necessary, set up decon zone.
5. Contain, absorb and pick up spilled liquids, transferring to clean, dry containers. Repeat absorption with additional absorbant squares and/or paper towels until job is complete. Remove used absorbant for proper disposal.
6. Remove portable equipment for decontamination at appropriate site.
7. Decontaminate team members and secure protective equipment for cleanup or disposal as indicated.
8. Inform coordinator when spill cleanup is finished. Ventilate area until approved for occupancy. Inform occupants when re-entry is authorized. Advise them of any equipment removed and of any remaining cautions.

SOP - Toxic Powders

CAUTION: Check references specific to the material involved before proceeding.

EQUIPMENT:

1. Plastic buckets with lids to contain material.
2. Hazmat bags.
3. Scoop shovel.
4. Hazmat vacuum cleaner.
5. Tyvek suits.
6. Gloves (Check glove chart in van for appropriate choice.)
7. Full-face repirators & particulate cartridges (*Yellow/Purple or Purple*).

ACTION:

All Spills

1. Tend to injured personnel. Move to fresh air. Remove contaminated clothing immediately and then flush affected body parts with water for at least 15 minutes. Seek medical attention.
2. Isolate area with hazardous material tape. Establish walkways and decon area as necessary. Don't spread the problem with your feet.
3. Contain spill as indicated by the situation. Plug floor and sink drains if necessary. Exterior spills may require plastic sheets to protect spill from spreading by wind, or water.
4. With scoop shovel very carefully pick up as much spill material as possible. Transfer to clean dry containers. Clean up remnants with vacuum cleaner.

Medium/Large Spills

1. Secure area. Evacuate area and limit access by the general public. Call Public Safety or Golden Police Department for additional assistance.
2. Stabilize the area. Ventilate, remove aggravating hazards, isolate incompatible materials, disconnect power, plug drains. Do not allow water to contact the spilled material.
3. Assemble needed equipment and personnel. Contact other spill team members through the EHS secretary, Public Safety or Golden P.D. Contact Golden F.D. or Jeffco Hazmat if required.
4. Organize stepwise response action. Assign tasks to spill team members, use outside support when necessary, set up decon zone.
5. Contain, and pick up spilled powders, transferring to clean, dry containers.
6. Decontaminate all surfaces.
7. Remove portable equipment for decontamination at appropriate site.
8. Decontaminate team members and secure protective equipment for cleanup or disposal as indicated.
9. Inform coordinator when spill cleanup is finished. Ventilate area until approved for occupancy. Inform occupants when re-entry is authorized. Advise them of any equipment removed and of any remaining cautions.

SOP -Radioactive Friable Solids

CAUTION: This SOP applies to radioactive powder spills. For cleanup of radioactive powders the following equipment and procedures should be used. **Before cleanup determine the radionuclide in the powder and what type of emitter it is (i.e. alpha, beta, gamma).**

EQUIPMENT: (Check HMMF and then van)

1. LudLum Model 14C Geiger counter located in Chauvenet Hall room 197
1. HEPA filter vacuum (located in the special handling compartment of the HMMF)
2. Vacuum attachments (located in white 5- gallon bucket next to vacuum)
4. ProShield 2 suits (full bunny suits)
5. Gloves (both inner and outer, consult glove chart in van for proper glove selection)
6. Fullface Respirators or PAPRs with HEPA filters.
8. Plastic bags for debris

ACTION:

All Spills

1. Tend to injured personnel. Move to well ventilated area, place personnel on poly or in decon unit. **(Place injured personnel in secondary containment and provide respiratory protection as needed.)** Remove contaminated clothing immediately and place in plastic bags. Follow up with medical evaluation.
2. Isolate area with hazardous material tape. Establish walkways & decon area as necessary. **Do not spread the problem with your feet**.
3. **Plug all floor drains and sink drains and close all windows**.
4. Vacuum all surfaces from the edge of the spill area toward the center of the spill. Do not vacuum liquids with a normal HEPA vacuum. If liquids are involved, use the wet/dry HEPA vacuum. (Located in the HMMF)
5. Clean all drains that might be contaminated.
6. Establish a background radiation level by taking the meter to a spot that is near the spill area but remote enough to be unaffected by the activity from the spill and observing the meter reading for a few minutes. The average will be the background level.
7. After all surfaces have been vacuumed and all visible powder cleaned up use the meter to survey the area for activity. Continue cleaning until the activity level matches the background level. Screen the area far beyond what the limit of the visible spill residue. Be aware that other radioactive sources in the area can affect your readings.
8. Wet wipe all surfaces in the spill area and place the wipes in a sealed plastic bag.

SPECIAL MEASURES:

1. If the spill is large and the grain size is small (-400 mesh or less) the area needs to be isolated from all surrounding air space and ventilated using an intrinsically safe HEPA filtered air hog with the exhaust going directly to the outdoors.
2. Reference copy of Section 5, Chapter 12 of Operational Health Physics in van

SOP -Radioactive Liquid Spills

CAUTION: This SOP applies to radioactive liquid spills. For cleanup of radioactive liquids the following equipment and procedures should be used. **Before cleanup determine the radionuclide in the liquid and what type of emitter it is (i.e. alpha, beta, gamma). This will enable you to determine whether the meter can detect the energy given off by this radionuclide. If it is a organic then also consult organic spill SOP for additional cautions. If it is a water based liquid consult corrosive liquid spill SOP for additional cautions. Be aware that if it is an organic liquid with a high vapor pressure that there might be a fire danger.**

EQUIPMENT: (Check HMMF and then van)

1. LudLum Model 14C Geiger counter located in Chauvenet Hall room 197.
2. Appropriate roll absorbent
3. Kappler CPF III suits (full bunny suits)
4. Gloves (both inner and outer, consult glove chart in van for proper glove selection)
5. Fullface Respirators or PAPRs with combination HEPA\appropriate filters.
6. Plastic bags for used absorbent.

ACTION:

All Spills

1. Tend to injured personnel. Move to well ventilated area, place personnel on poly or in decon unit. **(Place injured personnel in secondary containment and provide respiratory protection as needed.)** Remove contaminated clothing immediately and place in plastic bags. Follow up with medical evaluation.
2. Isolate area with hazardous material tape. Establish walkways & decon area as necessary. **Do not spread the problem with your feet**.
3. **Plug all floor drains and sink drains and close all windows**.
4. Absorb from the edge of the spill area toward the center of the spill.
5. Clean all drains that might be contaminated.
6. Establish a background radiation level by taking the meter to a spot that is near the spill area but remote enough to be unaffected by the activity from the spill and observing the meter reading for a few minutes. The average will be the background level.
7. After all surfaces have been dried use the meter to survey the area for activity. Continue cleaning until the activity level matches the background level. Screen the area far beyond what the limit of the visible spill residue. Be aware that other radioactive sources in the area can affect your readings.
8. Wet wipe all surfaces in the spill area and place the wipes in a sealed plastic bag.

SPECIAL MEASURES:

1. If the spill is large and the liquid has a high vapor pressure the area needs to be isolated from all surrounding air space and ventilated using a HEPA and charcoal filtered air hog with the exhaust going directly to the outdoors.
2. Reference the copy of section 5, Chapter 12 of Operational Health Physics in the van.

SOP – Oxidizing Acids

CAUTION: Oxidizing acids include Nitric Acid, Perchloric Acid, *Fuming* Sulfuric Acid, Red Fuming Nitric Acid. Severe contact and inhalation hazard. Violent reaction with water and organic materials. Flammable, poisonous gases may accumulate in confined spaces. May ignite other combustible materials (wood, paper, oil, etc.). Runoff to sewer may create fire or explosion hazard.

EQUIPMENT:

1. Full body suits (Kappler CPF III or equivalent)
2. Gloves (both inner and outer). Refer to glove chart in van for selection.
3. Rubber boots
4. Full-face respirators with combination gas cartridges for organic vapor/acid gas/ particulate (yellow/purple in color)
5. Flat shovels and scrapers for pickup of the acid
6. Neutralizer for acid spill, limestone, slaked (hydrated) lime, sodium bicarbonate
7. Container(s) for neutralized material
8. Broom, shovel, dustpan, etc. for pickup of neutralized material

ACTION:

All Spills

1. Tend to injured personnel. Move to fresh air. Remove contaminated clothing immediately and then flush affected body parts with water for at least 15 minutes. Seek medical attention.
2. Isolate area with hazardous material tape. Establish walkways and decon area as necessary. Don't spread the problem with your feet.
3. Contain spill as indicated by the situation. Plug floor and sink drains. Dike the spill area with absorbent or soil. Do not put water on leak or spill area.
4. With flat scrapers and very carefully pick up as much acid as possible. Transfer to clean dry containers. [Do not use absorbent mats.]
5. After Step 4, cautiously apply neutralizing absorbent or solution to the spilled acid. Neutralization will generate considerable heat. Apply enough absorbent to completely neutralize and solidify the spilled material. Transfer the neutral solid to containers using scoops, shovels, dust-pans.

Medium/Large Spills

1. Secure area. Evacuate area and limit access by the general public. Call Public Safety or Golden Police Department for additional assistance.
2. Stabilize the area. Ventilate, remove aggravating hazards, isolate incompatible materials, disconnect power, plug drains. Do not allow water to contact the spilled material.
3. Assemble needed equipment and personnel. Contact other spill team members through the EHS secretary, Public Safety or Golden P.D. Contact Golden F.D. or Jeffco Hazmat if required.
4. Organize stepwise response action. Assign tasks to spill team members, use outside support when necessary, set up decon zone.
5. Contain and pick up spilled acid, transferring to clean, dry containers. After pickup of as much of the bulk liquid as possible, apply neutralizing solid to the affected area. Collect and remove used absorbent for proper disposal.
6. Decontaminate surfaces with neutralizing solution until pH is neutral.
7. Remove portable equipment for decontamination at appropriate site.
8. Decontaminate team members and secure protective equipment for cleanup or disposal as indicated.
9. Inform coordinator when spill cleanup is finished. Inform occupants when re-entry is authorized. Advise them of any equipment removed and of any remaining cautions.

SOP -Organometallics

CAUTION: This SOP applies to spills of organometallic materials. For cleanup of organometallic liquids the following equipment and procedures should be used. **Before cleanup determine the organic liquid present and the metal that is bonded to the carbon atom. This will enable you to determine whether there is a hazard associated with the metal present. Many organometallic compounds are air or water reactive. Some are also strong oxidizers. If it is a reactive compound, follow these guidelines for spills of 1 liter or less. If it is not a reactive organometallic compound, consult organic spill SOP for cleanup and cautions.**

EQUIPMENT: (Check HMMF and then van)

1. 4-Gas meter located in room 197 of Chauvenet Hall
2. Roll of white absorbent (Test a small piece of the white absorbent to see if an undesired reaction takes place between the organometallic and the absorbent before covering the spill with the absorbent.)
3. Brush and plastic scoop or shovel.
4. Kappler CPF III suits (full bunny suits) if liquid - Proshield 2 Bunny suits if solid
5. Gloves (both inner and outer, consult glove chart in van for proper glove selection)
6. Fullface Respirators or PAPRs with combination HEPA\acid gas\organic vapor cartridge
7. Plastic bags for used absorbent or plastic 5 gal bucket if materials will dissolve plastic bags.

ACTION:

All Spills

1. Tend to injured personnel. Move to well ventilated area. Place personnel on poly or in decon unit. Remove contaminated clothing immediately and place in plastic bags. **Place personnel in secondary containment and flush with water.** Follow up with medical evaluation.
2. Isolate area with hazardous material tape. Establish walkways & decon area as necessary. **Do not spread the problem with your feet.**
3. **Plug all floor drains and sink drains and close all windows.**
4. Absorb or vacuum from the edge of the spill area toward the center of the spill.
5. Clean all drains that might be contaminated.
6. Wet wipe all surfaces in the spill area and place the wipes in a sealed plastic bag.

SPECIAL MEASURES:

1. If the spill is of a large amount of liquid with a high vapor pressure, the area needs to be ventilated using an intrinsically safe air mover with the exhaust going directly to the outdoors.

EHS Closet Inventory

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Shelf 1

- Smoke bottles
- slip plates
- in box:
  - Pb test kit
  - CO analyzer
  - smoke emitters
  - Hg test kit
  - matches
  - pH paper
  - stop watch
  - 2 Hg centigrate thermometers
  - Hg vapor detector
  - 1 little bottel of Hcl
- food coloring
- 2 "clip on" passive dosimeters
- small screw driver set
- small plastic empty containers
- black pastic air calibration bottles
- year planners
- spark resitant flashlight
- Camera

Shelf 2

- Yellow-green effervescent Dye tablets
- FWT red tablets
- STD blue tablets
- Universal sealer primer stain killer spray
- shaving cream
- 2-26 spray
- skin shield spray
- old air sampler in leather bag
- 1 geiger counter with wand
- 1 geiger counter without wand
- 2 air samplers
- calibration tubes for air samplers
- sensidyne air pump sampler
- tri-sense temp/humidity/air velocity recorder
- charger cords
- charger
- 1 battery pack

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Shelf 3

- Hazardous waste identification stickers
- Hazardous waste tags
- container # tags
- emergency ph. # stickers
- packing list enclosed sticker pockets
- radio active material stickers
- request for chemical recycling and disposal sheets
- little hazardous waste stickers
- asbestos warning signs
- Radiation warning metal plaques

Shelf 4

- presentation papers
- chemmate papers
- pencils

Inventory of HMMF

113

HMMF INVENTORY

Blue Desk #1

Middle Drawer
- Request Sheets
- Uniform Haz. Waste Manifest Forms
- 3 scissors
- pens
- pencils
- locks
- stamp
- stamp pad

Right Top Drawer
- Packing list enclosed stickers
- duck tape
- plastic ties

Right Bottom Drawer
- Nilfisk Vacuum bags
- Nilfisk Hg Vacuum attachment
- Survive Air tank pressure gauges

Left Top Drawer
- Haz. Waste Tags
- Container ID Tags

Left Middle Drawer
- Plastic boots
- matches

Left Bottom Drawer
- Drum liners
- zip lock bags

HMMF INVENTORY

Pink Filing Cabinet #2

Drawer#1
- Respirator cartridges

Drawer#2
- Respirators (New)
- Full Face Mask air purifying respirator

Drawer#3
- Nitrile gloves
- Heavy duty Nitrile gloves
- Rubber gloves
- Neoprene over rubber gloves
- leather gloves
- Silver Shield gloves
- Viton gloves

Drawer#4
- Haz. Mat. disposal bags
- 1 roll Non-Regulated waste stickers
- 1 box asbestos stickers
- screws
- bolts
- hooks
- plastic

HMMF INVENTORY

Yellow Filing Cabinet #3

Drawer #1

- Respirator wipe pads
- Cleaning cloths
- PPE spray n wipes
- WYPALL plus
- label maker

Drawer #2

- Large Stickers

Drawer #3

- flashlight
- goggles
- old water filter
- fog fixer

Drawer #4

- old tyvek and butyl suits

Drawer #5

- paper towels

HMMF INVENTORY

Orange Stainless Steel Drawers #4

Surface

- Vice

Drawer #1

- SOP's
- Haz. Waste inventory
- NIOSH Pocket Guide to chemical hazards

Drawer #2

Drawer #3

- Flammable Solid Stickers
- Flammable Liquid Stickers
- Flammable Gas Stickers
- Non-Flammable Stickers
- Poisonous Stickers
- Corrosive Stickers
- Oxidizer Stickers

Cabinet #1

- Skill saw
- 2 sanders
- sawzall
- Super sawzall
- Ratchet Set
- Bolt Cutters
- Small Sledge hammer

HMMF INVENTORY

Buff Stainless Steel Drawers #5

Surface
- Grinder

Drawer #1
- PCB stickers
- Haz. waste stickers
- stickers

Drawer #2
- Stickers
- Placards

Drawer #3
- 1 roll nonflammable gas stickers
- Inhalation hazard Stickers
- Repair Putty

Cabinet #1
- large clamps
- crow bar
- framing hammer
- 3 hack saws
- large pipe wrenches
- Bin #1
  - Screwdriver
  - Wrenches
- Bin #2
  - Pliers
  - Files
- Bin #3
  - Chains
  - Hitches
  - Ratchets

HMMF INVENTORY

White Shelves #6

Top

4 1-gal bottles (2 boxes)

Shelf #1

Calcium Gluconate gel
lighter fuel
micro cover glasses
alconox
Solvent adsorbent

Shelf #2

4 1-gal bottles (3 boxes)
Qorpak bottles (1 box)
Navy radiac set
lids
yellow sample case

Shelf #3

battery charger
old gray sample case

HMMF INVENTORY

Green Shelves #7

Top

Face shield
electrical cord
old eye shower eye attachments

Shelf #1

test tube rack
plastic
light bulb
thermometers
grounding wires

Shelf #2

effervescent dye (non-haz)
toluene
clorox
van paint
1 roll caution tape
citrisolv plus
shin shield
500 ml pyrex
big glass funnel
assorted tools

Shelf #3

spill clean up kit bucket
1 bucket acid neutralizer
1 bucket silicate
3 buckets expanded silicate
Haz-Mat pigs
1 box Dry Neutralizer

VAN INVENTORY

Item	Stock Level	Container	Van Location
1 gal. small mouth plastic, new empty	1	box (4 ea.)	driver's side floor
1 gal. wide mouth glass, new empty	1	box (4 ea.)	driver's side floor
2.5 gal. jug, plastic, new empty	4		driver's side floor
5 gal. plastic bucket w/ lid	4		driver's side floor
Absorbant Pillows, expanded silicate	3		shelf 8
Acid Bucket	1		shelf 13
Acid Neutralizer	2	2.5 gal. plastic jug	rear floor
aprons, polyethylene disposable	1	box	shelf 2
Base Neutralizer	2	2.5 gal. plastic jug	rear floor
Batteries, Positive Pressure Full Face	2		shelf 9
Boots, Latex disposable	3	pair	shelf 5
Boots, Polyblend	2	pair	shelf 4
Boots, Polymax	2	pair	shelf 4
Broom, dustpan	1		shelf 5
Broom, Handheld	1		shelf 5
Bung Wrench	2		front floor in white cabinent
Calcium Gluconate (for HF Burns)	1	jar	BOX 2
Charkate Suit (Tyvek + PVC)	2		shelf 7
Container ID Tags (orange)	3	bunches	cab
Crowbar, large	1		shelf 5
Crowbar, small	1		shelf 5
Diposal Instructions	4	packages	BOX 1
Drum Thieves	3		passenger side back
Duct Tape	1		shelf 5
Duct Tape	1		shelf 11
Dust Masks	1	box	shelf 9
Dustpan	1		shelf 5

Ear Plugs	50	packages	BOX 1
Emergency Response Guidebook	1		shelf 3
Expanded Silicate	3	2.5 gal. plastic jug	rear floor
Extenstion Cord	1		front wall
Face Sheild	2		shelf 4
Face Sheild Lens (Replacement)	2		shelf 4
Filter Attachment for Pos. Press. Full Face Resp.	2		shelf 9
Fire Extinguisher,ABC Dry Chem. (RECHG: MAY)	1		front wall
Fire Extinguisher,Carbon Dioxide (RECHG: DECEMBER)	1		outside of shelf 3
Fire Extinguisher,Dry Chem. (RECHG: MARCH)	1		front wall
Fire Extinguisher,Water Pressure (RECHG: JULY)	1		front floor
first aid kit	1		shelf 3
Fit Test Ampules	4	boxes	BOX 1
Flashlights	4		shelf 5
Flashlights	2		shelf 3
Funnel, large	1		shelf 5
Funnel, medium	1		shelf 5
Funnel, small	1		shelf 5
Gas Tight Goggle Lens (Replacement)	1	pair	BOX 1
Gloves, light nitrile	1	box	shelf 11
Gloves, light nitrile	1	boxes	shelf 8
Gloves, light nitrile	1	box	cab
Gloves, Silver Sheild	2	rolls	shelf 8
gloves, vinyl latex disposable	1	box	shelf 2
Gloves, Viton	3	pair	BOX 6
Gloves,Butyl	4	pair	BOX 5
Gloves,Kevlar	3	pair	BOX 4
Gloves,Latex on Nitrile	5	pair	BOX 5
Gloves,Leather	2	pair	BOX 4
Gloves,Neoprene over Rubber	8	pair	BOX 3

Gloves,Nitrile, Heavy Duty	5	pair	BOX 6
Gloves,PVA	2	pair	BOX 2
goggles, chem.	3		shelf 1
goggles, gas tight	3		shelf 1
Graphite Powder/Metal Fire	2	2.5 gal. plastic jug	rear floor
Hair Spray	1	can	shelf 5
Hand Cleaner (Waterless)	1	can	shelf 5
Hardhats	2		shelf 4
Hazardous Chemical Data Book (2nd ed.)	1		shelf 2
Hazardous Materials Pocket Guide	1		shelf 3
Hazardous Waste Bags, large	1	roll	shelf 8
Hazardous Waste Bags, medium	1	roll	shelf 8
Hazardous Waste Bags, small	1	roll	shelf 8
Hazardous Waste Tags (Flourescent Yellow)	1	bunch	cab
Hazardous Waste Tags, stick on (Yellow)	1	bunch	cab
HEPA Vacuum bags	7		shelf 8
HF Acid Neutralizer	2	2.5 gal. plastic jug	rear floor
Hydrocarbon Adsorbant	1	roll	passenger side back
Hydrocarbon Adsorbant	2	2.5 gal. plastic jug	rear floor
Hydrogen Peroxide	1	bottle	shelf 5
Level 'A' Suit	3		on side of shelves 4 and 5
Level 'B' Suit	1		on side of shelves 4 and 5
Measuring Cups	1	set	shelf 5
Mercury collector (with extra sponges)	1		shelf 8
Metal Chains	2		shelf 10
metal Hazardous Materials Caution tape	1	box	shelf 3
Paper towels	1	bundle	shelf 13
pH paper	3	boxes	BOX 1
Pigs/Drain Plugs	2		shelf 14
Polyethlene Compression Sprayer	1		passenger side back

Repair Putty	7		shelf 7
Respiator, Positive Pressure Full Face	3		shelf 9
Respirator Cartridge, Mercury/Chlorine	2	sets	shelf 6
Respirator Cartridge,Ammonia,Methylamine	2	boxes (5 sets per ea.	shelf 6
Respirator Cartridge,Combination HEPA/Acid Gas	3	boxes (3 sets per ea.	shelf 6
Respirator Cartridge,Combination HEPA/Ammonia, Methylamine	2	boxes (3 sets per ea.	shelf 6
Respirator Cartridge,HEPA	2	boxes (5 sets per ea.	shelf 6
Respirator Cartridge,Organic Vapor Acid Gas	3	boxes (5 sets per ea.	shelf 6
Respirator Wipes	1	box	shelf 9
Respirator,Full Face	4		shelf 9
Respirator,Half Face	3		shelf 9
Sample Bottle, 1 quart glass	3		shelf 12
Sample Bottle, 500 CC Brown Glass	4		shelf 12
Sample Bottle, 60 mL glass	7		shelf 12
Saranex Suit	3		shelf 7
SCBA, Scott (CYL. T2513, REGUL. 58-20 0952) (AUG. '93)	1		front floor in white cabinent
SCBA, Scott (CYL. T77421, REGUL. 28-80 0117) (AUG. '93)	1		front floor in white cabinent
Scoop, metal	1		shelf 5
Shovel, plastic	1		shelf 5
Smoke Bottle	1		BOX 2
Smoke Emiters	1	box (10 ea.)	BOX 2
Smoke Sticks	7		shelf 7
tie boots, plastic disposable	1	box	shelf 2
tool kit,small	1		shelf 3
Toolbox (with tools)	1		driver's side floor
trash bags, 40 gal.	2	rolls	shelf 1
Tyvek Suit	5		shelf 7
Universal Adsorbant	1	roll	driver's side back floor
Vacuum Attachments			driver's side back floor
Washdown Tub and Mat	1		driver's side back floor

Weight Belts	2		cab
Ziplock Freezer bags	1	box	shelf 1

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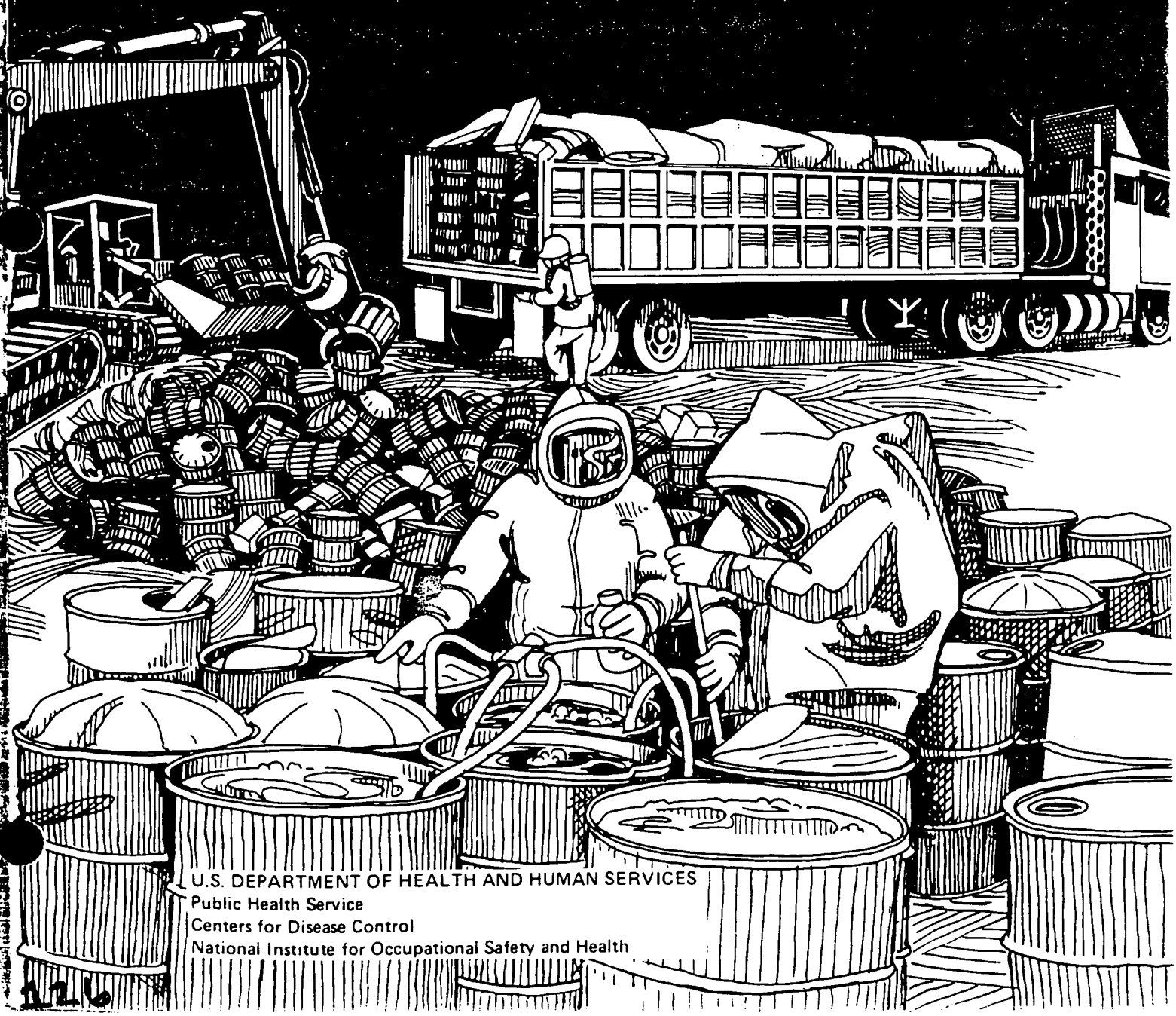
NIOSH/OSHA/USCG/EPA

Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Institute for Occupational Safety and Health

10. Decontamination

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Introduction

Decontamination—the process of removing or neutralizing contaminants that have accumulated on personnel and equipment—is critical to health and safety at hazardous waste sites. Decontamination protects workers from hazardous substances that may contaminate and eventually permeate the protective clothing, respiratory equipment, tools, vehicles, and other equipment used on site; it protects all site personnel by minimizing the transfer of harmful materials into clean areas; it helps prevent mixing of incompatible chemicals; and it protects the community by preventing uncontrolled transportation of contaminants from the site.

This chapter describes the types of contamination that workers may encounter at a waste site, the factors that influence the extent of contamination, and methods for preventing or reducing contamination. In addition, this chapter provides general guidelines for designing and selecting decontamination procedures at a site, and it presents a decision aid for evaluating the health and safety aspects of decontamination methods. The chapter does not cover decontamination of radioactively contaminated personnel or equipment. A health physicist should be consulted if this situation arises.

Decontamination Plan

A decontamination plan should be developed (as part of the Site Safety Plan) and set up before any personnel or equipment may enter areas where the potential for exposure to hazardous substances exists. The decontamination plan should:

- Determine the number and layout of decontamination stations.
- Determine the decontamination equipment needed.
- Determine appropriate decontamination methods.
- Establish procedures to prevent contamination of clean areas.
- Establish methods and procedures to minimize worker contact with contaminants during removal of personal protective clothing and equipment (PPE).
- Establish methods for disposing of clothing and equipment that are not completely decontaminated.

The plan should be revised whenever the type of personal protective clothing or equipment changes, the site conditions change, or the site hazards are reassessed based on new information.

Prevention of Contamination

The first step in decontamination is to establish Standard Operating Procedures that minimize contact with waste and thus the potential for contamination. For example:

- Stress work practices that minimize contact with hazardous substances (e.g., do *not* walk through areas of obvious contamination, do *not* directly touch potentially hazardous substances).
- Use remote sampling, handling, and container-opening techniques (e.g., drum grapplers, pneumatic impact wrenches).
- Protect monitoring and sampling instruments by bagging. Make openings in the bags for sample ports and sensors that must contact site materials.
- Wear disposable outer garments and use disposable equipment where appropriate.
- Cover equipment and tools with a strippable coating which can be removed during decontamination.
- Encase the source of contaminants, e.g., with plastic sheeting or overpacks.

In addition, Standard Operating Procedures should be established that maximize worker protection. For example, proper procedures for dressing prior to entering the Exclusion Zone will minimize the potential for contaminants to bypass the protective clothing and escape decontamination. In general, all fasteners should be used (i.e., zippers fully closed, all buttons used, all snaps closed, etc.). Gloves and boots should be tucked under the sleeves and legs of outer clothing, and hoods (if not attached) should be worn outside the collar. Another pair of tough outer gloves is often worn over the sleeves. All junctures should be taped to prevent contaminants from running inside the gloves, boots, and jackets (or suits, if one-piece construction).

Prior to each use, the personal protective equipment (PPE) should be checked to ensure that it contains no cuts or punctures that could expose workers to wastes. Similarly, any injuries to the skin surface, such as cuts and scratches, may enhance the potential for chemicals or infectious agents that directly contact the worker's skin to penetrate into the body. Particular care should be taken to protect these areas. Workers with large areas of

damaged skin should be kept from working on site until the skin heals.

All personnel should be trained in the Standard Operating Procedures for minimizing contact and maximizing worker protection, and these procedures should be enforced throughout site operations.

Types of Contamination

Contaminants can be located either on the surface of personal protective equipment or permeated into the PPE material. Surface contaminants may be easy to detect and remove; however, contaminants that have permeated a material are difficult or impossible to detect and remove. If contaminants that have permeated a material are not removed by decontamination, they may continue to permeate to either surface of the material where they can cause an unexpected exposure.

Five major factors affect the extent of permeation:

- Contact time. The longer a contaminant is in contact with an object, the greater the probability and extent of permeation. For this reason, minimizing contact time is one of the most important objectives of a decontamination program.
- Concentration. Molecules flow from areas of high concentration to areas of low concentration. As concentrations of wastes increase, the potential for permeation of personal protective clothing increases.
- Temperature. An increase in temperature generally increases the permeation rate of contaminants.
- Size of contaminant molecules and pore space. Permeation increases as the contaminant molecule becomes smaller, and as the pore space of the material to be permeated increases.
- Physical state of wastes. As a rule, gases, vapors, and low-viscosity liquids tend to permeate more readily than high-viscosity liquids or solids.

Decontamination Methods

All personnel, clothing, equipment, and samples leaving the contaminated area of a site (generally referred to as the Exclusion Zone) must be decontaminated to remove any harmful chemicals or infectious organisms that may have adhered to them. Decontamination methods either (1) physically remove contaminants, (2) inactivate contaminants by chemical detoxification or disinfection/sterilization, or (3) remove contaminants by a combination of both physical and chemical means. Various decontamination methods are listed in Table 10-1.

Physical Removal

In many cases, gross contamination can be removed by physical means involving dislodging/displacement, rinsing, wiping off, and evaporation. Physical methods involving high pressure and/or heat should be used only as necessary and with caution since they can spread contamination and cause burns. Contaminants that can be removed by physical means can be categorized as follows:

- Loose contaminants. Dusts and vapors that cling to equipment and workers or become trapped in small openings, such as the weave of the clothing fabrics, can be removed with water or a liquid rinse (see photograph). Removal of electrostatically attached materials can be enhanced by coating the clothing or equipment with anti-static solutions. These are available commercially as wash additives or anti-static sprays.
- Adhering contaminants. Some contaminants adhere by forces other than electrostatic attraction. Adhesive qualities vary greatly with the specific contaminants and the temperature. For example, contaminants such as glues, cements, resins, and muds have much greater adhesive properties than elemental mercury and, consequently, are difficult to remove by physical means. Physical removal methods for gross contaminants include scraping, brushing, and wiping. Removal of adhesive contaminants can be enhanced through certain methods such as solidifying, freezing (e.g., using dry ice or ice water), adsorption or absorption (e.g., with powdered lime or kitty litter), or melting.
- Volatile liquids. Volatile liquid contaminants can be removed from protective clothing or equipment by evaporation followed by a water rinse. Evaporation of volatile liquids can be enhanced by using steam jets. With any evaporation or vaporization process, care must be taken to prevent worker inhalation of the vaporized chemicals.

Table 10-1. Some Decontamination Methods

REMOVAL

- **Contaminant Removal**
  - Water rinse, using pressurized or gravity flow.
  - Chemical leaching and extraction.
  - Evaporation/vaporization.
  - Pressurized air jets.
  - Scrubbing/scraping. Commonly done using brushes, scrapers, or sponges and water-compatible solvent cleaning solutions.
  - Steam jets.
- **Removal of Contaminated Surfaces**
  - Disposal of deeply permeated materials, e.g., clothing, floor mats, and seats.
  - Disposal of protective coverings/coatings.

INACTIVATION

- **Chemical Detoxification**
  - Halogen stripping.
  - Neutralization.
  - Oxidation/reduction.
  - Thermal degradation.
- **Disinfection/Sterilization**
  - Chemical disinfection.
  - Dry heat sterilization.
  - Gas/vapor sterilization.
  - Irradiation.
  - Steam sterilization.

Gross contaminants can be removed with water or a liquid rinse. Here, a member of the decontamination team rinses and scrubs the boots of a worker with a soft-bristled brush. Both individuals are wearing Level C personal protective equipment.

Chemical Removal

Physical removal of gross contamination should be followed by a wash/rinse process using cleaning solutions. These cleaning solutions normally utilize one or more of the following methods:

- Dissolving contaminants. Chemical removal of surface contaminants can be accomplished by dissolving them in a solvent. The solvent must be chemically compatible with the equipment being cleaned. This is particularly important when decontaminating personal protective clothing constructed of organic materials that could be damaged or dissolved by organic solvents. In addition, care must be taken in selecting, using, and disposing of any organic solvents that may be flammable or potentially toxic. Organic solvents include alcohols, ethers, ketones, aromatics, straight-chain alkanes, and common petroleum products.

  Halogenated solvents generally are incompatible with personal protective equipment and are toxic. They should only be used for decontamination in extreme cases where other cleaning agents will not remove the contaminant.

  Table 10-2 provides a general guide to the solubility of several contaminant categories in four types of solvents: water, dilute acids, dilute bases, and organic solvents. Because of the potential hazards, decontamination using chemicals should be done only if recommended by an industrial hygienist or other qualified health professional.

- Surfactants. Surfactants augment physical cleaning methods by reducing adhesion forces between contaminants and the surface being cleaned, and by preventing redeposit of the contaminants. Household detergents are among the most common surfactants. Some detergents can be used with organic solvents to improve the dissolving and dispersal of contaminants into the solvent [1].

- Solidification. Solidifying liquid or gel contaminants can enhance their physical removal. The mechanisms of solidification are: (1) moisture removal through the use of absorbents such as grounded clay or powdered lime; (2) chemical reactions via polymerization catalysts and chemical reagents; and (3) freezing using ice water.

Table 10-2. General Guide to Solubility of Contaminants in Four Solvent Types

SOLVENT	SOLUBLE CONTAMINANTS
Water	Low-chain hydrocarbons. Inorganic compounds. Salts. Some organic acids and other polar compounds.
Dilute Acids	Basic (caustic) compounds. Amines. Hydrazines.
Dilute Bases For example: —detergent —soap	Acidic compounds. Phenols. Thiols. Some nitro and sulfonic compounds.
Organic Solvents[a] For example: —alcohols —ethers —ketones —aromatics —straight-chain alkanes (e.g., hexane) —common petroleum products (e.g., fuel oil, kerosene)	Nonpolar compounds (e.g., some organic compounds).

[a]WARNING: Some organic solvents can permeate and/or degrade the protective clothing.

- Rinsing. Rinsing removes contaminants through dilution, physical attraction, and solubilization. Multiple rinses with clean solutions remove more contaminants than a single rinse with the same volume of solution. Continuous rinsing with large volumes will remove even more contaminants than multiple rinsings with a lesser total volume.

- Disinfection/Sterilization. Chemical disinfectants are a practical means of inactivating infectious agents. Unfortunately, standard sterilization techniques are generally impractical for large equipment and for personal protective clothing and equipment. For this reason, disposable PPE is recommended for use with infectious agents.

Many factors, such as cost, availability, and ease of implementation, influence the selection of a decontamina-

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tion method. From a health and safety standpoint, two key questions must be addressed:

- Is the decontamination method effective for the specific substances present?
- Does the method itself pose any health or safety hazards?

Testing for the Effectiveness of Decontamination

Decontamination methods vary in their effectiveness for removing different substances. The effectiveness of any decontamination method should be assessed at the beginning of a program and periodically throughout the lifetime of the program. If contaminated materials are not being removed or are penetrating protective clothing, the decontamination program must be revised. The following methods may be useful in assessing the effectiveness of decontamination.

Visual Observation

There is no reliable test to immediately determine how effective decontamination is. In some cases, effectiveness can be estimated by visual observation.

- Natural light. Discolorations, stains, corrosive effects, visible dirt, or alterations in clothing fabric may indicate that contaminants have not been removed. However, not all contaminants leave visible traces; many contaminants can permeate clothing and are not easily observed.
- Ultraviolet light. Certain contaminants, such as polycyclic aromatic hydrocarbons, which are common in many refined oils and solvent wastes, fluoresce and can be visually detected when exposed to ultraviolet light. Ultraviolet light can be used to observe contamination of skin, clothing, and equipment; however, certain areas of the skin may fluoresce naturally, thereby introducing an uncertainty into the test [2,3,4]. In addition, use of ultraviolet light can increase the risk of skin cancer and eye damage; therefore, a qualified health professional should assess the benefits and risks associated with ultraviolet light prior to its use at a waste site.

Wipe Sampling

Wipe testing provides after-the-fact information on the effectiveness of decontamination. In this procedure, a dry or wet cloth, glass fiber filter paper, or swab is wiped over the surface of the potentially contaminated object and then analyzed in a laboratory. Both the inner and outer surfaces of protective clothing should be tested. Skin may also be tested using wipe samples.

Cleaning Solution Analysis

Another way to test the effectiveness of decontamination procedures is to analyze for contaminants left in the cleaning solutions. Elevated levels of contaminants in the final rinse solution may suggest that additional cleaning and rinsing are needed.

Testing for Permeation

Testing for the presence of permeated chemical contaminants requires that pieces of the protective garments be sent to a laboratory for analysis.

Health and Safety Hazards

While decontamination is performed to protect health and safety, it can pose hazards under certain circumstances. Decontamination methods may:

- Be incompatible with the hazardous substances being removed (i.e., a decontamination method may react with contaminants to produce an explosion, heat, or toxic products).
- Be incompatible with the clothing or equipment being decontaminated (e.g., some organic solvents can permeate and/or degrade protective clothing).
- Pose a direct health hazard to workers (e.g., vapors from chemical decontamination solutions may be hazardous if inhaled, or they may be flammable).

The chemical and physical compatibility of the decontamination solutions or other decontamination materials must be determined before they are used. Any decontamination method that permeates, degrades, damages, or otherwise impairs the safe functioning of the PPE is incompatible with such PPE and should not be used. If a decontamination method does pose a direct health hazard, measures must be taken to protect both decontamination personnel and the workers being decontaminated. Figure 10-1 presents a decision aid for evaluating the health and safety aspects of decontamination methods.

Decontamination Facility Design

At a hazardous waste site, decontamination facilities should be located in the Contamination Reduction Zone (CRZ), i.e., the area between the Exclusion Zone (the contaminated area) and the Support Zone (the clean area) as shown in Figure 9-1 in Chapter 9.

The level and types of decontamination procedures required depend on several site-specific factors including:

- The chemical, physical, and toxicological properties of the wastes.
- The pathogenicity of infectious wastes.
- The amount, location, and containment of contaminants.
- The potential for, and location of, exposure based on assigned worker duties, activities, and functions.
- The potential for wastes to permeate, degrade, or penetrate materials used for personal protective clothing and equipment, vehicles, tools, buildings, and structures.
- The proximity of incompatible wastes.
- The movement of personnel and/or equipment among different zones.
- Emergencies.
- The methods available for protecting workers during decontamination.

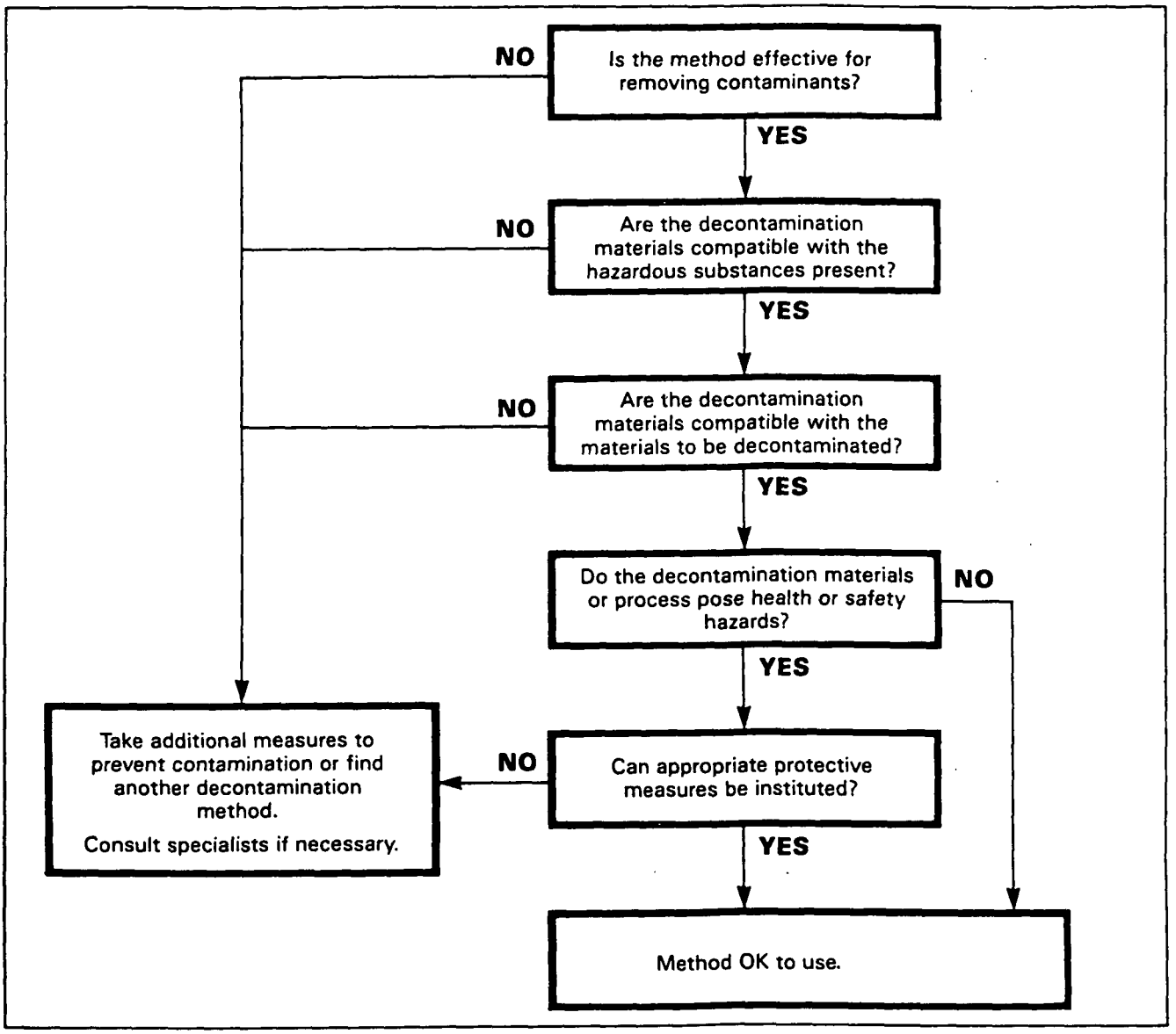

Figure 10-1. Decision Aid for Evaluating Health and Safety Aspects of Decontamination Methods.

- The impact of the decontamination process and compounds on worker safety and health.

Decontamination procedures must provide an organized process by which levels of contamination are reduced. The decontamination process should consist of a series of procedures performed in a specific sequence. For example, outer, more heavily contaminated items (e.g., outer boots and gloves) should be decontaminated and removed first, followed by decontamination and removal of inner, less contaminated items (e.g., jackets and pants). Each procedure should be performed at a separate station in order to prevent cross contamination. The sequence of stations is called the decontamination line.

Stations should be separated physically to prevent cross contamination and should be arranged in order of decreasing contamination, preferably in a straight line. Separate flow patterns and stations should be provided to isolate workers from different contamination zones containing incompatible wastes. Entry and exit points should be conspicuously marked, and the entry to the Contamination Reduction Zone (CRZ) from the Exclusion Zone should be separate from the entry to the Exclusion Zone from the CRZ. Dressing stations for entry to the CRZ should be separate from redressing areas for exit from the CRZ. Personnel who wish to enter clean areas of the decontamination facility, such as locker rooms, should be completely decontaminated.

Examples of decontamination lines and procedures for personnel wearing various levels of protection are provided in Appendix D.

A member of the decontamination team suited in Level B personal protective equipment stands by to scrub down a worker after an initial rinse down in the decontamination shower.

Decontamination Equipment Selection

Table 10-3 lists recommended equipment for decontamination of personnel, personal protective clothing, and equipment. In selecting decontamination equipment, consider whether the equipment itself can be decontaminated for reuse or can be easily disposed of. Table 10-4 lists recommended equipment for decontamination of large equipment and vehicles. Note that other types of equipment not listed in Tables 10-3 and 10-4 may be appropriate in certain situations.

Disposal Methods

All equipment used for decontamination must be decontaminated and/or disposed of properly. Buckets, brushes, clothing, tools, and other contaminated equipment should be collected, placed in containers, and labeled. Also, all spent solutions and wash water should be collected and disposed of properly. Clothing that is not completely decontaminated should be placed in plastic bags, pending further decontamination and/or disposal.

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Table 10-3. Some Recommended Equipment for Decontamination of Personnel and Personal Protective Clothing and Equipment

- Drop cloths of plastic or other suitable materials on which heavily contaminated equipment and outer protective clothing may be deposited.
- Collection containers, such as drums or suitably lined trash cans, for storing disposable clothing and heavily contaminated personal protective clothing or equipment that must be discarded.
- Lined box with absorbents for wiping or rinsing off gross contaminants and liquid contaminants.
- Large galvanized tubs, stock tanks, or children's wading pools to hold wash and rinse solutions. These should be at least large enough for a worker to place a booted foot in, and should have either no drain or a drain connected to a collection tank or appropriate treatment system.
- Wash solutions selected to wash off and reduce the hazards associated with the contaminants.
- Rinse solutions selected to remove contaminants and contaminated wash solutions.
- Long-handled, soft-bristled brushes to help wash and rinse off contaminants.
- Paper or cloth towels for drying protective clothing and equipment.
- Lockers and cabinets for storage of decontaminated clothing and equipment.
- Metal or plastic cans or drums for contaminated wash and rinse solutions.
- Plastic sheeting, sealed pads with drains, or other appropriate methods for containing and collecting contaminated wash and rinse solutions spilled during decontamination.
- Shower facilities for full body wash or, at a minimum, personal wash sinks (with drains connected to a collection tank or appropriate treatment system).
- Soap or wash solution, wash cloths, and towels for personnel.
- Lockers or closets for clean clothing and personal item storage.

Personal Protection

Decontamination workers who initially come in contact with personnel and equipment leaving the Exclusion Zone will require more protection from contaminants than decontamination workers who are assigned to the last station in the decontamination line. In some cases, decontamination personnel should wear the same levels of PPE as workers in the Exclusion Zone. In other cases, decontamination personnel may be sufficiently protected by wearing one level lower protection (e.g., wearing Level C protection while decontaminating workers who are wearing Level B).

The level of protection required will vary with the type of decontamination equipment used. For example, workers using a steam jet may need a different type of respiratory protection than other decontamination personnel because of the high moisture levels produced by steam jets. In some situations, the cleaning solutions used and wastes removed during decontamination may generate harmful vapors. Appropriate equipment and clothing for protecting decontamination personnel should be selected by a qualified health and safety expert.

Table 10-4. Some Recommended Equipment for Heavy Equipment and Vehicle Decontamination

- Storage tanks of appropriate treatment systems for temporary storage and/or treatment of contaminated wash and rinse solutions.
- Drains or pumps for collection of contaminated wash and rinse solutions.
- Long-handled brushes for general exterior cleaning.
- Wash solutions selected to remove and reduce the hazards associated with the contamination.
- Rinse solutions selected to remove contaminants and contaminated wash solutions.
- Pressurized sprayers for washing and rinsing, particularly hard-to-reach areas.
- Curtains, enclosures, or spray booths to contain splashes from pressurized sprays.
- Long-handled brushes, rods, and shovels for dislodging contaminants and contaminanted soil caught in tires and the undersides of vehicles and equipment.
- Containers to hold contaminants and contaminated soil removed from tires and the undersides of vehicles and equipment.
- Wash and rinse buckets for use in the decontamination of operator areas inside vehicles and equipment.
- Brooms and brushes for cleaning operator areas inside vehicles and equipment.
- Containers for storage and disposal of contaminated wash and rinse solutions, damaged or heavily contaminated parts, and equipment to be discarded.

All decontamination workers are in a contaminated area and must themselves be decontaminated before entering the clean Support Zone. The extent of their decontamination should be determined by the types of contaminants they may have contacted and the type of work they performed.

Emergency Decontamination

In addition to routine decontamination procedures, emergency decontamination procedures must be established. In an emergency, the primary concern is to prevent the loss of life or severe injury to site personnel. If immediate medical treatment is required to save a life, decontamination should be delayed until the victim is stabilized. If decontamination can be performed without interfering with essential life-saving techniques or first aid, or if a worker has been contaminated with an extremely toxic or corrosive material that could cause severe injury or loss of life, decontamination must be performed immediately. If an emergency due to a heat-related illness develops, protective clothing should be removed from the victim as soon as possible to reduce the heat stress. During an emergency, provisions must also be made for protecting medical personnel and disposing of contaminated clothing and equipment. See Chapter 12 for further information on decontamination during emergencies.

References

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COLORADO SCHOOL OF MINES

Environmental Health and Safety (EHS)

November 19, 1998

MEMO TO: Dave Dolif
Tim VanHaverbeke
George Griffin

FROM: Bob MacPherson, Director, EHS

SUBJECT: Chemical Spill Response Team

By virtue of your work history, educational background, on-the-job training, continued participation in annual HAZWOPER training, continued participation in the Medical Surveillance Program and continued participation in the monthly spill response team training, I hereby designate you as a member of the CSM Chemical Response Team with qualification as "Hazardous Materials Technician" as defined in OSHA Regulation 29 CFR 1910 Part 120 q(5),(6).

RAM/ge

cc: John Elliott

11/19/98-Bob/Memos/Memo368

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COLORADO SCHOOL OF MINES

Environmental Health and Safety (EHS)

November 19, 1998

MEMO TO: John Elliott
Linn Havelick
Dick Porter

FROM: Bob MacPherson, Director, EHS

SUBJECT: Chemical Spill Response Team

By virtue of your continued participation in annual HAZWOPER training, participation in the Medical Surveillance Program, work history, educational background and professional certification as Certified Hazardous Materials Manager (CHMM — John) and Certified Industrial Hygienist (CIH — Linn), I hereby designate you as members of the CSM Chemical Spill Response Team with qualification as "Incident Commander" as defined in OSHA Regulation 29 CFR 1910 Part 120 q(5),(6).

RAM/ge

11/19/98-Bob/Memos/Memo366

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Unit	TrainDate	Duration (hr)	Leader	Subject	Members Attending
128	6/16/98	2	RAHORST	Donning and use of new PAPRs. Practice cleanup of mock spill in HMMF.	PORTER RAHORST DOLIF VAN HAVERBEKE GRIFFIN ELLIOTT
129	7/14/98	2	ELLIOTT	Final review of SOPs. Exercise to respond to mock spill in CSDF lab	VAN HAVERBEKE ELLIOTT PORTER GRIFFIN
130	9/ 8/98	2	PORTER	Use, calibration, limitations of gas detection meters.	VAN HAVERBEKE ELLIOTT PORTER GRIFFIN
131	10/13/98	1	ELLIOTT	Emergency response vehicle - inventory	ELLIOTT HAVELICK VAN HAVERBEKE GRIFFIN PORTER
132	11/20/98	40	HAVELICK	Attendance at 40 hour HAZWOPER training conducted by Urie	HAVELICK

Printed 11/19/98

CSM Chemical Response Team Training

Unit	TrainDate	Duration (hr)	Leader	Subject	Members Attending
122	3/ 5/98	1	ELLIOTT	Revisit SOPs, assign members to write SOPs, new team structure	PORTER RAHORST DOLIF GRIFFIN ELLIOTT
123	3/19/98	1	RAHORST	Presentation of new written SOPs for organometallics and radioactive materials	GRIFFIN RAHORST ELLIOTT PORTER
124	4/ 9/98	2	PORTER	Welcome new member - Tim VanHaverbeke. Distribute new wallet cards. New SOP for air and water reactives.	PORTER GRIFFIN ELLIOTT RAHORST
125	5/14/98	2	ELLIOTT	Discussion of existing SOPs. Griffin to write last 2 SOPs. Spill cleanup exercise at CSDF.	ELLIOTT GRIFFIN PORTER
126	5/14/98	40	RAHORST	Attendance at ACGIH national convention in Atlanta.	RAHORST
127	5/14/98	40	VANHAVERBEKE	Attendance at 40 hour HAZWOPER training conducted by Urie.	VANHAVERBEKE

Printed 5/21/98

CSM CHEMICAL RESPONSE TEAM TRAINING

DOCUMENTATION OF TRAINING

(Textbook is "Chemistry of Hazardous Materials;" Eugene Meyer; Prentice-Hall; 1977)

Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
			Porter		
#121	2 hr	written make-up for November Training	Rahorst Griffin Elliott Dolif	Rahorst	SCBA Training-Types of SCBA Written Review Handed in 12/15/97

CSM CHEMICAL RESPONSE TEAM TRAINING

DOCUMENTATION OF TRAINING

(Textbook is "Chemistry of Hazardous Materials;" Eugene Meyer; Prentice-Hall; 1977)

Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
			Elliott Dolif		
#117	2 hr	08/14/97	Rahorst Griffin Elliott Dolif Porter	Rahorst	Training in radiation cleanup
#118	2 hr	10/08/97	Griffin Elliott Dolif Porter MacPherson	MacPherson	Training in radiation cleanup
#119	2 hr.	12/08/97	Rahorst Griffin Elliott Dolif Porter	Rahorst	Respirator fit testing & SCBA training
#120	2 hr	written make-up for September Training	Rahorst Griffin Elliott Dolif	Rahorst	SCBA Training-Respirator Hazards Written Review Handed in 12/15/97

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CSM CHEMICAL RESPONSE TEAM TRAINING

DOCUMENTATION OF TRAINING

(Textbook is "Chemistry of Hazardous Materials;" Eugene Meyer; Prentice-Hall; 1977)

Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
			Griffin Elliott Porter		
#113	2 hr.	04/04/97	Rahorst Griffin Elliott Porter Dolif	Rahorst	SOP's planning
#114	2 hr	05/05/97	Rahorst Griffin Elliott Porter Dolif	Rahorst	SOP flammable material
#115	2 hr	06/23/97	Rahorst Griffin Elliott Porter Dolif	Rahorst	Respirator fit test and training
#116	2 hr.	07/23/97	Rahorst Griffin	Rahorst	compile and review SOP's

CSM CHEMICAL RESPONSE TEAM TRAINING

DOCUMENTATION OF TRAINING

(Textbook is "Chemistry of Hazardous Materials;" Eugene Meyer; Prentice-Hall; 1977)

Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
#107	2 hr.	11/11/96	Rahorst Elliott Porter Griffin	Rahorst	Discuss SOP's
#108	2 hr.	12/12/96	Rahorst Griffin Elliott	Rahorst	SCBA training
#109	1 hr	01/17/97	Rahorst Griffin Elliott	Rahorst	SCBA training (cont)
#110	1 hr	01/22/97	Rahorst Griffin Elliott Porter	Rahorst	SCBA training (cont)
#111	2 hr.	02/04/97	Rahorst Griffin Elliott Porter	Rahorst	SOP's planning
#112	2 hr.	03/06/97	Rahorst	Rahorst	SOP's planning

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CSM CHEMICAL RESPONSE TEAM TRAINING

DOCUMENTATION OF TRAINING

(Textbook is "Chemistry of Hazardous Materials;" Eugene Meyer; Prentice-Hall; 1977)

Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
#103	2 hr.	05/06/96	Rahorst Elliott Porter Griffin	Rahorst	Planning for river rafting training
#104	4 hr.	06/26/96	Rahorst Elliott Griffin	Rahorst	River rafting
#105	2 hr.	09/27/96	Rahorst Elliott Porter Dolif	Rahorst	Planning of training for next year
#106	2 hr.	10/28/96	Rahorst Elliott Porter Dolif Griffin	Rahorst	Fit testing respirator training

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CSM CHEMICAL RESPONSE TEAM TRAINING

DOCUMENTATION OF TRAINING

(Textbook is "Chemistry of Hazardous Materials;" Eugene Meyer; Prentice-Hall; 1977)

Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
#99	1 hr.	02/23/96	Elliott Porter Rahorst Dolif Griffin	Rahorst	Discussion of SOP's left to write and assign of writing tasks.
#100	2 hr.	03/08/96	Rahorst Griffin Elliott Porter Dolif	Rahorst	SOP's
#101	2 hr.	03/29/96	Rahorst Griffin Elliott Porter Dolif	Rahorst	SOP's
#102	2 hr.	04/12/96	Rahorst Elliott Porter	Rahorst	SOP's

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CSM CHEMICAL RESPONSE TEAM TRAINING

DOCUMENTATION OF TRAINING

(Textbook is "Chemistry of Hazardous Materials;" Eugene Meyer; Prentice-Hall; 1977)

Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
			Dolif Griffin		
#96	1 hr.	01/12/96	Elliott Porter Rahorst Dolif Griffin	Elliott	Creation & review of concentrated sulfuric acid spill SOP.
#97	1 hr.	01/19/96	Elliott Porter Rahorst Dolif Griffin	Elliott	Creation & review of base spill SOP.
#98	1 hr.	02/16/96	Elliott Porter Rahorst Dolif Griffin	Rahorst	Compiling & ordering of SOP's created so far.

CSM CHEMICAL RESPONSE TEAM TRAINING

DOCUMENTATION OF TRAINING

(Textbook is "Chemistry of Hazardous Materials;" Eugene Meyer; Prentice-Hall; 1977)

Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
#92	1 hr.	10/23/95	Elliott Porter Rahorst Dolif Griffin	Griffin	Creation & review of standard SOP format.
#93	2 hrs.	11/17/95	Elliott Porter Rahorst Dolif Griffin	Elliott	Creation & review of SOP for common (mineral) acid spill.
#94	1 hr.	12/01/95	Elliott Porter Rahorst Dolif Griffin	Porter	Creation & review of hydroflouric acid spill.
#95	1 hr.	12/19/95	Elliott Porter Rahorst	Rahorst	Creation & review of elemental mercury spill SOP.

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CSM CHEMICAL RESPONSE TEAM TRAINING

DOCUMENTATION OF TRAINING

(Textbook is "Chemistry of Hazardous Materials;" Eugene Meyer; Prentice-Hall; 1977)

Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
			Porter Rahorst Dolif		
#89	2 hrs.	08/23/95	Elliott Porter Rahorst Dolif Griffin	Rahorst	Organizational meeting on writing Standard Operating Procedure (SOP)
#90	2 hrs.	09/22/95	Elliott Porter Rahorst Dolif Griffin	Rahorst	Creation of outline needed SOP's presented & discussed.
#91	2 hrs.	10/13/95	Elliott Porter Rahorst Dolif Griffin	Rahorst	Creation of review of standard SOP format.

CSM CHEMICAL RESPONSE TEAM TRAINING

DOCUMENTATION OF TRAINING

(Textbook is "Chemistry of Hazardous Materials;" Eugene Meyer; Prentice-Hall; 1977)

Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
			Porter Dolif Elliott		
#85	3 hrs	04/13/95	Rahorst MacPherson Dolif Porter	Rahorst	Spill Response Alderson Hall, Nitric Acid/Benzyl Alochol
#86	1 hr	04/14/95	Rahorst Elliott Dolif Porter	Group	After Action Review of Alderson Hall
#87	3 hrs	06/15/95	Elliott Porter Rahorst	Rahorst	I. Air Monitoring Equipment II. Fit Testing III.Respirator Care & Maintenance IV. Review of Equipment Storage
#88	2 hrs.	07/26/95	Elliott	Rahorst	Review of Hazard Classing

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CSM CHEMICAL RESPONSE TEAM TRAINING

DOCUMENTATION OF TRAINING

(Textbook is "Chemistry of Hazardous Materials;" Eugene Meyer; Prentice-Hall; 1977)

Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
			Elliott		
#81	2 hrs	8/25/94	Rahorst Porter Dolif Elliott	Rahorst	Videos I. Radiation Protection Practices II. Decontamination III. Incident Command System IV. Marking, Labeling & Placarding
#82	2 hrs	10/27/94	Rahorst Porter Dolif Elliott MacPherson	Rahorst	I. Handout Level-1 Incident Command Diplomas II. HM126-F Training III. Respirator Fit Testing
#83	4 hrs	11/22/94	Rahorst Porter Dolif Elliott	Rahorst	HM-126F Training ICS Level II
#84	2 hrs	02/03/95	Rahorst	Rahorst	Spill Simulation at HMMF

CSM CHEMICAL RESPONSE TEAM TRAINING

DOCUMENTATION OF TRAINING

(Textbook is "Chemistry of Hazardous Materials;" Eugene Meyer; Prentice-Hall; 1977)

Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
#76-77	8 hrs	8/19/94 4/28/94 5/13/94 3/18/94 3/18/94	MacPherson Rahorst Porter Dolif Snelling	Varied	I. 8 Hr. Updates 29 CFR 1910.120
#78	2 hrs	5/12/94	MacPherson Rahorst Porter Dolif Elliott	Rahorst	I. Review of spill equipment inventory and use. II. Fit-test and training on respirator use.
#79	4 hrs	6/17-18/94	MacPherson Rahorst Porter Dolif Elliott	Rahorst	I. Emergency Response Level I. First Responder Awareness (FRLI FRA) References: ERLI FRA Front Range Community College
#80	2 hrs	7/28/94	MacPherson Rahorst Porter Dolif	Group	After-Action Review of Spill on July 27, 1994.

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
					III. Practical exercise in Coolbaugh Lab Rm #322 identification of chemical hazards in a lab. IV. Segregation of chemicals into hazard classes transportation and storage.
#74	2 hr	1/27/94	MacPherson Rahorst Porter Dolif Snelling	Rahorst	I. Redox reactions vs. acid-base reactions. II. Use of ACGIH TL's and BEI's. III. Definition and use of: Curie, Roentgen, Rad, IV. Basic theory of the atom.
#75	2 hr	2/17/94	MacPherson Rahorst Porter Dolif Snelling	Rahorst	I. Take test: Spilquz1, 3/27/89. II. Review Quiz.

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DOCUMENTATION OF TRAINING

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
			Porter Dolif Snelling		
#71	3 hr	9/12/93	MacPherson Rahorst Porter Dolif Snelling	Rahorst	I. Respirator fit test and cleaning. II. Use of Scott Air-Pac II a. III. Spill cleanup at Chauvenet of nitric acid and c
#72	3 hr	12/09/93	MacPherson Rahorst Porter Dolif Snelling	Rahorst	I. Discussion of responsibilities of Chemical Hyg Hygiene Services Technician and formulation questions for oral exam. II. F.E. demo and use of F.E. III. Hands-on training involving extinguishing of a flammable liquid fire.
#73	3 hr	12/16/93	MacPherson Rahorst Porter Dolif Snelling	Rahorst	I. Class on oxidization/reduction phenomenaon. II. Class on oxidizers. What is an oxidizer and how to identify.

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
			Snelling Dolif Porter		III. Actual CSE.
#67	2 hr	5/21/93	MacPherson Rahorst Snelling Dolif Porter	Rahorst	I. Discussion of Chapter 1 & 2 of 2nd Ed. of "Self-Contained Breathing Apparatus" publish by International Fire Service Training Assoc. II. Group work project on researching effects of III. Test on Chapters 1 & 2.
#68	1 hr	6/17/93	MacPherson Rahorst Porter Dolif Snelling	MacPherson	I. Video: "Fundamentals of Radiation Safety"
#69	2 hr	7/02/93	MacPherson Rahorst Porter Dolif	Dolif	I. Chapter 3 (See entry #67). II. Test Chapter 3. III. Practical experience.
#70	2 hr	8/30/93	MacPherson Rahorst	Rahorst	I. J.J. Keller's HM 181 Training Program & Dis

CSM CHEMICAL RESPONSE TEAM TRAINING

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
			Dolif		II. Interface with Jefferson County Bomb Squad
#63	2 hr	12/11/92	MacPherson Rahorst Snelling Dolif Porter	MacPherson Rahorst	I. Tour of Industrial Chemical Storage Facility. II. Discussion of communications during spill. How to contact each spill team member/
# 64	3 hr	2/19/93	MacPherson Rahorst Snelling Dolif Porter	Rahorst	I. Review of how to select proper PPE using ACGIH guideline for selection. II. Use of new absorbents and equipment acquired in recent months.
#65	3 hr	3/22/93	MacPherson Rahorst Snelling Dolif Porter	Rahorst	I. Pretest II. Lecture: Units of measure; density of matter gravity; vapor density; pV = n compounds; atoms, molecules III. Test: On file.
#66	2 hr	5/05/93	MacPherson Rahorst	Rahorst	I. Inventory of Confined Space Entry (CSE) equ II. Insturction in use of CSE equipment.

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
			Snelling Dolif		II. Proper E.R. actions for spills of flammables.
#58	1 hr	7/30/92	MacPherson Rahorst Snelling	Rahorst	I. Full dress simulation of small mercury spills. II. Response to spill in 1st floor Chemistry stock
#59	3 hr	8/07/92	MacPherson Rahorst Snelling Dolif	Rahorst	I. Simulation of chlorine leak in Volk Gym. II. After-action review of training simulation.
#60	2 hr	9/18/92	MacPherson Rahorst Snelling Dolif	MacPherson Rahorst	I. Operation of Exotox 75 air monitoring device II. Use of Exotox 75 in emergency response.
#61	2 hr	10/29/92	MacPherson Rahorst Snelling Dolif	MacPherson Rahorst	I. View video of reactive and explosive material II. Tour of Coolbaugh and Hill Hall chemical stor
#62	2 hr	11/02/92	MacPherson Rahorst Snelling	MacPherson Rahorst	I. Review handling, transportation and storage reactives and shock sensitive materials.

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
					III. Demonstration of spill cleanup.
#53	2 hr	2/14/92	MacPherson Rahorst Snelling Dolif	MacPherson Rahorst	Discussion: How physical state of chemicals affe toxicity to humans. Respirator familiarization. Respirator fit test. Review of previous discussion.
#54	2 hr	3/27/92	MacPherson Rahorst Snelling Dolif	MacPherson Rahorst	Donning of level A and discussion of PPE works to protect the wearer.
#55	2 hr	5/01/92	MacPherson Rahorst Snelling Dolif	Rahorst	Full dress rehearsal of response to ammonium hy spill in Chauvenet hall, including actual clean-up of 1 liter of ammonium hydroxide in HMMF.
#56	2.5 hr	5/15/92	MacPherson Rahorst Snelling Dolif	MacPherson Rahorst	I. 1 hour respirator care and maintenance. II. 1.5 hours, hazards of acid and all corrosives. Oxidation-reduction reactions and electron transfer, neutralization, pH, and salt formatio
#57	2 hr	6/12/92	MacPherson Rahorst	MacPherson Rahorst	I. Overview of Organic Chemistry, aphathic vs. aromatic, nomenclature & gener

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
#51	2 hr	1/09/92	MacPherson Rahorst Snelling Dolif	MacPherson Rahorst	Introduction briefing for Snelling and Dolif. Familiarization with SCV & HMMF.
#52	2 hr	1/24/92	MacPherson Rahorst Snelling Dolif	MacPherson Rahorst	I. Discussion/Lecture: a. define elements/compounds/m b. atomic structure: nucleus, elec c. signs of elements/chemical for d. how to read the periodic chart e. ionic and covalent bonds f. oxidation/reduction reactions g. measures of toxicity 1. dose/response relationship 2. LD50 3. TLV 4. TWA h. routes of entry i. acute/chronic effects j. mutagens; carcinogens; teratog k. review handout/definitions rela II. Introduction to personal protective clothing.

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
#45	1 hr	6/17/91	MacPherson Wagner Miller Rahorst	Rahorst	Respirator fit testing.
#46	2 hr	7/24/91	MacPherson Wagner Miller Rahorst	Rahorst	I. Lecture: Air and Water Reactives II. Demonstrations: Phosphorus, potassium in w and reducers, water and acid, nitric acid and
#47	2 hr	8/28/91	MacPherson Wagner Rahorst	Rahorst	I. Respirator fit testing new Glendale half-face, full-face and PAPR II. Tour of Jeffco Hazmat Command Center
#48	2 hr	10/09/91	MacPherson Wagner Rahorst	Rahorst and MacPherson	I. Review of chemical response equipment inve II. Procedures for control and isolation of spill si III. 30 minute video on structure of the atom.
#49	2 hr	11/05/91	MacPherson Wagner Rahorst	MacPherson	I. Discussion of response to the spill of a flamm Full-dress rehearsal of level "A" response to a flammable material.
#50	2 hr	11/10/91	MacPherson Wagner Rahorst	Rahorst	I. Use and location of reference materials. II. Use and location of air monitoring equipment III. Use and location of personal protection equip

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
#40	2 hrs	3/20/91	MacPherson Wagner Miller	MacPherson	I. Compressed gas cylinders. Pressure, volum relationships. Chemical properties of comm
#41	2 hrs	4/24/91	MacPherson Wagner Miller	Switzer	Review ventilation system operation in Alderson, Chauvenet. Review chemical usage and storage
#42	2 hrs	5/08/91	MacPherson Wagner Miller Rahorst	MacPherson	Radiation safety. Discuss origin and types of radia Sealed sources, radiolabeling, shielding, inverse s
#43	2 hrs	6/12/91	MacPherson Wagner Miller Rahorst	No Entry	Discuss communications procedures during chem Motorola representative gives presentation/demo.
#44	1 hr	6/12/91	MacPherson Wagner Miller Rahorst	No Entry	Critique of recent HNO3 spill.

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
#35	2 hrs	9/25/90	MacPherson Wagner Miller Wilson	MacPherson	I. Discuss environmental regulations in general hazardous waste regulations in particular. II. Discuss industrial toxicology, TLV's, PEL's, e
#36	2 hrs	11/07/90	MacPherson Wagner Miller	MacPherson	I. Review 3/23/89 Quiz. II. Demonstrate multi-gas meter.
#37	2 hrs	11/20/90	MacPherson Wagner Miller	MacPherson	I. Review 12/5/89 Quiz. II. Review use and storage locations of spill con
#38	2 hrs	12/04/90	MacPherson Wagner Miller	MacPherson	I. Onsite inspection of Hill Hall Research Labor Walkthrough response actions in the event o of H2 and H2S in the Lab.
#39	2 hrs	1/23/91	MacPherson Wagner Miller	Switzer	I. Onsite inspection and review of mechanical in Gym, Coolbaugh and Hill Hall in anticipatio chlorine leak and other toxic gas releases.

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
#31	2 hrs	7/02/90	MacPherson Wagner Miller	MacPherson	I. Review handouts on respiratory protection. a. Discuss types of respirators b. Discuss protection factors
#32	2 hrs	7/17/90	MacPherson Wagner Miller	MacPherson	I. Review communications procedures. II. Review team organization/lines of authority.
#33	2 hrs	8/07/90	MacPherson Wagner Miller	MacPherson	I. Review behavior of gases and liquids in relati II. Discuss vapor pressure and boiling point. III. Fit test half-mask and full-face respirators.
#34	2 hrs	9/12/90	MacPherson Wagner Miller	MacPherson	I. Observe demonstration of communications eq used in connection with "Level A" protection II. Practice donning of "Level A" protection.

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
#27	2 hrs	1/16/90	MacPherson Wagner Miller Mueller	MacPherson	I. Read pages 328-350 Lecture/Discussion--Radiation/Radioactivity Handouts--a. Uranium Decay Series b. Average Americal Yearly Dose c. Dose from Terestrial/Cosmic Sourc
#28	2 hrs	3/06/90	MacPherson Wagner Miller Mueller	MacPherson	I. Review Hazardous MAterial EMergency Resp Test operate portable gas monitor
#29	2 hrs	3/20/90	MacPherson Wagner Miller	MacPherson	I. Run through several simulated spill scenarios at HMMF.
#30	2 hrs	5/09/90	MacPherson Wagner Miller	MacPherson	I. Read/review section in book on water reactiv II. Discuss/demonstrate use of Class D fire extin III. Don SCBA's. IV. Clean up actual spill of HF.

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
#23	2 hrs	9/06/89	MacPherson Wagner Miller Mueller	MacPherson	I. Read chapter on "Chemical Explosives" pp. 3 II. Discuss possible encounters with chemical ex in academic buildings and on campus.
#24	2 hrs	10/31/89	MacPherson Wagner Miller Mueller	MacPherson	I. Review last written exam and review last 4 c assigned in book in preparation for exam in N
#25	2 hrs	11/18/89	MacPherson Wagner Miller Mueller	MacPherson	I. Take practice exam -- review results
#26	2 hrs	12/05/89	MacPherson Wagner Miller Mueller	MacPherson	I. Take exam -- review results

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
#20	2 hrs	5/17/89	Wagner Miller	MacPherson	I. Briefing by Ron Miller on content of recent co II. Read pp. 240-277; "Organic Compounds" III. Fit test on half- and full-face respirators IV. Walk-through Hazardous Materials Managem
#21	2 hrs	6/21/89	MacPherson Wagner Miller Mueller	Independent	I. Watch video tape segments a. Safety in responding to fire an b. Problems with infectious was II. Read pp. 278-305; Plastics, Resins and Riber
#22	2 hrs	7/26/89	MacPherson Wagner Miller Mueller	MacPherson	I. Discussion concerning design of interior of sp response equipment--equipment intended to b

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
					II. Administer Quiz (see attachment)
					III. Reading Assignment (pp 186-215)
#17	2 hrs	3/23/89	Wagner Miller Mueller	MacPherson	I. Administer "Graded" Quiz (see attachments)
					II. Discuss toxicology of heavy metals--from rea
					III. Demonstrate use of SCBA. Practive donning
					IV. Demonstrate use of Class 'A' encapsulation
#18	8 hrs	3/28/89	Mueller	Video	One day seminar on "Confined Space Entry" sponsored by ROE Fi
#19	2 hrs	4/03/89	Wagner Miller Mueller	MacPherson	I. Discuss reading assignment pp 218-227
					II. Review placement of spill control equipment i
					III. Discuss selection of respiratory protection an
					IV. Practice use of spill adsorbents/neutralizers o acid and base. All participate in practice spill

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
#13	3 hrs	2/21/89	Miller MacPherson	Brian Rothman of Biscraft Northeast, Inc.	I. Overview of radiation hazards: a. ionizing, nonionizing b. Alpha Gamma Beta II. Radiation detection instruments III. Protective clothing, decontamination procedu
#14	30 min	3/02/89	Wagner	Video	Review video--"Introduction to Reactive and Explosive Materials"
#15	8 hrs	3/09/89	Wagner	Verne Brown	One-day seminar on "Safety Procedures for Confined Space Entry and Reserve Operations" (see attached broc
#16	2 hrs	3/13/89	MacPherson Wagner Miller Mueller	MacPherson Wagner	I. Lecture/Discussion: a. Confined Space Entry b. Toxicology (from reading assi

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
					3. portable GC - 4. Miran Sample II. Insidious hazards in the laboratory: a. picric acid b. peroxide formation c. perchloric acid
#11	30 min	2/11/89	Miller MacPherson	Video	Review video--"Introduction to Reactive and Explosive Materials"
#12	2 hrs	2/20/89	Wagner Mueller	MacPherson	I. Read pages 156-184 in text II. Lecture/Discussion: a. water reactive materials b. factors which influence speed III. Tour Chemistry Department storeroom. Obse potassium, phosphorus in storage. IV. Practice finding chemicals/information in refe

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
					1. chromatograp 2. colorimetry 3. PID/FID/Mira REAL TIME" INS 1. CGI 2. colorimetric t 3. PID/FID/Mira
#10	2 hrs	1/30/89	Miller Wagner Mueller	MacPherson	A. LECTURE/DISCUSSION I. Continue discussion of sampling and analytic techniques principles: a. filters, tubes, bags, cascade i samplers, impingers b. GC., MS., infrared spectrome gravimetric, asbestos--PCM,PL c. field instruments: 1. CGI 2. OVA -- PID

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
					VI. Discuss colorimetric tubes, combustible gas detectors, passive dosimeters
#9	2 hrs	1/23/89	Miller Mueller Wagner	MacPherson	I. Discussion/Lecture: a. EPA "Protection Levels" b. fit testing c. define: IDLH d. oxygen deficient atmospheres e. confined space entry threats: 1. flammable/ex 2. toxic 3. asphyxiants/O f. reading the CGI/LEL - UEL g. normal O2 - 19.5% h. health effects appear - 16% i. O2 level for "inerting" - 8% O reqired to support combustion j. no entry if above 10% of LEL k. general principles of air sampl

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
					2. saranex 3. encapsulation II. Respiratory Protection a. air purifying respirators 1. type: 1/2 ma 2. cartridge sele b. air supplying respirators 1. supplied air 2. SCBA c. fit testing d. protection factors e. handout (attachment) III. Review TLV's, PEL's, TWA's IV. Discuss air sampling techniques and equipm V. Demonstrate air sampling pumps, calibration equipment, filters, charcoal tubes, etc...

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
#7	2 hrs	2/09/89	Miller Wagner Mueller	MacPherson	I. Read pages 131-153 in text--chapter entitled "Chemistry of Corrosive Materials" II. Discussion/Lecture: a. development of incident respo b. evaluation of "carcinogens"--r III. Exercise: a. work through attached spill sc risk; decide on tactics; determ protective gear; determine pro materials (attachement).
#8	3 hrs	1/13/89	Miller Wagner	MacPherson	A. DISCUSSION/LECTURE I. Personal Protective Equipment/Demonstration a. gloves/boots and face/eye/hea b. protective suits 1. tyvek

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT

i. Condensed Chemical Dictionar

IV. Discuss hazard assessment factors:

a. toxicity
b. reactivity
c. flammability
d. corrosivity

V. Important Assessment Information:

a. identification of chemical
b. physical state--solid, liquid, ga
c. how much/what form in air?

1. vapor pressu
2. toxicity
3. UEL/LEL

d. warning properties
e. in contact with an incompatib

VI. Exercise: Find information in appropriate bo chemicals listed in handout (attachment)

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
			Mueller		II. Discussion/Lecture: a. selection of respiratory protec b. selection of personal protectiv use of "Guideline" reference b c. familiarization with new book Properties of Industrial Materia d. review plans for spill control v storage facility
#6	2 hrs	12/02/88	Miller Wagner Mueller	MacPherson	I. Read pages 100-130 II. Review oxidation/reduction reactions III. Familiarization with chemical information refe a. Hazardous Chemical Data Boo b. Handbook of Reactive Chemic c. Merck Index d. Sigma-Aldrich Library of Chem e. Clinical Toxicology of Comme f. Handbook of Chemical Synony g. Handbook of Chemistry and P h. Handbook of Laboratory Safe

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
					h. routes of entry i. acute/chronic effects j. mutagens; carcinogens; terato k. review handout/definitions rel
#4	2 hrs	11/11/88	Miller Wagner Mueller	MacPherson	I. Read pages 78-88 in text II. Review: a. important physical properties b. elements, compounds, and fo c. periodic table d. LD50, TLV, TWA e. routes of entry; acute/chronic f. carcinogens, teratogens, muta III. Discuss chemical reactions (pages 78-88 in b IV. Research some chemicals in Patty's Industria and Toxicology
#5	2 hrs	11/18/88	Miller Wagner	MacPherson	I. Read pages 88-100 in text

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
					d. laten heat of vaporization (fire e. relationship of pressure/tempe pressure/volume f. cryogenics g. flammability--UEL/LEL; flash p
#3	2 hrs	11/04/88	Miller Wagner Mueller	MacPherson	I. Read pages 1-78 in text II. Discussion/Lecture: a. define elements/compounds/m b. atomic structure: nucleus, ele neutrons c. signs of elements/chemical fo d. how to read the periodic char e. ionic and covalent bonds f. oxidation/reduction reactions g. measures of toxicity 1. dose/respons 2. LD50 3. TLV 4. TWA

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Unit	Time	Date	Attendance	Instructor	TOPIC/ASSIGNMENT
#1	2 hrs	10/14/88	Miller Wagner Mueller	MacPherson	I. Read pages 1-78 in text II. Discussion/Lecture: a. assessment of chemical spills b. use/availability of reference b c. classes of fires/selection of ex d. review categories of hazardou e. placarding/labeling systems f. properties of chemicals and ho figure in spill assessment and 1. define: solid fume, must 2. define: dens density, vapo
#2	2 hrs	10/28/88	Miller Wagner Mueller	MacPherson	I. Read pages 1-78 in text II. Discussion/Lecture: a. metric system b. conversion of degrees centigr c. define organic and inorganic

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_____
(Name)

QUIZ

Chemical Spill Response Team Training
March 27, 1989

1. The smallest subdivision of an element which still retains the chemical identity of the element is:

   a. atom
   b. nucleus
   c. molecule
   d. compound
   e. proton

2. An atomic nucleus is comprised of:

   a. neutrons and electrons
   b. protons and electrons
   c. protons, and alpha particles
   d. negatrons and isotopes
   e. neutrons and protons

3. In an uncharged atom, the number of electrons equals the number of protons which equals the atomic number of the element.

   True - or - False

4. The atomic weight of an element equals the sum of the number of protons plus the number of neutrons.

   True - or - False

5. Organic chemistry is the study of substances which contain:

   a. hemoglobin
   b. hydrogen
   c. bacteria
   d. carbon
   e. oxygen

6. The benzene ring is the basic building block of:

   a. aromatic hydrocarbons
   b. aliphatic hydrocarbons
   c. esoteric hydrocarbons

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7. Match the following:

a. electrons	A. are positively charged
b. neutrons	B. may be positively or negatively charged
c. ions	C. are not charged
d. protons	D. are negatively charged

8. What elements are represented by the following signs:

a. C = _____

b. O = _____

c. H = _____

d. N = _____

e. Cl = _____

f. Hg = _____

g. Na = _____

h. K = _____

9. A chemical with a "per" in its name probably contains a lot of:

a. carbon
b. hydrogen
c. nitrogen
d. oxygen

10. A "halogenated" hydrocarbon may contain fluorine, chlorine, or bromine.

True - or - false

11. Name the following acids:

a. H_2SO_4 = _____

b. HCl = _____

c. $HClO_4$ = _____

d. HNO_3 = _____

12. Which of the following is <u>not</u> an acid: _____

a. H_2CO_3

b. H_3BO_3

c. HF

d. CH_3COOH

e. FeO_2

13. Gasoline is a(n) _____ agent.

a. oxidizing
b. alkaline
c. reducing
d. secret

14. An oxidizing agent is an electron "acceptor."

True - or - False

15. A reducing agent is an electron "donor."

True - or - False

16. An acid is a proton "donor."

True - or - False

17. A base is a proton "acceptor."

True - or - False

18. A stable electron configuration of an atom is:

a. stable duet
b. stable trio
c. 6 electrons plus an ion
d. stable octet

19. A potentially flammable atmosphere which is below the upper explosive limit will not explode if subjected to a spark.

True - or - False

20. It is o.k. to enter an atmosphere which is between the LEL and UEL so long as one wears a supplied air respirator.

True - or - False

21. Match the following:

a. TLV	A. is a measure of allowable worker exposure
b. LD_{50}	B. is a measure of toxicity based on the percentage of deaths of lab animals
c. TWA	C. is a means of integrating concentration and time of exposure to a toxic material
d. UEL	D. is a measure of flammability of an atmosphere
e. IDLH	E. describes the degree of danger posed by an environment with a toxic atmosphere

22. A person wearing self-contained breathing apparatus can safely enter an oxygen deficient atmosphere.

True - or - False

23. A person wearing an air purifying respirator equipped with HEPA filter cartridges can safely enter an area where a solvent spill has occurred, so long as the atmosphere is not classified "IDLH."

True - or - False

24. No precautions are needed to enter a space which has been flooded with a nontoxic material such as nitrogen or carbon dioxide.

True - or - False

25. Supplied air respirators are safe to use in an atmosphere which contains a material which is toxic by skin contact if a whole body encapsulation suit is also used.

True - or - False

26. A material which has a low boiling point is likely to:

    a. evaporate quickly
    b. evaporate slowly
    c. be a solid at room temperature
    d. sublimate

27. Mixing of which of the following materials (at room temperature and pressure) is likely to produce a violent reaction?

	(Check One)	
a. H_2O + CO_2	___ violent	___ non-violent
b. Fe + H_2O	___ violent	___ non-violent
c. K + H_2O	___ violent	___ non-violent
d. sodium + H_2O	___ violent	___ non-violent
e. H_2SO_4 + NaOH	___ violent	___ non-violent
f. Kerosene + Chlorine	___ violent	___ non-violent
g. Silicon + Carbon	___ violent	___ non-violent
h. Helium + Hydrogen	___ violent	___ non-violent
i. Peroxides + Organic Solvents	___ violent	___ non-violent
j. KOH + HCL	___ violent	___ non-violent

28. Match the formulas with the names:

a. Carbon Dioxide	A. $LiAlH_4$
b. Nitrogen Trioxide	B. SO_2
c. Hydrogen Sulfide	C. NaCl
d. Sulfur Dioxide	D. PCl_3
e. Potassium Permanganate	E. $KMnO_4$
f. Methane	F. HCN
g. Carbon Disulfide	G. CO_2
h. Carbon Monoxide	H. H_2S
i. Sodium Chloride	I. NO_3
j. Phosphorus Trichloride	J. CH_4
k. Lithium Aluminum Hydride	K. CO
l. Hydrogen Cyanide	L. CS_2
m. Sulfuric Acid	M. H_2SO_4
n. Nitric Acid	N. HNO_3

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29. A material which has a specific gravity greater than one, will (pick one) ___ Float or ___ Sink in water?

30. A "chlorinated solvent" is probably flammable, but is not likely to be toxic.

True - or - False

31. A material with a low vapor pressure is likely to have a high boiling point.

True - or - False

32. The noble gases form unstable electron configurations and therefore are highly reactive.

True - or - False

33. Fluorine is the <u>least</u> reactive element.

True - or - False

34. A combustible gas indicator gives accurate readings in an oxygen deficient atmosphere.

True - or - F false

35. Consider the following hypothetical situation: You enter a room where there is a leak of hydrogen gas and test the air with a combustible gas indicator (CGI). The instrument reading goes rapidly from zero to 100% LEL. Then the reading declines back to zero. Choose the statement which is most accurate:

a. The concentration of H_2 is probably below the LEL.
b. The concentration of H_2 is probably between the LEL and the UEL.
c. The concentration of H_2 is probably above the UEL.
d. The CGI is probably defective.

36. Use of an air purifying respirator fitted with organic vapor cartridges in conjunction with use of a whole body encapsulation suit would provide adequate protection in a small, closed room where five gallons of phenol was spilled.

True - or - False

29. A material which has a specific gravity greater than one, will (pick one) ___ Float or ___ Sink in water?

30. A "chlorinated solvent" is probably flammable, but is not likely to be toxic.

True - or - False

31. A material with a low vapor pressure is likely to have a high boiling point.

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d. The CGI is probably defective.

36. Use of an air purifying respirator fitted with organic vapor cartridges in conjunction with use of a whole body encapsulation suit would provide adequate protection in a small, closed room where five gallons of phenol was spilled.

True - or - False

37. Which of the following gases would be a good choice to use in "inerting" an old flammable liquid storage tank?

a. H_2
b. H_2S
c. CO
d. O_2
e. N_2

38. A chemical <u>compound</u> is made up of two or more elements.

True - or - False

39. The smallest subdivision of a compound which still retains the chemical identity of the compound is:

a. molecule
b. chemical lattice
c. Pi Meson
d. Element

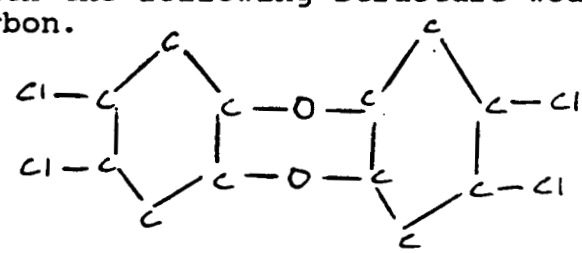
40. If a proton is added or subtracted to the nucleus of an atom, the atom becomes a different element.

True - or - False

41. A hydrocarbon compound with the following structure would be a(n) <u>(A or B)</u> hydrocarbon.

a. Aliphatic

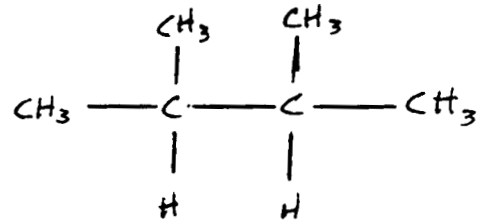
b. Aromatic



42. A hydrocarbon compound with the following structure would be a(n) <u>(A or B)</u> hydrocarbon.

a. Aliphatic

b. Aromatic



3/27/89-splquiz1

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_____
(Name)

QUIZ

Chemical Spill Response Team Training
December 5, 1989

1. A number which represents the "combining capacity" of one element with another is called:

   a. atomic number
   b. molecular weight
   c. angstrom unit
   d. valence

2. Elements which are strong oxidizers tend to have negative valence numbers.

   True - or - False

3. The group of alkali metals described in the periodic table of the elements all have a valence of +3.

   True - or - False

4. If all alkali metals have the same positive valence number, that must mean that they are all reducing agents.

   True - or - False

5. The combined valences of the various elements in an uncharged polyatomic molecule must equal:

   a. 1
   b. the atomic number of the lightest element
   c. zero

6. Yttrium is an element with an atomic number of 39, an average molecular weight of 88.9, and a valence of +3. Fluorine has a valence of -1. By balancing the valence numbers of yttrium and fluorine it can be determined that __(choose one from the list)__ is a possible compound of yttrium and fluorine.

   a. YF
   b. Y_2
   c. Y_3F
   d. YF_3

7. All elements have only one valence number. True - or - False

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8. The element radium has an atomic number of 88. Its valence is _____ .

9. The element radon has an atomic number of 86. Its valence is _____ .

10. The noble gases (Group VIII) have a valence of zero and are therefore highly reactive.

True - or - False

11. When sodium and fluorine react, fluorine accepts an electron, and sodium donates an electron, therefore:

a. fluorine acts as a reducing agent
b. sodium acts as an oxidizing agent
c. sodium is reduced
d. fluorine is oxidized
e. sodium acts as a reducing agent

12. There is a compound called helium cyanide. True - or - False

13. An oxidizing agent is an electron acceptor. True - or - False

14. A reducing agent is an electron donor. True - or - False

15. All "redox" reactions are very hazardous. True - or - False

16 An ion is an element or a combination of elements which has discharged a proton and has thus acquired an electrical charge.

True - or - False

17. The concepts of "valence" and "combining capacity" are related to the tendency of atoms to achieve a stable electron configuration by completely filling the outermost electron "shell."

Utilize Table 3-6 below and answer the following questions:

TABLE 3-6 VALENCES OF THE COMMON IONS

Valence of Positive One	Valence of Negative One
Ammonium, NH_4^+	Acetate, $C_2H_3O_2^-$
Cuprous, Cu^+	Bicarbonate, HCO_3^-
Hydrogen, H^+	Bisulfate, HSO_4^-
Lithium, Li^+	Bisulfite, HSO_3^-
Potassium, K^+	Bromide, Br^-
Silver, Ag^+	Chlorate, ClO_3^-
Sodium, Na^+	Chloride, Cl^-
	Chlorite, ClO_2^-
Valence of Positive Two	Cyanide, CN^-
Barium, Ba^{2+}	Fluoride, F^-
Cadmium, Cd^{2+}	Hydride, H^-
Calcium, Ca^{2+}	Hydroxide, OH^-
Chromous, Cr^{2+}	Hypochlorite, ClO^-
Cobalt, Co^{2+}	Iodide, I^-
Cupric, Cu^{2+}	Nitrate, NO_3^-
Ferrous, Fe^{2+}	Nitrite, NO_2^-
Lead, Pb^{2+}	Perchlorate, ClO_4^-
Magnesium, Mg^{2+}	Permanganate, MnO_4^-
Manganese, Mn^{2+}	
Mercuric, Hg^{2+}	Valence of Negative Two
Mercurous, Hg_2^{2+}	Carbonate, CO_3^{2-}
Stannous, Sn^{2+}	Chromate, CrO_4^{2-}
Zinc, Zn^{2+}	Dichromate, $Cr_2O_7^{2-}$
	Oxalate, $C_2O_4^{2-}$
Valence of Positive Three	Oxide, O^{2-}
Aluminum, Al^{3+}	Peroxide, O_2^{2-}
Antimony, Sb^{3+}	Sulfate, SO_4^{2-}
Chromic, Cr^{3+}	Sulfide, S^{2-}
Ferric, Fe^{3+}	Sulfite, SO_3^{2-}
	Thiosulfate, $S_2O_3^{2-}$
Valence of Positive Four	
Stannic, Sn^{4+}	Valence of Negative Three
Zirconium, Zr^{4+}	Nitride, N^{3-}
	Phosphate, PO_4^{3-}
	Phosphide, P^{3-}
	Phosphite, PO_3^{3-}

18. Ferrous manganese is a common compound. True - or - False

19. The chromate ion can act as a reducing agent. True - or - False

20. A compound with the formula $SnCr_2O_8$ $[Sn(CrO_4)_2]$ is possible.
True - or - False

21. The "per" in the names permanganate, perchlorate, and peroxide is a sign that such materials are likely to be strong reducing agents.
True - or - False

22. Which of the following compounds cannot exist:

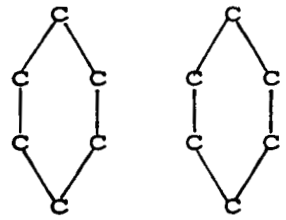
a. $NaCO_3$
b. HgC_2O4
c. $Al(HCO_3)_3$
d. ZrOH
e. $Zr(OH)_4$
f. Calcium Oxalate

23. It is the unique property of the element _____ to combine with itself and other nonmetals which allows the tremendous variety of organic compounds.

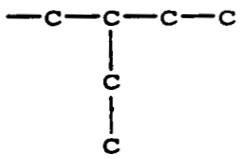
a. Nitrogen
b. Oxygen
c. Carbon
d. Hydrogen

24. Match the correct description with the diagram of the general form of two types of organic molecules:

a. Aliphatic — Form 1



b. Aromatic — Form 2



25. Match the following:

Tetra	One
Hexa	Two
Di	Three
Mono	Four
Tri	Five
Penta	Six

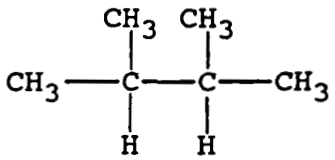
26. Two or more compounds having the same chemical formula but a different structural arrangement of their constituent atoms are said to be:

a. Polymers
b. Monomers
c. Tetramers
d. Isomers

27. Given: a. CH_3-C-C-CH_3 is butane

b. CH_3 is the alkyl substituent "methyl"

What should be the chemical name of the following compound?



The correct answer is:

a. 1,2, Trimethyl Butane
b. 3,6, Dibutyl Methane
c. 1,4, Triethyl Heptane
d. 2,3, Dimethyl Butane

28. A "saturated" hydrocarbon is one in which all the carbon to carbon bonds consist of a single pair of shared electrons (single bond).

True - or - False

29. The terms Ortho (O); Meta (M); and Para (P) refer to the relative positions of functional groups which may be attached at various positions around the periphery of the benzene ring.

True - or - False

30. Benzene, Toluene and Xylene are all aliphatic hydrocarbons.

True - or - False

31. Which of the following chemicals would probably be more hazardous to handle:

a. Methyl ethyl ketone
b. Methyl ethyl ketone peroxide

32. The presence of "sulfide" in the compound carbon disulfide causes the material to be chemically similar to the "chloride" in carbon tetra chloride. Therefore, carbon disulfide is probably a good fire extinguishing agent.

True - or - False

33. Simple compounds called polymers can be joined to form complex large molecules called monomers.

True - or - False

34. Chemicals which are commonly added to monomers in order to initiate the polymerization process are usually non-reactive reducing agents.

True - or - False

35. Some principal hazards associated with some common solid polymers are (pick all that apply):

a. toxic by way of skin contact
b. form shock-sensitive peroxides
c. burn readily
d. tend to degenerate into corrosive liquids
e. produce toxic smoke

36. Exposure of a monomer to heat, light or air might cause the following dangerous condition:

a. isomerization
b. rapid depolymerization
c. release of toxic vapor
d. explosive polymerization

37. By tightly confining an explosive, it is rendered less dangerous because the expanding gases are trapped before they can do any damage.

True - or - False

38. I would rather:

a. Hit a defused five-hundred-pound bomb as hard as I could with a 20-pound sledge hammer.

b. Drop a fuse or primer to the floor.

39. A common form of plant fertilizer is a main component of a powerful explosive.

True - or - False

40. A good way to neutralize a spill of kerosene is to pour solid ammonium nitrate onto the puddle.

True - or - False

41. Which of the following are chemicals which can present explosion hazards:

a. Calcium Dioxinate
b. Benzoyl Peroxide
c. Sodium Fluoride
d. Sodium Azide
e. Isopropyl Ether
f. Acetic Acid
g. Picric Acid
h. Trinitrotoluene
i. Mercuric Fulminate
j. Trinitroresorcinate
k. Paraquat
l. Methyl Ethyl Ketone peroxide
m. Hydrochloric Acid
n. Perchloric Acid
o. Nitrogen Cyanide
p. A ten-year-old can of Petroleum Ether
q. A ten-year-old can of Tetrahydrofuran

HAZARDOUS MATERIALS EMERGENCY INFORMATION

(Post by Laboratory Telephones)

Chemical Spills: The Environmental Health and Safety (EHS) Office provides a chemical spill response service. EHS personnel are properly equipped to assist lab workers in cleaning up small-scale chemical spills. Call the EHS office any time for an evaluation, information or spill cleanup assistance. In the event of significant spills which pose an imminent threat of fire/explosion or poisoning, or in those circumstances where an immediate evacuation seems advisable, lab personnel should: 1) sound the fire alarm to initiate an evacuation; 2) call the Fire Department; 3) call CSM Public Safety (Public Safety will notify the EHS Office).

ALL occupants must evacuate campus buildings whenever:

1. The fire alarm sounds.
2. An order to evacuate is given by the Fire Officer in charge, EHS Office personnel, Public Safety Officers, or the Department Head.

Exercise of Authority: If the Fire Department responds to an incident in a campus building, the Senior Fire Officer on the scene is in command. All School personnel shall take direction from the Senior Fire Officer. During such events, EHS personnel are the School's on-scene representatives and coordinate activities with fire authorities. If the Fire Department is not involved, EHS personnel are in charge and will coordinate with senior administrators in the building to resolve the problem.

CSM Public Safety Officers are invested with police powers and may exercise command authority during emergencies.

Chemical Exposure/Chronic Illness: Lab personnel should be familiar with the hazardous characteristics of chemicals in the lab. Call the EHS Office for information concerning flammability, toxicity, reactivity, etc., of chemicals and recommended safe handling procedures. If physical symptoms appear which may be related to chemical exposure, call the EHS Office for an evaluation.

Hazardous Waste: The School provides a centralized hazardous waste collection and disposal service. Call the EHS Office for information. All chemical waste generated in laboratories is presumed to be "Regulated Hazardous Waste" unless determined otherwise by EHS personnel or other knowledgeable person. DO NOT DUMP CHEMICALS DOWN THE DRAIN OR IN THE TRASH. Participation in the School's Hazardous Waste Program is mandatory for all campus personnel who generate chemical waste. Collection, transport or disposal of regulated waste by any other method is prohibited.

EMERGENCY PHONE NUMBERS

EHS Office	273-3316
CSM Public Safety Office	278-0757
	273-3333
Golden Fire Department	9-911
Golden Police Department	9-911
Ambulance	9-911
Rocky Mountain Poison Center	629-1123

COLORADO SCHOOL OF MINES
HAZARDOUS WASTE MANAGEMENT PROGRAM

EMERGENCY PROCEDURES AND CONTINGENCY PLAN

PREPAREDNESS AND PREVENTION PLAN

Revised: November 1998

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APPENDICES

Appendix 1: Description of the Hazardous Materials Management Facility

Appendix 2: Emergency Equipment Inventory

Appendix 3: Arrangements with Local Authorities

Appendix 4: Satellite Accumulation Locations

Appendix 5: Standard Operating Procedures

11/20/98-Reports/Plan2

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INTRODUCTION

Colorado Hazardous Waste Regulation 6 CCR 1007-3 requires generators of hazardous waste to prepare a Contingency Plan to minimize or eliminate the hazards of a hazardous waste release. The Colorado School of Mines is a generator of hazardous waste as defined in Parts 261 and 262 of the Waste Regulation. This document has been prepared in accordance with Part 264, Subpart D-Contingency Plan and Emergency Procedures, and part 264, Subpart C-Preparedness and Prevention.

This plan describes the procedures to be followed at the Hazardous Materials Management Facility in response to a hazard to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water.

The following topics are covered by this plan:

- Emergency Contact Information
- Spills and/or Leaking Containers
- Fires and/or Explosions
- Personal Injuries and Illnesses
- Releases to the Environment
- Responsibilities of the Emergency Coordinator
- Evacuation of Hazardous Waste Storage Locations
- Reportable Quantities

Part A: Emergency Coordinators

Contact	Phone Number	Home
Linn Havelick (Primary) EHS Env. Health Mgr.	Office: 273-3998 Pager: 851-3266 (Digit) Pager: 643-8328 (V/M)	[redacted]
Bob MacPherson (Alternate) Director, EHS	Office: 273-3573 Pager: 855-0759 (Digit) Pager: 790-5645 (V/M)	[redacted]

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Part B: Important Phone Numbers

HAZARDOUS MATERIALS EMERGENCY INFORMATION

Hazardous Materials Management Facility (HMMF) Emergency Coordinators

Environmental Health and Safety (EHS) Office — Phone: 303-273-3316
Colorado School of Mines (CSM), Chauvenet Hall, RM 194
Golden, CO 80401

	Contact Phone Number	Home
Linn Havelick (Primary) Environmental Health Manager	Office: 303-273-3998 Pager: 303-851-3266	[redacted]
Bob MacPherson (Alternate) Director, EHS	Office: 303-273-3573 Pager: 303-855-0759	[redacted]

EMERGENCY PHONE NUMBERS: EHS Office Phone = 303-273-3316

1.	Bob MacPherson, Director Environmental Health & Safety	Home: Pager:
2.	Linn Havelick Environmental Health Manager	Home: Pager:
3.	Dick Porter CSM Safety Officer	Home: Pager:
4.	John Elliott Chemical Hygiene Manager	Home: Pager:
5.	CSM Public Safety Office	911 or 303-273-3333
6.	Golden Fire Department	911 or 303-384-8092
7.	Golden Police Department	911 or 303-384-8045
8.	Ambulance	911 or 303-572-9111
9.	Jefferson County Sheriff	911 or 303-277-0211
10.	JEFFCO Hazardous Materials Specialist - Glenn Grove	303-277-0211 (24 Hours)
11.	JEFFCO Emergency Management Coordinator - James Ellis	303-271-8519 (Office Hours)
12.	JEFFCO Emergency Preparedness Office	303-271-8215 (Office Hours)
13.	Chair, JEFFCO Local Emergency Planning Committee - Tim Gablehouse	303-572-0050 (Office Hours)
14.	Chair, Clear Creek County Local Emergency Planning Committee - Garland Baker	303-679-2349 (Office Hours) 303-679-2393 (24 Hours)
15.	CDPHE Emergency Management Unit	303-692-3020 (Gen Info) = Bus. Hrs.
16.	CDPHE Radiation Control Division	303-692-3030 = Business Hours
17.	CDPHE Environmental Emergency Response Line (all CDPHE divisions)	303-756-4455 (24 hours)
18.	EPA Emergency Response Line	800-227-8914 or
19.	EPA Emergency Spill No.	303-293-1788 (24 hours)
20.	Rocky Mountain Poison Center	303-629-1123
21.	National Response Center	800-424-8802
22.	Chemical Transportation Emergency Center (CHEMTREC)	800-424-9300

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Part C: Spills and/or Leaking Containers

I. Definitions:

A. A spill is defined as an unexpected release of any material from a container. A spill may be divided into two categories:

1. less than or equal to one gallon, and

2. greater than one gallon.

B. A leak is a release of any material from a container via a puncture, corroded or weak spot in the container. Leaks are divided into two levels:

1. minor leaks resulting from a discharge of less than or equal to one gallon of material and,

2. major leaks, which result in the discharge of more than one gallon. Compressed gases may be considered as a major leak, depending on the nature, location, and any other environmental conditions or circumstances.

II. Response to a Spill or a Leak:

A. If a spill or leak is discovered at a hazardous waste storage location, immediately leave the area. Don personal protective equipment appropriate for the material spilled. Eye, hand and respiratory protection are mandatory. Other protective equipment may be used depending on the nature and severity of the spill. If the identity of the material spilled is unknown, wear the maximum personnel protective equipment available.

B. Spills or leaks less than or equal to one gallon may be cleaned up by employees as described below. If the spill is greater than one gallon, the spill must be reported to the Emergency Coordinator listed on Page 1 of this plan. The Emergency Coordinator will then notify the Golden Fire Department (if necessary), proceed to the spill area and assist in the spill clean-up.

C. A spill or leak which could threaten human health or the environment must be immediately reported to the Emergency Coordinator listed on Page 1 of this plan.

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D. Spill and leak control procedures:

1. Identify the spilled material, either by information on the container or through records of the container.

2. Check to make sure the proper personal protective equipment is being worn.

3. If the container is leaking, try to stop the leak by tilting the container away from the leak, plugging the leak, placing the leaking container into another container, or transferring the contents to another container (of compatible material).

4. Contain the spill by diking with an appropriate spill control material.

5. Cover the remainder of the spill with spill control material.

6. Follow any necessary instructions for the particular spill control material used, if any.

7. Make sure all the spill has been contained by the absorbent material. Collect all the absorbed material and place in an appropriate container (a one or five-gallon plastic pail with secure lid, a lined 55-gallon drum, etc.).

8. Thoroughly clean the spill area with an appropriate detergent or solvent. Be aware that these rinsates may be considered hazardous waste and must be disposed of accordingly.

9. Properly label and mark all containers used in the spill clean-up.

10. Clean, repair, and restore to working condition all emergency response equipment used.

Part D: Fires and/or Explosions

I. In the event of a fire or explosion, employees and students will evacuate the building.

II. Call the Golden Fire Department. Employees will evacuate the area to a safe distance.

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III. Employees will contact the EHS Director to check in, to make sure the fire department has been notified, and to inform the Emergency Coordinator.

IV. The Golden Fire Department Chief, or his designee, has complete authority as on-scene commander. The Emergency Coordinator and employees will assist and, if required, advise the fire chief on chemical hazards and provide any necessary information.

V. It is recommended that water not be used as a fire extinguishing agent unless absolutely necessary. Water may react violently with some types of hazardous wastes. Also, water will cause a greater clean-up problem and may convey hazardous materials into the environment. Rapid response by fire fighting personnel is necessary to identify and correct the cause of the initial fire situation and to prevent recurrence of any further fires.

VI. After the fire has been controlled, the area must be carefully checked for chemical hazards, cleaned and decontaminated.

VII. The Emergency Coordinator will immediately contact the National Response Center and the Local Emergency Planning Commission following procedures outlined in Part G.

Part E: Personal Injuries and/or Illness

I. If an injury occurs at a hazardous waste storage site, the employee(s) will render immediate aid to the victim. Such aid may be in the form of first aid, use of the eye wash/safety shower, removal of contaminated clothing, extinguishing of any flames, etc. If necessary, the Fire Department Ambulance will be called. In all cases of injury, the victim will be taken to a hospital for medical treatment.

   A. If an employee is working alone and is injured, the employee will activate the fire alarm, call the fire department or use the phone or hand-held radio to notify the Golden Fire Department Ambulance or CSM Public Safety Office.

II. The following information, if possible, should be sent with the victim to the hospital:

   A. Identify any hazardous properties of the waste involved.

   B. Estimated quantity involved in the incident.

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C. Extent of exposure.

D. Time and location of incident.

III. The Emergency Coordinator must be called, either by the hospital staff or an employee, to provide the hospital staff with information concerning the chemicals involved and their hazards.

IV. The Emergency Coordinator is required to perform a complete inspection of the waste storage facility to assure that the accident resulting in personal injury has not created a situation which could result in further harm to human health and/or the environment. Any such situation must be immediately resolved.

V. If an employee becomes ill as a result of acute or chronic exposure to hazardous waste, he/she must be removed from the job for the duration of the illness.

Part F: Releases to the Environment

I. Whenever there is a release of hazardous waste to the environment (i.e., outside of a hazardous waste storage location), an immediate response is necessary.

II. Response to release of liquid or solid hazardous wastes:

A. The Emergency Coordinator must be called immediately. The Emergency Coordinator will then contact the Golden Fire Department.

B. Don appropriate personal protective equipment necessary for the hazardous material. Use maximum personal protective equipment if chemical identity is unknown.

C. Release must be contained by diking or trenching, depending on the size and nature of the spill.

D. If release is not completely absorbed by soil, add more soil or absorbent material to complete absorption.

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E. Remove contaminated soil or other absorbent material and place in suitable containers, a lined, protected area, or other lined containers (e.g., barrels, dump truck, etc.).

F. Depending on the size and nature of the release, samples may need to be taken and analyzed to verify clean-up of the released chemical.

G. In the event of a release which meets the reporting criteria enumerated in CERCLA or EPCRA, the Emergency Coordinator will immediately contact the National Response Center, the State Emergency Planning Commission and the Local Emergency Planning Committee following procedures outlined in Part G.

III. Response to release of gas, vapors, fumes or mists of hazardous wastes:

A. The Emergency Coordinator must be called immediately. The Emergency Coordinator will then contact the Golden Fire Department.

B. The area must be evacuated or personnel must be wearing the maximum personal protective equipment.

C. Environmental conditions, such as wind direction, temperature, etc., should be noted.

D. Depending on the size, nature, and direction of the release, evacuation of the surrounding areas may need to be considered. The Emergency Coordinator will assist, and if requested, advise the Golden Fire Chief on the chemical hazards of the release and whether evacuation is necessary.

E. In the event of a release which meets the reporting criteria enumerated in CERCLA or EPCRA, the Emergency Coordinator will immediately contact the National Response Center, the State Emergency Planning Commission and the Local Emergency Planning Committee following procedures outlined in Part G.

Part G: Responsibilities of the Emergency Coordinator

I. The Emergency Coordinator is defined throughout this plan as the primary emergency coordinator or, if the primary emergency coordinator is not available, the alternate emergency coordinator listed on Page 1.

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II. The Emergency Coordinator is responsible for organizing any emergency response measures necessary during an imminent or actual emergency situation. The Emergency Coordinator must be familiar with the operation of hazardous waste storage facilities, the design and safety features of the buildings, the activities of hazardous waste handling, the location and characteristics of the waste handled, where all the records for the building are maintained, and all aspects of this plan.

III. The Emergency Coordinator has the authority to commit any resources available at the Colorado School of Mines that are necessary to carry out this plan.

IV. Response actions of the Emergency Coordinator:

A. During an imminent or actual emergency situation:

1. Ensure that personnel working in the vicinity of hazardous materials storage locations are notified of the situation. This may be accomplished by the automatic building alarms, by the hand-held radios or actual on-site communication.

2. Notify all local and State agencies involved in response activities for the Hazardous Materials Management Facility as appropriate. Contacts may include:

a) Golden Fire Department
b) Golden Police Department
c) Local Emergency Planning Committee
d) State Emergency Planning Commission
e) National Response Center

B. Whenever there is a release, fire, or explosion, the Emergency Coordinator must immediately (in addition to the above requirements) identify the character, exact source, amount, and real extent of any released materials. He may do this by observation, review of hazardous waste records, or, if necessary, by chemical analysis. The Emergency Coordinator must also assess any possible hazards to human health or the environment that may result from the release, fire, or explosion.

C. If a hazardous waste storage location has a release, fire, or explosion which could threaten human health or the environment, he must (in addition to the above requirements) report his findings as follows:

1. If the above assessment indicates that evacuation of local areas may be necessary, he must immediately notify the Fire Department Chief or his designee. He must be available to help the Fire Department Chief or his designee decide whether local areas should be evacuated.

2. The Emergency Coordinator must immediately notify the National Response Center and report the following:

   a) Name:_____
   and
   telephone number:_____

   b) Name of facility:_____
   and
   address:_____

   c) Time of incident:_____
   and
   type:_____

   d) Name of material:_____
   _____
   and quantity:_____

   e) The extent of injuries, if any:_____
   _____
   _____
   _____
   _____
   _____
   _____
   _____

   f) The possible hazards to human health or the environment, outside of the facility:
   _____
   _____
   _____
   _____
   _____
   _____
   _____

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D. During any emergency, the Emergency Coordinator must take all reasonable measures to ensure that fires, explosions, and releases do not occur, recur, or spread to other hazardous wastes at the facility.

E. After any emergency, the Emergency Coordinator must:

1. Provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion at the facility;

2. Not treat, store, or dispose of any waste (other than the release materials) in the affected areas until the clean-up procedures are completed;

3. Ensure that any emergency equipment used be cleaned and fit for its intended use; and

4. Notify the following agencies as appropriate:

   a) EPA Regional Administrator

   b) Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division

   c) Golden Fire Department

   d) Local Emergency Planning Committee

   e) State Emergency Planning Commission

F. Within 15 days after a significant incident requiring the implementation of this plan, the Emergency Coordinator must submit a written report on the incident to the:

Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South
Denver, CO 80222

The report must include the following:

1. Name, address, and telephone number of the facility.

2. Date, time and type of incident.

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3. Name and quantity of material(s) involved.

4. The extent of injuries, if any.

5. An assessment of actual or potential hazards to human health or the environment, where this is applicable.

6. Estimated quantity and disposition of recovered material that resulted from the incident.

Part H: Evacuation of Hazardous Materials Management Facility

I. Evacuation Procedures.

If, for any reason, the Hazardous Materials Management Facility must be evacuated, personnel will follow these procedures:

A. Notification to evacuate will be by one of the following methods:

1. Verbal communication by an employee.

2. Communication by hand-held radio or by phone.

3. Building alarm, either automatic or manually activated.

B. Evacuation within the facility will be through the nearest available exit, taking into account the emergency situation and any possible hazards it may present when exiting.

C. When outside, check to make sure all other employees and students have evacuated the area (if possible). Do not reenter the facility to assist someone unless you are wearing the proper personal protective equipment and the emergency situation will allow you to do so.

II. Evacuation of the area surrounding the affected location will depend on a variety of factors, the main two being:

A. The severity of the emergency situation, and

B. The wind direction.

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If evacuation of the area immediately surrounding the Hazardous Materials Management Facility is deemed necessary, employees will be notified by the Emergency Coordinator, Golden Fire Department and/or Golden Police personnel.

Appropriate emergency responders will personally check buildings in the area surrounding the hazardous waste storage locations to verify complete evacuation.

Evacuation routes will follow those listed in Appendix 1.

III. Large-scale evacuation of the general population.

If evacuation of any area is deemed necessary, the Golden Fire Department will so order and/or notify other jurisdictions of the potential hazard. Any evacuees should be directed to temporary shelter in an area deemed safe. Local authorities should check the location of the emergency to ensure that evacuation is complete, provide necessary security and prevent unauthorized entry into the area.

Part I: Reportable Quantities

I. CERCLA Reportable Quantities:

If any hazardous substance listed in CFR Part 302.4 is released outside a hazardous waste storage location in amounts equal to or greater than the listed final reportable quantity (RQ), the National Response Center, the State Emergency Planning Commission and the Local Emergency Planning Committee must be immediately notified.

II. SARA, Title III Reportable Quantities:

If any extremely hazardous substance listed in 40 CFR Part 355, Appendix 1, is released outside a hazardous waste storage location in amounts equal to or greater than the listed reportable quantity, the State Emergency Planning Commission and the Local Emergency Planning Committee must be immediately notified.

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APPENDIX 1: Descriptions of Hazardous Waste

Storage Locations and Evacuation Routes

I. The EPA hazardous waste generator number for the campus is COD-982597320.

Hazardous Materials Management Facility (HMMF) — Appendix 1 Items 1, 2 and 3 depict the location and schematic design of the facility.

A. Construction: The HMMF is constructed of steel. Interiors are coated with chemical resistant epoxy paint. Partitions between compartments in the Model 22 are of 1-hour fire resistive construction. Partitions in the Model 15 are of 2-hour fire resistive construction.

B. Chemical Segregation: Conforms with the plan detailed in Appendix 1 Item 3.

C. HVAC: Both buildings are equipped with explosion proof electrical heaters and ventilation fans. Heat is thermostatically controlled.

D. Lights/Electrical: Both buildings are equipped with explosion proof lights and electrical distribution systems.

E. Fire Suppression: Both buildings are equipped with dry sprinkler systems. 2-1/2" fire department connections are located at the north end of both buildings. One 160 degree fusible link-sprinkler head is located in each compartment. An automatic, general-purpose dry chemical extinguishing system is provided for each building. The system can be activated in three ways:

1. Fusible link on a spring-loaded cable in each compartment.

2. Rate of rise heat detector in each compartment.

3. Manual activation station on each building.

F. Spill Control: Spill control sumps are located beneath floor grates in each department.

G. Alarms: Each building is equipped with a local alarm system. Alarms are activated automatically by the release of the dry chemical extinguishing

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agent or manually, by the activation of pull stations provided on each building.

H. Emergency Response Equipment: Types and locations are as indicated in Appendix 3.

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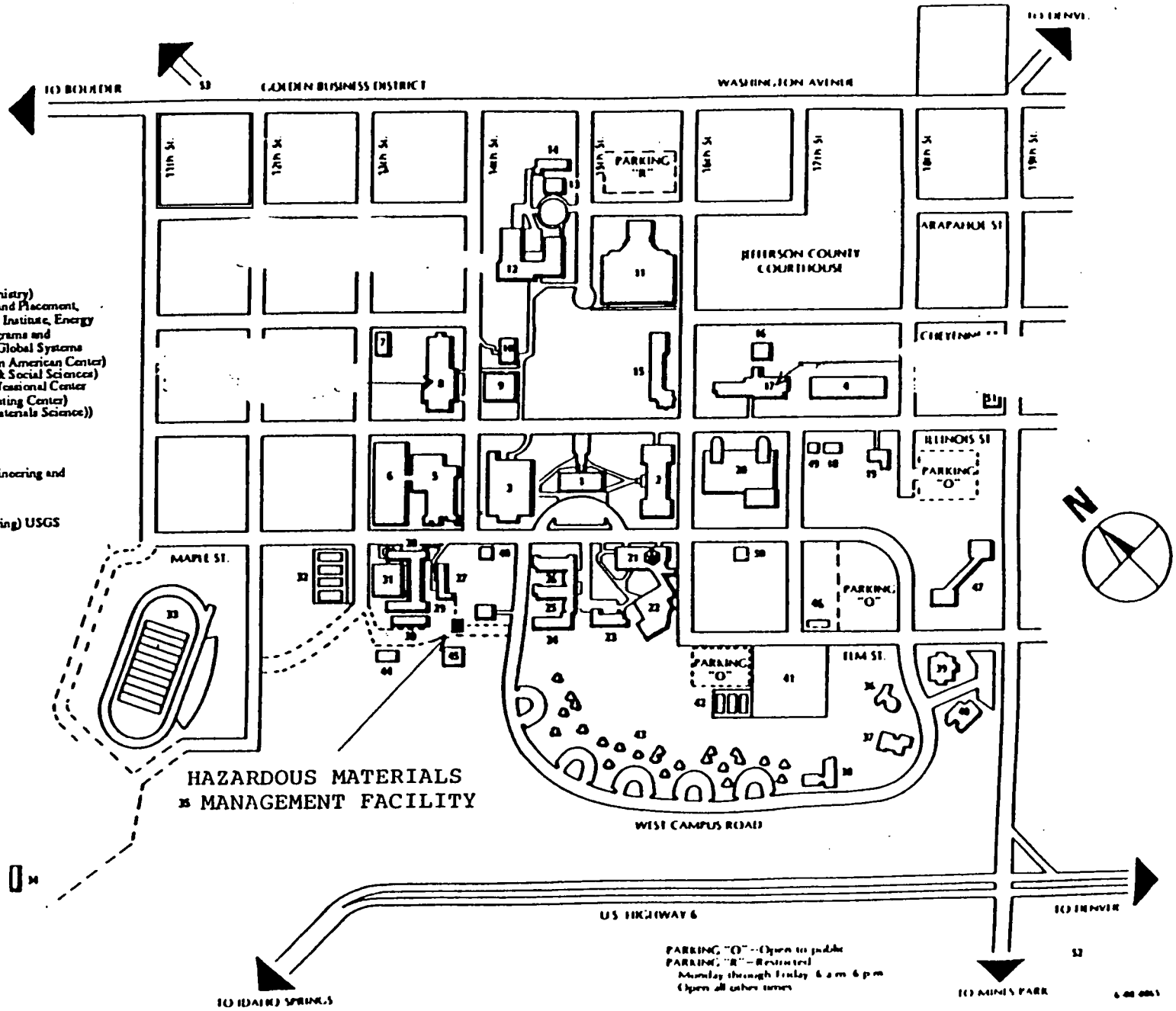
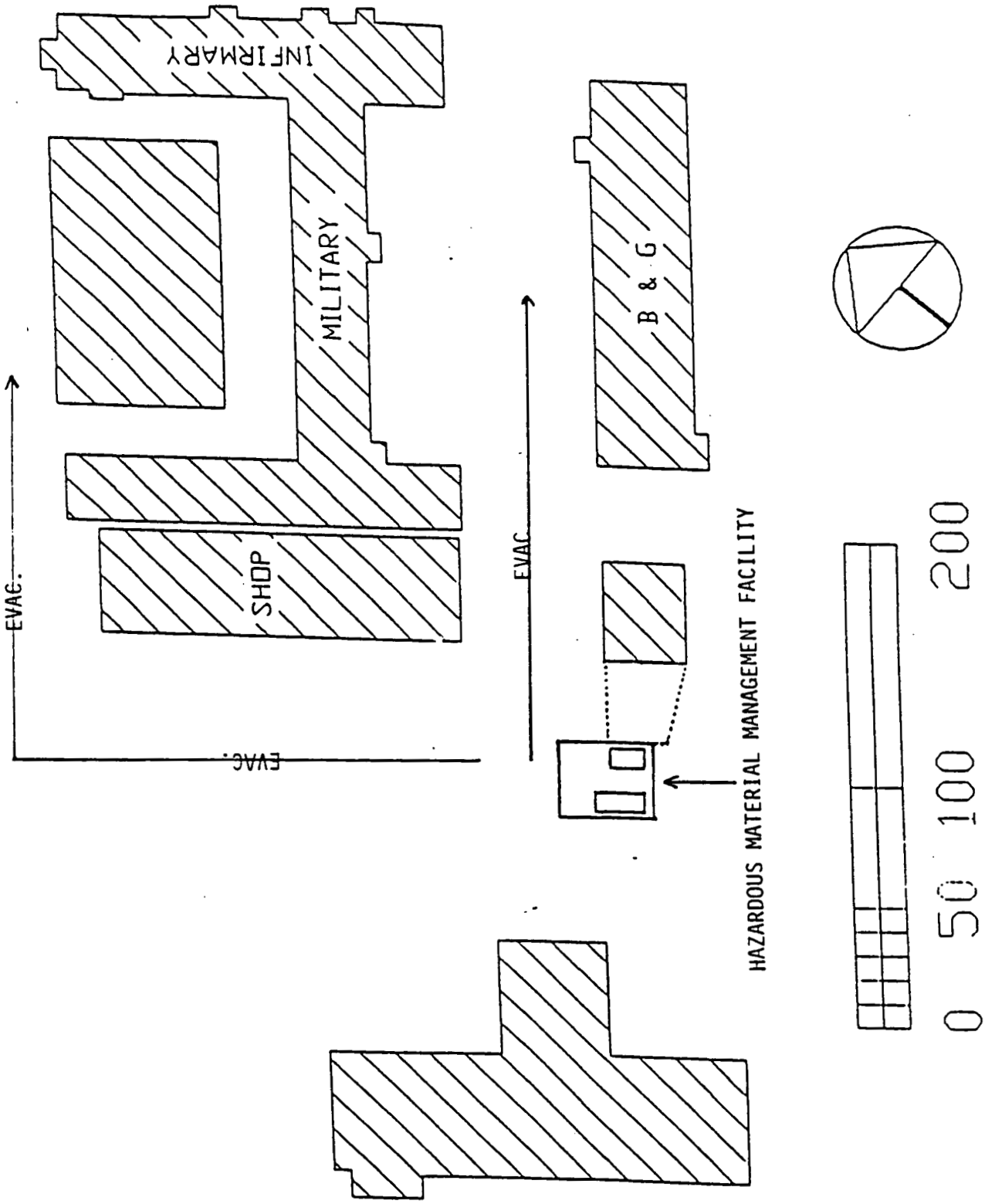
CAMPUS GUIDE

COLORADO SCHOOL OF MINES

KEY TO FACILITIES

1. Guggenheim Hall (Administration)
2. Berthoud Hall (Geology, Museum)
3. Arthur Lakes Library
4. U.S.G.S. Offices and Laboratories
5. Russell H. Volk Gymnasium
6. Steinhauer Field House
7. Power Plant
8. Coolbaugh Hall (Chemistry and Geochemistry)
9. Chauvenet Hall (Cooperative Education and Placement, Environmental Science, Earth Mechanics Institute, Energy and Minerals Field Institute, Special Programs and Continuing Education, EPICS, Dept. of Global Systems and Cultures, International Students, Latin American Center)
10. Stratton Hall (Mathematics, Humanities & Social Sciences)
11. Cecil H. and Ida Green Graduate and Professional Center (Geophysics, Mineral Economics, Computing Center)
12. Nathaniel P. Hill Hall (Metallurgy and Materials Science))
13. Engineering Hall
14. Publications Center
15. Paul Meyer Hall (Physics)
16. Unit Operations Laboratory
17. Alderson Hall (Petroleum, Chemical Engineering and Petroleum Refining)
18. Alpha Tau Omega
19. President's Home
20. George R. Brown Hall (Mining, Engineering) USGS Soils Lab (1/1/87)
21. Ben H. Parker Student Center, Bookstore
22. Dining Hall
23. Randall Hall
24. Bradford Hall
25. Thomas Hall
26. Morgan Hall (Mathematics)
27. Plant Facilities
28. Plant Facilities
29. Military
30. Plant Facilities
31. Warehouse
32. Tennis Courts
33. Brooks Field
34. Hoisting Laboratory
35. Rocky Field
36. Sigma Nu
37. Kappa Sigma
38. Beta Theta Pi
39. Sigma Alpha Epsilon
40. Sigma Phi Epsilon
41. Nils A. Swenson Intramural Field
42. Tennis Courts
43. Prospector Village
44. Carpenter Shop
45. EMI Drilling Laboratory
46. Infirmary
47. Twin Towers Residence Hall (Admissions, CSM Alumni Assn., CSM Foundation, Inc.)
48. Student Development Center (Affirmative Action, Internal Auditor)
49. Alpha Tau Omega
50. Agape House
51. CSM Credit Union
52. Survey Field




INFIRMARY
MILITARY
SHOP
EVAC.
EVAC.
EVAC
B & G
HAZARDOUS MATERIAL MANAGEMENT FACILITY
0 50 100 200

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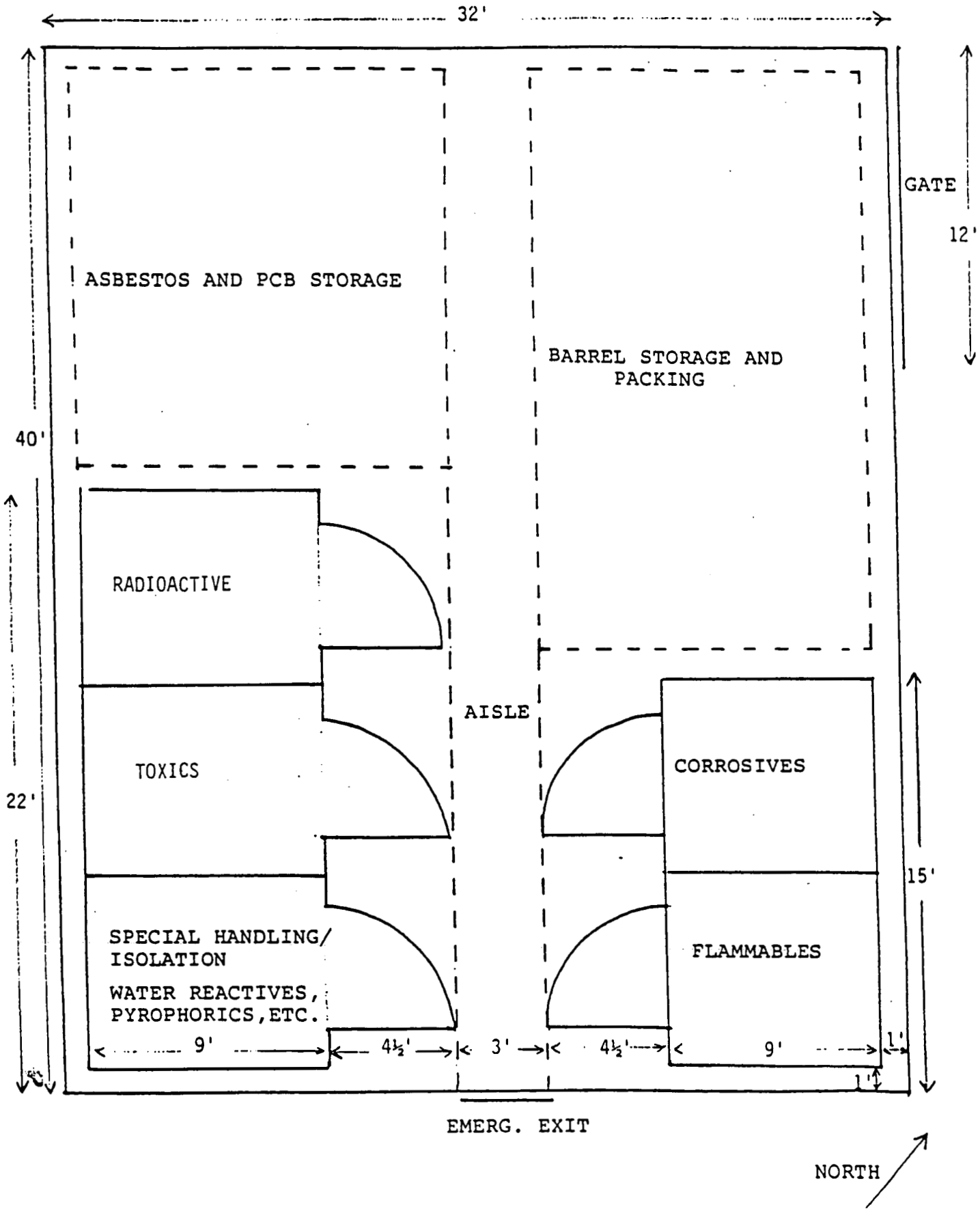
HAZARDOUS MATERIALS MANAGEMENT FACILITY



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EHS Closet Inventory

Shelf 1

- Smoke bottles
- slip plates
- in box:
  - Pb test kit
  - CO analyzer
  - smoke emitters
  - Hg test kit
  - matches
  - pH paper
  - stop watch
  - 2 Hg centigrate thermometers
  - Hg vapor detector
  - 1 little bottel of Hcl
- food coloring
- 2 "clip on" passive dosimeters
- small screw driver set
- small plastic empty containers
- black pastic air calibration bottles
- year planners
- spark resitant flashlight
- Camera

Shelf 2

- Yellow-green effervescent Dye tablets
- FWT red tablets
- STD blue tablets
- Universal sealer primer stain killer spray
- shaving cream
- 2-26 spray
- skin shield spray
- old air sampler in leather bag
- 1 geiger counter with wand
- 1 geiger counter without wand
- 2 air samplers
- calibration tubes for air samplers
- sensidyne air pump sampler
- tri-sense temp/humidity/air velocity recorder
- charger cords
- charger
- 1 battery pack

Shelf 3

- Hazardous waste identification stickers
- Hazardous waste tags
- container # tags
- emergency ph. # stickers
- packing list enclosed sticker pockets
- radio active material stickers
- request for chemical recycling and disposal sheets
- little hazardous waste stickers
- asbestos warning signs
- Radiation warning metal plaques

Shelf 4

- presentation papers
- chemmate papers
- pencils

Inventory of HMMF

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HMMF INVENTORY

Blue Desk #1

Middle Drawer
- Request Sheets
- Uniform Haz. Waste Manifest Forms
- 3 scissors
- pens
- pencils
- locks
- stamp
- stamp pad

Right Top Drawer
- Packing list enclosed stickers
- duck tape
- plastic ties

Right Bottom Drawer
- Nilfisk Vacuum bags
- Nilfisk Hg Vacuum attachment
- Survive Air tank pressure gauges

Left Top Drawer
- Haz. Waste Tags
- Container ID Tags

Left Middle Drawer
- Plastic boots
- matches

Left Bottom Drawer
- Drum liners
- zip lock bags

HMMF INVENTORY

Pink Filing Cabinet #2

Drawer#1
- Respirator cartridges

Drawer#2
- Respirators (New)
- Full Face Mask air purifying respirator

Drawer#3
- Nitrile gloves
- Heavy duty Nitrile gloves
- Rubber gloves
- Neoprene over rubber gloves
- leather gloves
- Silver Shield gloves
- Viton gloves

Drawer#4
- Haz. Mat. disposal bags
- 1 roll Non-Regulated waste stickers
- 1 box asbestos stickers
- screws
- bolts
- hooks
- plastic

HMMF INVENTORY

Yellow Filing Cabinet #3

Drawer #1
- Respirator wipe pads
- Cleaning cloths
- PPE spray n wipes
- WYPALL plus
- label maker

Drawer #2
- Large Stickers

Drawer #3
- flashlight
- goggles
- old water filter
- fog fixer

Drawer #4
- old tyvek and butyl suits

Drawer #5
- paper towels

HMMF INVENTORY

Orange Stainless Steel Drawers #4

Surface

Vice

Drawer #1

SOP's
Haz. Waste inventory
NIOSH Pocket Guide to chemical hazards

Drawer #2

Drawer #3

Flammable Solid Stickers
Flammable Liquid Stickers
Flammable Gas Stickers
Non-Flammable Stickers
Poisonous Stickers
Corrosive Stickers
Oxidizer Stickers

Cabinet #1

Skill saw
2 sanders
sawzall
Super sawzall
Ratchet Set
Bolt Cutters
Small Sledge hammer

HMMF INVENTORY

Buff Stainless Steel Drawers #5

Surface
- Grinder

Drawer #1
- PCB stickers
- Haz. waste stickers
- stickers

Drawer #2
- Stickers
- Placards

Drawer #3
- 1 roll nonflammable gas stickers
- Inhalation hazard Stickers
- Repair Putty

Cabinet #1
- large clamps
- crow bar
- framing hammer
- 3 hack saws
- large pipe wrenches
- Bin #1
  - Screwdriver
  - Wrenches
- Bin #2
  - Pliers
  - Files
- Bin #3
  - Chains
  - Hitches
  - Ratchets

HMMF INVENTORY

White Shelves #6

Top

4 1-gal bottles (2 boxes)

Shelf #1

Calcium Gluconate gel
lighter fuel
micro cover glasses
alconox
Solvent adsorbent

Shelf #2

4 1-gal bottles (3 boxes)
Qorpak bottles (1 box)
Navy radiac set
lids
yellow sample case

Shelf #3

battery charger
old gray sample case

HMMF INVENTORY

Green Shelves #7

Top

Face shield
electrical cord
old eye shower eye attachments

Shelf #1

test tube rack
plastic
light bulb
thermometers
grounding wires

Shelf #2

effervescent dye (non-haz)
toluene
clorox
van paint
1 roll caution tape
citrisolv plus
shin shield
500 ml pyrex
big glass funnel
assorted tools

Shelf #3

spill clean up kit bucket
1 bucket acid neutralizer
1 bucket silicate
3 buckets expanded silicate
Haz-Mat pigs
1 box Dry Neutralizer

VAN INVENTORY

Item	Stock Level	Container	Van Location
1 gal. small mouth plastic, new empty	1	box (4 ea.)	driver's side floor
1 gal. wide mouth glass, new empty	1	box (4 ea.)	driver's side floor
2.5 gal. jug, plastic, new empty	4		driver's side floor
5 gal. plastic bucket w/ lid	4		driver's side floor
Absorbant Pillows, expanded silicate	3		shelf 8
Acid Bucket	1		shelf 13
Acid Neutralizer	2	2.5 gal. plastic jug	rear floor
aprons, polyethylene disposable	1	box	shelf 2
Base Neutralizer	2	2.5 gal. plastic jug	rear floor
Batteries, Positive Pressure Full Face	2		shelf 9
Boots, Latex disposable	3	pair	shelf 5
Boots, Polyblend	2	pair	shelf 4
Boots, Polymax	2	pair	shelf 4
Broom, dustpan	1		shelf 5
Broom, Handheld	1		shelf 5
Bung Wrench	2		front floor in white cabinent
Calcium Gluconate (for HF Burns)	1	jar	BOX 2
Charkate Suit (Tyvek + PVC)	2		shelf 7
Container ID Tags (orange)	3	bunches	cab
Crowbar, large	1		shelf 5
Crowbar, small	1		shelf 5
Diposal Instructions	4	packages	BOX 1
Drum Thieves	3		passenger side back
Duct Tape	1		shelf 5
Duct Tape	1		shelf 11
Dust Masks	1	box	shelf 9
Dustpan	1		shelf 5

Ear Plugs	50	packages	BOX 1
Emergency Response Guidebook	1		shelf 3
Expanded Silicate	3	2.5 gal. plastic jug	rear floor
Extenstion Cord	1		front wall
Face Sheild	2		shelf 4
Face Sheild Lens (Replacement)	2		shelf 4
Filter Attachment for Pos. Press. Full Face Resp.	2		shelf 9
Fire Extinguisher,ABC Dry Chem. (RECHG: MAY)	1		front wall
Fire Extinguisher,Carbon Dioxide (RECHG: DECEMBER)	1		outside of shelf 3
Fire Extinguisher,Dry Chem. (RECHG: MARCH)	1		front wall
Fire Extinguisher,Water Pressure (RECHG: JULY)	1		front floor
first aid kit	1		shelf 3
Fit Test Ampules	4	boxes	BOX 1
Flashlights	4		shelf 5
Flashlights	2		shelf 3
Funnel, large	1		shelf 5
Funnel, medium	1		shelf 5
Funnel, small	1		shelf 5
Gas Tight Goggle Lens (Replacement)	1	pair	BOX 1
Gloves, light nitrile	1	box	shelf 11
Gloves, light nitrile	1	boxes	shelf 8
Gloves, light nitrile	1	box	cab
Gloves, Silver Sheild	2	rolls	shelf 8
gloves, vinyl latex disposable	1	box	shelf 2
Gloves, Viton	3	pair	BOX 6
Gloves,Butyl	4	pair	BOX 5
Gloves,Kevlar	3	pair	BOX 4
Gloves,Latex on Nitrile	5	pair	BOX 5
Gloves,Leather	2	pair	BOX 4
Gloves,Neoprene over Rubber	8	pair	BOX 3

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Gloves,Nitrile, Heavy Duty	5	pair	BOX 6
Gloves,PVA	2	pair	BOX 2
goggles, chem.	3		shelf 1
goggles, gas tight	3		shelf 1
Graphite Powder/Metal Fire	2	2.5 gal. plastic jug	rear floor
Hair Spray	1	can	shelf 5
Hand Cleaner (Waterless)	1	can	shelf 5
Hardhats	2		shelf 4
Hazardous Chemical Data Book (2nd ed.)	1		shelf 2
Hazardous Materials Pocket Guide	1		shelf 3
Hazardous Waste Bags, large	1	roll	shelf 8
Hazardous Waste Bags, medium	1	roll	shelf 8
Hazardous Waste Bags, small	1	roll	shelf 8
Hazardous Waste Tags (Flourescent Yellow)	1	bunch	cab
Hazardous Waste Tags, stick on (Yellow)	1	bunch	cab
HEPA Vacuum bags	7		shelf 8
HF Acid Neutralizer	2	2.5 gal. plastic jug	rear floor
Hydrocarbon Adsorbant	1	roll	passenger side back
Hydrocarbon Adsorbant	2	2.5 gal. plastic jug	rear floor
Hydrogen Peroxide	1	bottle	shelf 5
Level 'A' Suit	3		on side of shelves 4 and 5
Level 'B' Suit	1		on side of shelves 4 and 5
Measuring Cups	1	set	shelf 5
Mercury collector (with extra sponges)	1		shelf 8
Metal Chains	2		shelf 10
metal Hazardous Materials Caution tape	1	box	shelf 3
Paper towels	1	bundle	shelf 13
pH paper	3	boxes	BOX 1
Pigs/Drain Plugs	2		shelf 14
Polyethlene Compression Sprayer	1		passenger side back

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Repair Putty	7		shelf 7
Respiator, Positive Pressure Full Face	3		shelf 9
Respirator Cartridge, Mercury/Chlorine	2	sets	shelf 6
Respirator Cartridge,Ammonia,Methylamine	2	boxes (5 sets per ea.	shelf 6
Respirator Cartridge,Combination HEPA/Acid Gas	3	boxes (3 sets per ea.	shelf 6
Respirator Cartridge,Combination HEPA/Ammonia, Methylamine	2	boxes (3 sets per ea.	shelf 6
Respirator Cartridge,HEPA	2	boxes (5 sets per ea.	shelf 6
Respirator Cartridge,Organic Vapor Acid Gas	3	boxes (5 sets per ea.	shelf 6
Respirator Wipes	1	box	shelf 9
Respirator,Full Face	4		shelf 9
Respirator,Half Face	3		shelf 9
Sample Bottle, 1 quart glass	3		shelf 12
Sample Bottle, 500 CC Brown Glass	4		shelf 12
Sample Bottle, 60 mL glass	7		shelf 12
Saranex Suit	3		shelf 7
SCBA, Scott (CYL. T2513, REGUL. 58-20 0952) (AUG. '93)	1		front floor in white cabinent
SCBA, Scott (CYL. T77421, REGUL. 28-80 0117) (AUG. '93)	1		front floor in white cabinent
Scoop, metal	1		shelf 5
Shovel, plastic	1		shelf 5
Smoke Bottle	1		BOX 2
Smoke Emiters	1	box (10 ea.)	BOX 2
Smoke Sticks	7		shelf 7
tie boots, plastic disposable	1	box	shelf 2
tool kit,small	1		shelf 3
Toolbox (with tools)	1		driver's side floor
trash bags, 40 gal.	2	rolls	shelf 1
Tyvek Suit	5		shelf 7
Universal Adsorbant	1	roll	driver's side back floor
Vacuum Attachments			driver's side back floor
Washdown Tub and Mat	1		driver's side back floor

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Weight Belts	2		cab
Ziplock Freezer bags	1	box	shelf 1

APPENDIX 3

A contingency plan meeting was held on June 27, 1989 with the appropriate local emergency response authorities, as required in Hazardous Waste Regulations Part 265, Subparts C and D. The following agenda outlines the contents of the meeting:

Meeting Agenda

I. Introduction

II. Overview of the Colorado School of Mines Hazardous Waste Management Program

   A. Sources, collection and quantity of waste generated.

   B. Hazardous waste storage locations.

   C. Disposal of hazardous wastes.

III. Overview of chemical hazards at the hazardous waste storage locations.

   A. Flammable and combustible liquids.

   B. Corrosive materials — acids and caustics.

   C. Toxic materials.

   D. Radioactive materials.

   E. Miscellaneous materials:

      1) Gases
      2) Oxidizers
      3) Flammable solids

IV. Discussion of contingency plan.

Environmental Health and Safety
Colorado School of Mines
Golden, CO 80401-1887
303/273-3316

COLORADO SCHOOL OF MINES
GOLDEN, COLORADO 80401-1887

November 23, 1998

Dear Colleagues:

State and federal regulations require that the Colorado School of Mines arrange to familiarize local emergency responders with hazardous waste operations on the School campus. In accordance with these regulations, the School sponsors periodic tours of our hazardous waste management facilities. We have recently hired Linn Havelick as our new Environmental Health Manager and it seems like a good time to invite you once again to review our program, tour our facilities and meet Linn Havelick. Please call me at 303-273-3573 to make an appointment.

If you are unable to make a visit, the attached fact sheet will help to familiarize you with our hazardous waste management program.

Sincerely,

Robert A. MacPherson
Director, Environmental
Health and Safety

Attachment

11/23/98-Bob/CORSPN/Let139

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DISTRIBUTION LIST

CSM Department of Public Safety
Dennis Page, Acting Chief 303-273-3333
1500 Illinois Street
Golden, CO 80401

Golden Fire Department
Mark Wallace, Chief 303-384-8090
911 Tenth Street
Golden, CO 80401

Jefferson County Sheriff's Department - Hazardous Materials Specialist
Glen Grove 303-271-5696
200 Jefferson County Parkway
Golden, CO 80401

Golden Police
Russ Cook, Chief 303-384-8030
Al Reffel, Operations Manager 303-384-8032
Dispatch 303-384-8045
911 Tenth Street
Golden, CO 80401

American Medical Response
Dispatched by Golden 911 303-384-8900
2821 South Parker Road
Aurora, CO 80014
ph 303-614-8900

Lutheran Hospital
James Thompson, EMS Coordinator 303-425-2088
Emergency Department
8300 West 38th Avenue
Wheatridge, CO 80033

Jefferson County Emergency Management Department
Terry Green, Director 303-271-8215
100 Jefferson County Parkway
Golden, CO 80419

11/23/98-Bob/CORSPN/Let139A

Hazardous Materials Management Facility (HMMF) Emergency Coordinators

Environmental Health and Safety (EHS) Office
Colorado School of Mines (CSM), Chauvenet Hall, RM 194
Golden, CO 80401

Phone: 303-273-3316

Contact	Phone Number	Home
Linn Havelick (Primary) Environmental Health Manager	Office: 303-273-3998 Pager: 303-851-3266	[redacted]
Bob MacPherson (Alternate) Director, EHS	Office: 303-273-3573 Pager: 303-855-0759	[redacted]

EMERGENCY PHONE NUMBERS: EHS Office Phone = 303-273-3316

1.	Bob MacPherson, Director Environmental Health & Safety	Home: [redacted] Pager:
2.	Linn Havelick Environmental Health Manager	Home: Pager:
3.	Dick Porter CSM Safety Officer	Home: Pager:
4.	John Elliott Chemical Hygiene Manager	Home: Pager:
5.	CSM Public Safety Office	911 or 303-273-3333
6.	Golden Fire Department	911 or 303-384-8092
7.	Golden Police Department	911 or 303-384-8045
8.	Ambulance	911 or 303-572-9111
9.	Jefferson County Sheriff	911 or 303-277-0211
10.	JEFFCO Hazardous Materials Specialist - Glenn Grove	303-277-0211 (24 Hours)
11.	JEFFCO Emergency Management Coordinator - James Ellis	303-271-8519 (Office Hours)
12.	JEFFCO Emergency Preparedness Office	303-271-8215 (Office Hours)
13.	Chair, JEFFCO Local Emergency Planning Committee - Tim Gablehouse	303-572-0050 (Office Hours)
14.	Chair, Clear Creek County Local Emergency Planning Committee - Garland Baker	303-679-2349 (Office Hours) 303-679-2393 (24 Hours)
15.	CDPHE Emergency Management Unit	303-692-3020 (Gen Info) = Bus. Hrs.
16.	CDPHE Radiation Control Division	303-692-3030 = Business Hours
17.	CDPHE Environmental Emergency Response Line (all CDPHE divisions)	303-756-4455 (24 hours)
18.	EPA Emergency Response Line	800-227-8914 or
19.	EPA Emergency Spill No.	303-293-1788 (24 hours)
20.	Rocky Mountain Poison Center	303-629-1123
21.	National Response Center	800-424-8802
22.	Chemical Transportation Emergency Center (CHEMTREC)	800-424-9300

11/3/98-Gendocs/EmerNos

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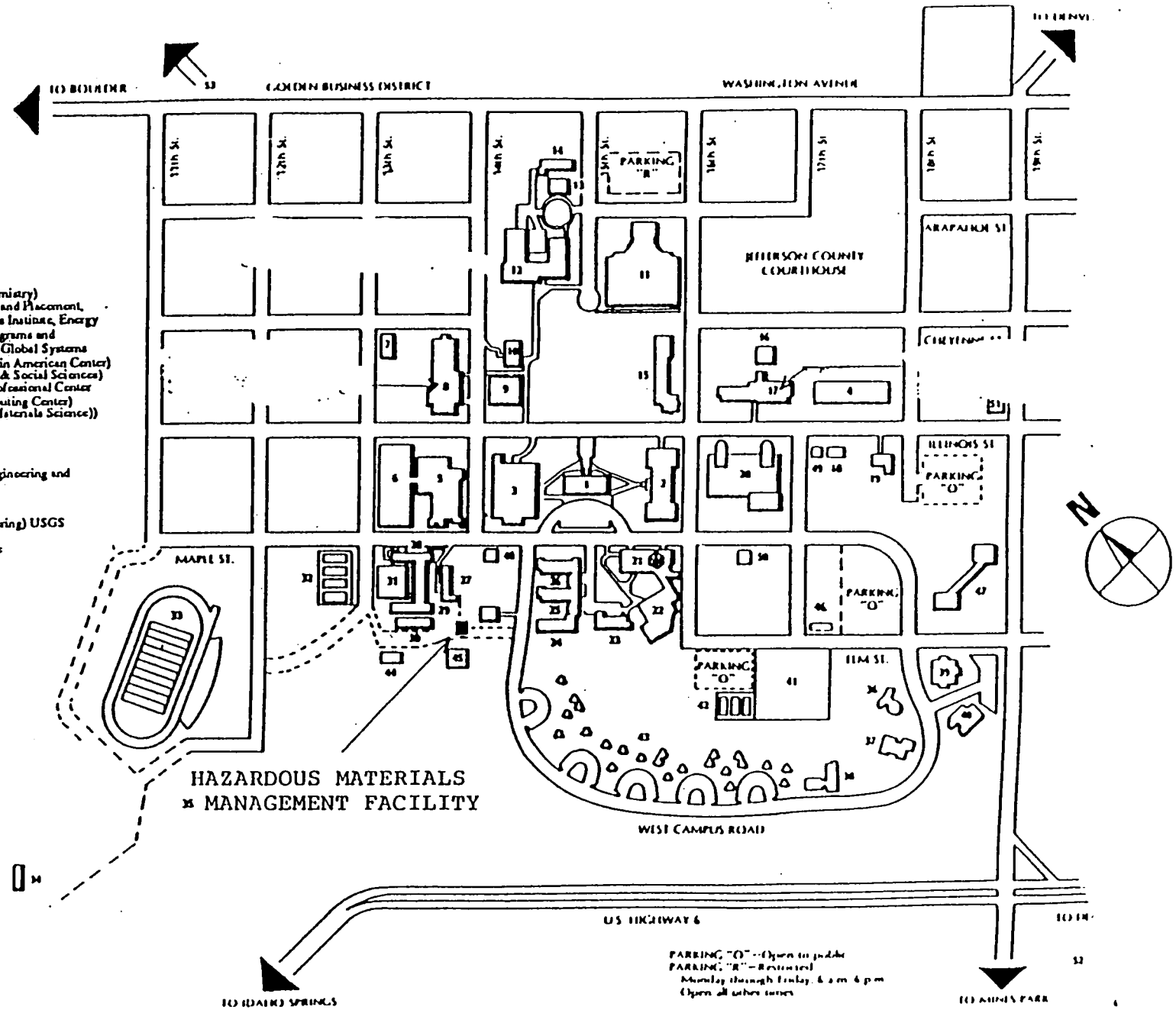
CAMPUS GUIDE

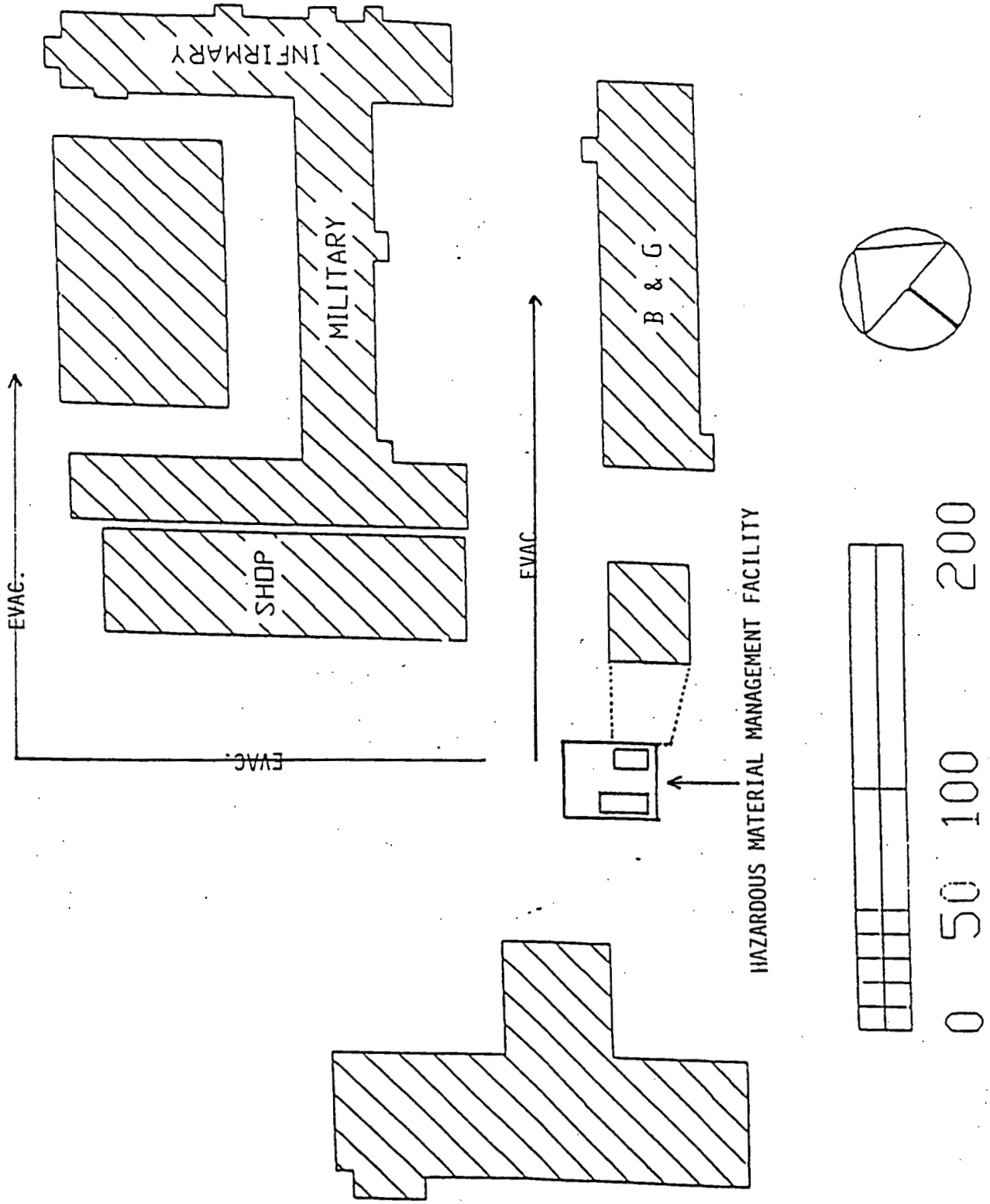
COLORADO SCHOOL OF MINES

KEY TO FACILITIES

1. Guggenheim Hall (Administration)
2. Berthoud Hall (Geology, Museum)
3. Arthur Lakes Library
4. U.S.G.S. Offices and Laboratories
5. Russell H. Volk Gymnasium
6. Steinhauer Field House
7. Power Plant
8. Coolbaugh Hall (Chemistry and Geochemistry)
9. Chauvenet Hall (Cooperative Education and Placement, Environmental Science, Earth Mechanics Institute, Energy and Minerals Field Institute, Special Programs and Continuing Education, EPICS, Dept. of Global Systems and Cultures, International Students, Latin American Center)
10. Stratton Hall (Mathematics, Humanities & Social Sciences)
11. Cecil H. and Ida Green Graduate and Professional Center (Geophysics, Mineral Economics, Computing Center)
12. Nathaniel P. Hill Hall (Metallurgy and Materials Science))
13. Engineering Hall
14. Publications Center
15. Paul Meyer Hall (Physics)
16. Unit Operations Laboratory
17. Alderson Hall (Petroleum, Chemical Engineering and Petroleum Refining)
18. Alpha Tau Omega
19. President's Home
20. George R. Brown Hall (Mining, Engineering) USGS Soils Lab (1/1/87)
21. Ben H. Parker Student Center, Bookstore
22. Dining Hall
23. Randall Hall
24. Bradford Hall
25. Thomas Hall
26. Morgan Hall (Mathematics)
27. Plant Facilities
28. Plant Facilities
29. Military
30. Plant Facilities
31. Warehouse
32. Tennis Courts
33. Brooks Field
34. Hoisting Laboratory
35. Rocky Field
36. Sigma Nu
37. Kappa Sigma
38. Beta Theta Pi
39. Sigma Alpha Epsilon
40. Sigma Phi Epsilon
41. Nils A. Swenson Intramural Field
42. Tennis Courts
43. Prospector Village
44. Carpenter Shop
45. EMI Drilling Laboratory
46. Infirmary
47. Twin Towers Residence Hall (Admissions, CSM Alumni Assn., CSM Foundation, Inc.)
48. Student Development Center (Affirmative Action, Internal Auditor)
49. Alpha Tau Omega
50. Agape House
51. CSM Credit Union
52. Survey Field



PARKING "O"—Open to public
PARKING "R"—Reserved
Monday through Friday, 6 a.m. 6 p.m.
Open all other times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HAZARDOUS MATERIAL MANAGEMENT FACILITY
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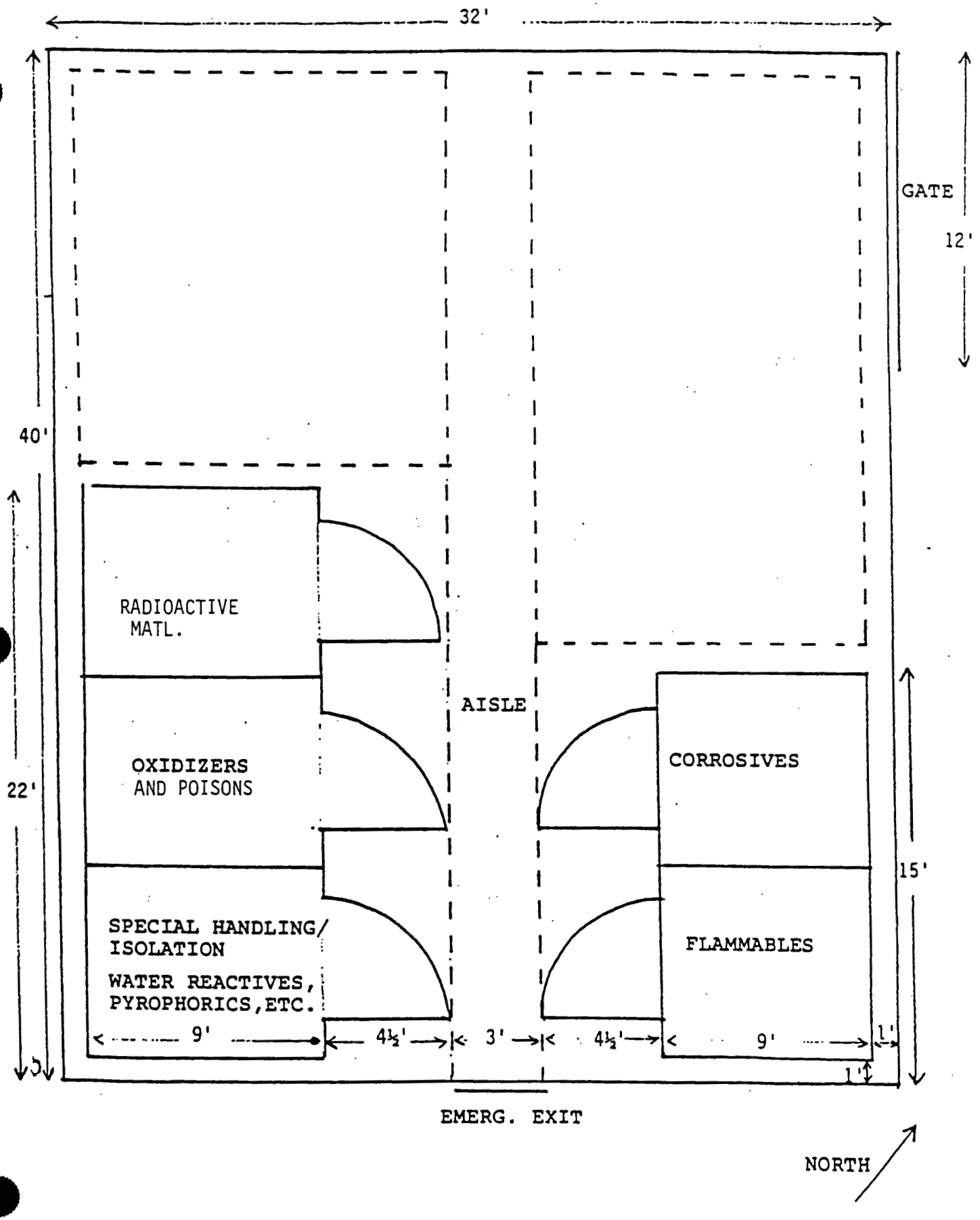
32'
GATE
12'
40'
RADIOACTIVE
MATL.
AISLE
OXIDIZERS
AND POISONS
CORROSIVES
22'
15'
SPECIAL HANDLING/
ISOLATION
WATER REACTIVES,
PYROPHORICS,ETC.
FLAMMABLES
9'
4½'
3'
4½'
9'
1'
1'
EMERG. EXIT
NORTH

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COLORADO SCHOOL OF MINES
HAZARDOUS WASTE MANAGEMENT PROGRAM FACT SHEET
(Revised: November 1998)

- Emergency contact information is provided on the attachment.

- The School's EPA identification number is COD 982597320.

- CSM operates a central waste management facility where waste is kept in segregated storage pending transportation to a permitted disposal facility. The facility has five storage compartments for the segregated storage of incompatible waste. Facility equipment includes: explosion proof lights, explosion proof electrical outlets, explosion proof heat and ventilation systems (ventilation is continuous), automatic dry chemical fire extinguishing system activated by 165°F fusible links, local alarm system, shower and eyewash, secondary containment sumps, explosion blow-out panels, electrical grounding connections, telephone, security fence and roof. The facility is located at 1318 Maple Street, Golden, CO 80401. See attached schematics.

- Campus laboratories and workshops function as "satellite accumulation locations" where hazardous waste is initially collected. Waste is transported from satellite accumulation locations to the central waste management facility by members of the CSM Environmental Health and Safety (EHS) office. A specially customized van is used to transport waste. The van is equipped with a variety of chemical spill cleanup gear.

- All persons who produce chemical waste in campus laboratories and workshops are required to attend waste generator training every year. EHS personnel who handle waste at the central waste management facility initially attend 40 hours of OSHA "HAZWOPER" training and annual refresher training. The Environmental Health Manager is a "Certified Industrial Hygienist." The Chemical Hygiene Manager is a "Certified Hazardous Materials Manager." All EHS staff members participate in a hazardous materials medical surveillance program.

- EHS staff members and volunteers from other campus organizations serve on a chemical spill response team. Team members attend monthly training sessions. Team members also receive initial and refresher "HAZWOPER" training and participate in a medical surveillance program. The team is well equipped to handle a wide variety of chemical release incidents. Equipment includes level "A" whole body encapsulation suits and self-contained breathing apparatus.

- CSM is a "Large Quantity Generator" of hazardous waste as defined in 40 CFR Part 262.34. CSM produces hazardous waste at a rate of about 10-20,000 kg per year. Ninety percent of this waste is composed of common organic liquids (alcohol) and corrosive aqueous solutions which contain various metals (similar to drain cleaner). The maximum quantity of RCRA hazardous waste on hand at any one time is about 100 gallons of organic liquid, one hundred gallons of corrosive metal solution and up to 100 pounds of various other materials. Hazardous waste which collects at the central waste management facility is shipped for disposal within 90 days of receipt. Radioactive material, laboratory reagents and a variety of compressed gases are also stored in the facility.

- Institutional plans related to hazardous materials management which are available for review include:

  - Hazardous Waste Management Policies and Procedures
  - Waste Minimization Plan
  - Emergency Response Plan
  - Hazardous Material Discharge Notification Guidelines
  - Emergency Procedures and Contingency Plan
  - Preparedness and Prevention Plan

APPENDIX 4

LOCATIONS FOR SATELLITE ACCUMULATION OF REGULATED WASTE ON THE CSM CAMPUS

1. Alderson Hall, 1613 Illinois Street
   Room Numbers: 184, 186, 190, 194, 191, 181, 133, 125, 279, 281, 282, 286, 288, 290, 294, 291, 291A, 287, 390, 394, 391, 383, 430, 468, 463, 481, 483, 487, 486, 490, 491, 494 and Unit Operations Annex.

2. Berthoud Hall, 1516 Illinois Street
   Room Numbers: 148, 147A, 147B, 147, 147D, 147E, 147C, 141, 142, 143, 109, 110, 111, 129, 140, 137, 201, 203, 204, 205, 206, 306, 301, 303, 303A, 401, 403, 404, 405, 406, 406A, 406B, 407.

3. Brown Building, 1610 Illinois Street
   Room Numbers: 104, 106, 109, 108, 110, 114, 120, 125, 134, 142, 149, 145, 154, 171, 292, 206, 204, 253, 255, 260, 332, 302A, 302B, 302, 303, 315, 316A, 329.

4. Chauvenet Hall, 1015 14th Street
   Room Numbers: 180, 182, 186, 178, 215B

5. Coolbaugh Hall, 1012 14th Street
   Room Numbers: 030, 029, 019, 166, 168, 142, 148, 149, 151, 122, 124, 128, 130, 132, 121, 134, 220, 220C, 228, 228C, 222, 236, 242, 235, 237, 260, 320, 322, 324, 327, 325, 323.

6. Green Center, 924 16th Street
   Room Numbers: B80, B78, B74, B68, B73, B83, B87, B53, B59.

7. Hill Hall, 920 15th Street
   Room Numbers: Under construction — to be determined.

8. Materials Science Building, 814 15th Street
   Room Numbers: B01, 150, 160, 175, 150BA.

9. Meyer Hall, 1523 Illinois Street
   Room Numbers: 147, 149, 155, 155A, 155B, 163, 175, 174, 170, 164, 140, 225, 235, 247, 257, 263, 275, 270, 264, 240, 220A, 370, 364, 416, 418, 414, 413, 420, 470, 475, 463, 466A, 464B, 444, 446, 440.

10. Student Health Center, 1225 17th Street

11. Student Center, 1600 Maple Street
    Oredigger Photo Processing Lab

12. Earth Mechanics Institute Lab, 1312 Maple Street

13. Plant Facilities, 1318 Maple Street
    Paint Shop, Grounds Shop, Welding Shop, Electrical Shop, General Maintenance Shop, Instrument Shop, Small Engine Repair Shop, Vehicle Maintenance Shop.

14. Steam Plant, 1001 13th Street
    Plumbing Shop, HVAC Shop.

15. Experimental Mine, Idaho Springs
    Maintenance Shop, Chemical Storage Building.

SPILL RESPONSE
STANDARD PROCEDURE - INITIAL

Injured Persons

Remove injured persons to safe area.
Administer first aid as required.
Call emergency medical help if necessary (9-911).

Evacuation Zone

Direct all non-essential personnel out of spill area.
Set up physical and/or human barriers to prevent entry.
Consider immediate chemical and physical hazards.
Assess potential hazards - vapors, fire, explosion.

Security

Call Public Safety when needed (3333).
Use officers for evacuation, security, and communication.

Area Stabilization

Stop or slow source of continuing spill.
Isolate and minimize spill area. Seal drains.
Remove incompatibles.
Shut off electrical power, gas service, water supply.

Backup Support

Summon other spill team members as needed (EHS office ext. 3316). Refer to plastic card in your wallet.
Notify Golden Fire Department and/or Jeffco Hazmat when necessary (9-911).

Evaluation

Determine relevant information about the spill:
- What material or materials are involved?
- What is size of spill - present and potential?
- Are there aggravating factors?
- Does person in charge need to be contacted?

Determine personnel needed for appropriate spill response.
Determine equipment and PPE requirements.
Consider ultimate disposal and decontamination factors.

SOP - Air and Water Reactive Materials

CAUTION: Spills of air and water reactive materials commonly involve fires. A conventional fire started by a small quantity of an air/water reactive material, if sufficiently advanced, may make it advisable to use conventional fire fighting techniques (water sprays etc.). While this may aggravate the reaction of the air/water reactive material, it may lessen the overall danger and damage. Spills of air/water reactives commonly produce very toxic and/or corrosive products. These may be in gaseous or liquid form. Hence it is critical to exclude non-essential personnel from the area (including the down-wind breathing zone). Extensive PPE may be needed to approach the spill. Characteristics of a/w reactives vary widely. Specific knowledge of the spilled material may permit lessening of the precautions contained in these procedures which were designed for any spill of this kind.

EQUIPMENT:

1. SCBA
2. Fully encapsulating (Level A) suit
3. Graphite powder
4. Plastic shovel and brush
5. Class D fire extinguisher
6. Dry sand or earth
7. Chemical resistive boots and gloves
8. Metal bucket or drum

ACTION:

All Spills:

1. Move injured personnel to a well ventilated area. Remove contaminated clothing and flush contacted skin with generous amounts of water.
2. Establish a generous exclusion zone with special attention to air flow and potential downwind exposure. Close windows and turn off the ventilation system.
3. If the quantity of spilled material is significant or if it is already on fire, activate a manual fire alarm to evacuate the building and have someone call 9-911 to advise the Fire Department that an air/water reactive material is involved. Have that person meet the responding fire crew to further advise them of the presence of this material.
4. Remove flammable materials from the vicinity of the spill.

Spills Without Fire:

1. The emphasis should be on stopping further spillage and removing spilled material to a safe location. Keep in mind that even though fire is not present, toxic, corrosive or flammable gases may be evolving from the spill due to reaction with the air or moisture in the air. Also, flames may erupt unexpectedly and you should be prepared to deal with them immediately if that occurs. Take care to avoid any potential source of ignition while collecting or moving spilled material. If cleanup is delayed, an inverted metal bucket or drum placed CAREFULLY over a small spill (so that no sparks are produced which might ignite flammable gases) may prevent additional fires being started by the spattering of burning materials if a reaction starts.

2, If removal of spilled material is impossible or is delayed, application of a smothering agent, including DRY: graphite powder (except for lithium), sand or earth, may be appropriate.

Spills With Fire:

1. Wearing SCBA (and Level A suit if appropriate) use a class D extinguisher to knock down flames taking care to not spread the burning material with the pressurized stream. After putting out the flames or if a Class D extinguisher is not available, smother the material with DRY: graphite powder (except for lithium fires), sand or earth. An inverted metal bucket or drum placed over a small spill may help prevent additional fires caused by spattering of reacting material. If the fire is unlikely to spread, it may be best to allow it to burn down without approaching.
2. If the burning material is a liquid or a gas, and it is possible to eliminate the source by closing a valve or otherwise isolating the fire from the fuel source, do so as quickly as possible.
3. Knock down smoke with a water spray ONLY if it can be done without the water contacting the spill.

REMOVAL:

Material that is not burning may be removed from the building in a metal bucket or drum that is partially filled with a DRY, non-flammable smothering agent such as sand or earth, with additional smothering agent covering the air/water reactive material. Remove to a safe area, such as (depending on weather) a parking lot and cover with plastic. It is suggested that some technique be employed to maximize the distance between the bucket and personnel removing it (such as suspending the bucket between to persons on a pole.

SOP - Halogenated organics

CAUTION: Severe inhalation hazard. Moderate contact hazard. Volatile organics may accumulate in confined spaces.

EQUIPMENT:

1. Full body suits (Kappler CPF III or equivalent)
2. Gloves (both inner and outer). Refer to glove chart in van for selection.
3. Rubber boots
4. Full-face respirators with combination gas cartridges for organics and particulates (yellow/purple in color)
5. Absorbant squares, rolled mats for pickup of organics (**white material** , not gray)
6. Container(s) for absorbed spill material - bags, 5 gallon pails, drums

ACTION:

All Spills

1. Tend to injured personnel. Move to fresh air. Remove contaminated clothing immediately and then flush affected body parts with water for at least 15 minutes. Seek medical attention.
2. Isolate area with hazardous material tape. Establish walkways and decon area as necessary. Don't spread the problem with your feet.
3. Contain spill as indicated by the situation. Plug floor and sink drains if necessary. Dike large liquid spill area with absorbant or soil. Do not put water on leak or spill area.
4. With flat scrapers and/or absorbant mats very carefully pick up as much spill material as possible. Transfer to clean dry containers. If spill is solid, sweep up and transfer to clean dry container.
5. Repeat Step 4 with additional absorbant mats and/or paper towels until absorption is complete. Transfer the used absorbants to waste containers.
6. Ventilate area until approved for occupancy.

Medium/Large Spills

1. Secure area. Evacuate area and limit access by the general public. Call Public Safety or Golden Police Department for additional assistance.
2. Stabilize the area. Ventilate, remove aggravating hazards, isolate incompatible materials, disconnect power, plug drains. Do not allow water to contact the spilled material.
3. Assemble needed equipment and personnel. Contact other spill team members through the EHS secretary, Public Safety or Golden P.D. Contact Golden F.D. or Jeffco Hazmat if required.
4. Organize stepwise response action. Assign tasks to spill team members, use outside support when necessary, set up decon zone.
5. Contain, absorb and pick up spilled halogenated organics, transferring to clean, dry containers. Repeat absorption with additional absorbant squares and/or paper towels until job is complete. Remove used absorbant for proper disposal.
6. Decontaminate all surfaces by wiping with absorbant material.
7. Remove portable equipment for decontamination at appropriate site.
8. Decontaminate team members and secure protective equipment for cleanup or disposal as indicated.
9. Inform coordinator when spill cleanup is finished. Ventilate area until approved for occupancy. Inform occupants when re-entry is authorized. Advise them of any equipment removed and of any remaining cautions.

11/19/98

SOP - Elemental Mercury Spill

CAUTION: This SOP applies to elemental mercury spills. For cleanup of mercury containing powders consult the Toxic Powders Spill SOP; for containing liquids consult the Corrosive Liquids SOPs. **Also, any source of heat near elemental mercury requires special protections against mercury vapor.**

EQUIPMENT: (Check HMMF and then van)

1. Mercury vacuum (located in the special handling compartment of the HMMF)
2. Mercury vacuum attachments (located in white 5- gallon bucket next to vacuum)
3. Mercury indicator powder (located in white 5- gallon bucket next to vacuum)
4. Tyvek suits (full bunny suits)
5. Gloves (both inner and outer, consult glove chart in van for proper glove selection)
6. Half-face respirators with mercury cartridges (olive drab in color)
7. Goggles or safety glasses
8. Plastic bags for debris

ACTION:

All Spills

1. Tend to injured personnel- move to well ventilated area, place personnel on poly or in decon unit, remove contaminated clothing immediately and bag in plastic bags. **(Do not flush with water.)** Follow up with medical evaluation.
2. Isolate area with hazardous material tape - establish walkways & decon area as necessary. **Don't spread the problem with your feet..**
3. **Plug all floor drains and sink drains.**
4. Vacuum all surfaces from the edge of the spill area toward the center of the spill. Periodically hold hose above vacuum and shake. Do not vacuum liquids with the mercury vacuum. If liquids are involved use the wet/dry mercury vacuum. (Located in the HMMF)
5. Clean all drains that might be contaminated. (Use wet/dry vac or empty by hand)
6. After all surfaces have been vacuumed and all visible mercury cleaned up sprinkle mercury indicator powder on floor and counter surfaces (light dusting). Leave area isolated over night.
7. Return next morning and check if indicator powder has discolored. If mercury indicator powder has not discolored vacuum up powder and release area.
8. If indicator powder has discolored repeat clean up steps 2 thru 5.

SPECIAL MEASURES:

If the mercury spill is in an area of hot surfaces the area needs to be isolated from all surrounding air space and ventilated directly to the outdoors. This can be accomplished with the confined space ventilator located in the carpentry shop.

SOP - Hydrofluoric Acid

CAUTION: Hydrofluoric Acid is extremely corrosive and exposure to it via contact or inhalation can cause devastating injury or death, and there may be no immediate pain to indicate that an exposure has occurred. Hydrofluoric Acid corrodes **most** materials to some degree (with the exception of lead, wax, **polyethylene** and platinum) and produces potentially explosive hydrogen gas when in contact with many metals. Be **extremely** careful - Do not become a victum.

EQUIPMENT: (Check van, HMMF and CSDF - in that order)

1. Acid resistant full-body (hood and feet) suit such as Kappler CPF-3 or Saranex
2. Full-face respirator with acid gas (yellow) cartridge or SCBA
3. Acid resistant gloves and under-gloves such as nitrile and silver shield
4. Acid resistant boots and poly bags as under-boots
5. Poly waste disposal bags
6. Fire extinguisher
7. Calcium gluconate tube(s)
8. Plastic Buckets (2) for neutralizing solution and rinse water
9. Sponges or absorbent pads for wipe-down
10. Duct tape for sealing disposal bags and protective clothing
11. Adsorbents: pads, kitty litter
12. Acid neutralizing powders
13. Perimeter (warning) tape
14. Fan(s)
15. Plastic Shovel

ACTION: (Never respond **alone** to an HF spill - Get help)

1. Put on appropriate PPE **before** entering area.
1. Remove injured parties from scene to fresh air
2. Give appropriate first aid (not necessarily in this order):
   A. Remove contaminated clothing
   B. Flush contact areas with water for at least 15 min and apply calcium gluconate paste to affected skin (re-apply every 15 min.)
   C. Give rescue breathing or CPR if necessary.
3. Exclude public and ventilate area (Caution to exclude public from exhaust area).
4. If spreading, contain spill with absorbent pads, kitty litter, vermiculite or dirt and prevent entry into floor drains.
5. Establish walkways and decon area to avoid spread of contamination
6. Remove contacted metal or organics to safe area (i.e. outside) bagged for later decontamination.
7. Soak up excess liquid with absorbants and bag in poly hazmat bags.
8. Wash down (w/sponge or absorb. pads) contaminated surfaces until pH is neutral and rinse. Minimize liquid and retain all rinse water.
9. Continue to ventilate area and exclude public until atmosphere is clear.
10. Decontaminate personnel and bag PPE for decontamination or disposal as needed.

SPECIAL NOTE: Be alert for fire during clean-up and look for absorbent surfaces or cracks which may retain HF residue and pose an on-going hazard.

11/19/98

SOP - Concentrated sulfuric acid

CAUTION: Severe contact and inhalation hazard. Violent reaction with water. Flammable and/or poisonous gases may accumulate in confined spaces. May ignite other combustible materials (wood, paper, oil, etc.). Runoff to sewer may create fire or explosion hazard.

EQUIPMENT:

1. Full body suits (Kappler CPF III or equivalent)
2. Gloves (both inner and outer). Refer to glove chart in van for selection.
3. Rubber boots
4. Full-face respirators with combination gas cartridges for organic vapor/acid gas/ particulates (yellow/purple in color)
5. Flat shovels and scrapers for pickup of the acid
6. Neutralizer for acid spill, limestore, slaked (hydrated) lime, sodium bicarbonate
7. Container(s) for neutralized material
8. Broom, shovel, dustpan, etc. for pickup of neutralized material

ACTION:

All Spills

1. Tend to injured personnel. Move to fresh air. Remove contaminated clothing immediately and then flush affected body parts with water for at least 15 minutes. Seek medical attention.
2. Isolate area with hazardous material tape. Establish walkways nd decon area as necessary. Don't spread the problem with your feet.
3. Contain spill as indicated by the situation. Plug floor and sink drains. Dike the spill area with absorbant or soil. Do not put water on leak or spill area.
4. With flat scrapers and very carefully pick up as much acid as possible. Transfer to clean dry containers. [Do not use absorbant mats on concentrated sulfuric acid.]
5. After Step 4, cautiously apply neutralizing absorbant or solution to the spilled acid. Neutralization will generate considerable heat. Apply enough absorbant to completely neutralize and solidify the spilled material. Transfer the neutral solid to containers using scoops, shovels, dust pans.

Medium/Large Spills

1. Secure area. Evacuate area and limit access by the general public. Call Public Safety or Golden Police Department for additional assistance.
2. Stabilize the area. Ventilate, remove aggravating hazards, isolate incompatible materials, disconnect power, plug drains. Do not allow water to contact the spilled material.
3. Assemble needed equipment and personnel. Contact other spill team members through the EHS secretary, Public Safety or Golden P.D. Contact Golden F.D. or Jeffco Hazmat if required.
4. Organize stepwise response action. Assign tasks to spill team members, use outside support when necessary, set up decon zone.
5. Contain and pick up spilled acid, transferring to clean, dry containers. After pickup of as much of the bulk liquid as possible, apply neutralizing solid to the affected area. Collect and remove used absorbant for proper disposal.
6. Decontaminate surfaces with neutralizing solution until pH is neutral.
7. Remove portable equipment for decontamination at appropriate site.
8. Decontaminate team members and secure protective equipment for cleanup or disposal as indicated.
9. Inform coordinator when spill cleanup is finished. Inform occupants when re-entry is authorized. Advise them of any equipment removed and of any remaining cautions.

11/19/98

SOP - Common Acid Spill

CAUTION: *Hydrofluoric Acid, Red Fuming Nitric Acid and Concentrated Sulfuric Acid* require special precautions and/or procedures. Check references specific to the material involved before proceeding.

EQUIPMENT:

1. Absorbent squares & rolled mats (gray).
2. Hazmat bags.
3. Neutralizer.
4. Tyvek suits.
5. Gloves (Check glove chart in van for appropriate choice.)
6. Full-face repirators & Acid Gas cartridges (*Yellow/Purple*).
7. Rubber boots.
8. Plastic buckets and sponges for neutralizing solution.

ACTION:

All Spills

1. Tend to injured personnel. Move to fresh air. Remove contaminated clothing immediately and then flush affected body parts with water for at least 15 minutes. Seek medical attention.
2. Isolate area with hazardous material tape. Establish walkways and decon area as necessary. Don't spread the problem with your feet.
3. Contain spill as indicated by the situation. Plug floor and sink drains if necessary. Dike large liquid spill area with absorbant or soil. Do not put water on leak or spill area.
4. With flat scrapers and/or absorbant mats very carefully pick up as much spill material as possible. Transfer to clean dry containers. If spill is solid, sweep up and transfer to clean dry container.
5. Repeat Step 4 with additional absorbant mats and/or paper towels until absorption is complete. Transfer the used absorbants to waste containers.
6. Ventilate area until approved for occupancy.

Medium/Large Spills

1. Secure area. Evacuate area and limit access by the general public. Call Public Safety or Golden Police Department for additional assistance.
2. Stabilize the area. Ventilate, remove aggravating hazards, isolate incompatible materials, disconnect power, plug drains. Do not allow water to contact the spilled material.
3. Assemble needed equipment and personnel. Contact other spill team members through the EHS office, Public Safety or Golden P.D. Contact Golden F.D. or Jeffco Hazmat if required.
4. Organize stepwise response action. Assign tasks to spill team members, use outside support when necessary, set up decon zone.
5. Contain, absorb and pick up spilled acids, transferring to clean, dry containers. Repeat absorption with additional absorbant squares and/or paper towels until job is complete. Remove used absorbant for proper disposal.
6. Decontaminate all surfaces by wiping with neutralizer, then clean, dry paper towels.
7. Remove portable equipment for decontamination at appropriate site.
8. Decontaminate team members and secure protective equipment for cleanup or disposal as indicated.
9. Inform coordinator when spill cleanup is finished. Ventilate area until approved for occupancy. Inform occupants when re-entry is authorized. Advise them of any equipment removed and of any remaining cautions.

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SOP - Bases

CAUTION: Severe contact hazard with all concentrated bases. Volatile bases such as ammonia, ammonium hydroxide and amines present inhalation hazard and may accumulate in confined spaces. Concentrated bases may react violently with water. Ammonia and amines are extremely poisonous. Slight fire danger and moderate explosion danger with ammonia.

EQUIPMENT:

1. Full body suits (Kappler CPF III or equivalent)
2. Gloves (both inner and outer). Refer to glove chart in van for selection.
3. Rubber boots
4. Full-face respirators with combination gas cartridges for ammonia and particulates (green/purple in color)
5. Flat shovels, scrapers, absorbant squares, rolled mats for pickup of liquid base (**gray material** not white)
6. Broom, shovel, dustpan, etc. for pickup of solid base
7. Neutralizer for spill of bases
8. Container(s) for spill and neutralized material - bags, 5 gallon pails, drums

ACTION:

All Spills

1. Tend to injured personnel. Move to fresh air. Remove contaminated clothing immediately and then flush affected body parts with water for at least 15 minutes. Seek medical attention.
2. Isolate area with hazardous material tape. Establish walkways and decon area as necessary. Don't spread the problem with your feet.
3. Contain spill as indicated by the situation. Plug floor and sink drains if necessary. Dike large liquid spill area with absorbant or soil. Do not put water on leak or spill area.
4. With flat scrapers and/or absorbant mats very carefully pick up as much liquid base as possible. Transfer to clean dry containers. If spill is solid, sweep up and transfer to clean dry container.
5. After Step 4, cautiously apply neutralizing liquid (weak acid) to the spilled base. Neutralization may generate considerable heat. Absorb the neutralized material with additional absorbant squares and/or paper towels. Transfer the used absorbants to waste containers.

Medium/Large Spills

1. Secure area. Evacuate area and limit access by the general public. Call Public Safety or Golden Police Department for additional assistance.
2. Stabilize the area. Ventilate, remove aggravating hazards, isolate incompatible materials, disconnect power, plug drains. Do not allow water to contact the spilled material.
3. Assemble needed equipment and personnel. Contact other spill team members through the EHS secretary, Public Safety or Golden P.D. Contact Golden F.D. or Jeffco Hazmat if required.
4. Organize stepwise response action. Assign tasks to spill team members, use outside support when necessary, set up decon zone.
5. Contain, absorb and pick up spilled base, transferring to clean, dry containers. After pickup of as much of the bulk liquid as possible, apply neutralizing solution to the affected area. Collect neutral mixture with additional absorbing material. Remove used absorbant for proper disposal.
6. Decontaminate all surfaces with neutralizing solution until pH is neutral.
7. Remove portable equipment for decontamination at appropriate site.
8. Decontaminate team members and secure protective equipment for cleanup or disposal as indicated.
9. Inform coordinator when spill cleanup is finished. Inform occupants when re-entry is authorized. Advise them of any equipment removed and of any remaining cautions.

11/19/98

SOP - Organic Liquid Spill (Low Flashpoint)

CAUTION: Many organic liquids/vapors are known carcinogens and/or skin irritants.

EQUIPMENT:

1. Absorbent squares & rolled mats (**white**).
2. Hazmat bags.
3. Tyvek suits.
4. Gloves (Check glove chart in van for appropriate choice; double gloves advised.)
5. Full-face respirators & Organic Vapor cartridges (*Black*).
6. Rubber boots.
7. Plastic buckets for used absorbent material.
8. Combustible Gas Indicator.

ACTION: *First find out what material was spilled.*

All Spills

1. Use Combustible Gas Indicator to check for concentration of vapors. If concentration is between LEL and UEL **DO NOT ENTER**. In that case evacuate and isolate surrounding area, ventilate affected area, eliminate possible sources of ignition.
2. Tend to injured personnel. Move to fresh air. Remove contaminated clothing immediately and then flush affected body parts with water for at least 15 minutes. Seek medical attention.
3. Isolate area with hazardous material tape. Establish walkways and decon area as necessary. Don't spread the problem with your feet.
4. Ventilate area to reduce fire/explosion hazard; eliminate ignition sources.
5. Contain spill as indicated by the situation. Plug floor and sink drains if necessary. Dike large liquid spill area with absorbent material or soil.
6. With absorbent mats very carefully pick up as much spill material as possible. Transfer to clean dry containers.
7. Repeat Step 4 with additional absorbent mats and/or paper towels until absorption is complete. Transfer the used absorbents to waste containers.
8. Ventilate area until approved for occupancy.

Medium/Large Spills

1. Secure area. Evacuate area and limit access by the general public. Call Public Safety or Golden Police Department for additional assistance.
2. Stabilize the area. Ventilate, remove aggravating hazards, isolate incompatible materials, disconnect power, plug drains.
3. Assemble needed equipment and personnel. Contact other spill team members through the EHS secretary, Public Safety or Golden P.D. Contact Golden F.D. or Jeffco Hazmat if required.
4. Organize stepwise response action. Assign tasks to spill team members, use outside support when necessary, set up decon zone.
5. Contain, absorb and pick up spilled liquids, transferring to clean, dry containers. Repeat absorption with additional absorbent squares and/or paper towels until job is complete. Remove used absorbent for proper disposal
6. Remove portable equipment for decontamination at appropriate site.
7. Decontaminate team members and secure protective equipment for cleanup or disposal as indicated.
8. Inform coordinator when spill cleanup is finished. Ventilate area until approved for occupancy. Inform occupants when re-entry is authorized. Advise them of any equipment removed and of any remaining cautions.

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SOP - Organic Liquid Spill (High Flashpoint)

CAUTION: Many organic liquids/vapors are known carcinogens and/or skin irritants.

EQUIPMENT:

1. Absorbent squares & rolled mats (**white**).
2. Hazmat bags.
3. Tyvek suits.
4. Gloves (Check glove chart in van for appropriate choice; double gloves advised.)
5. Full-face respirators & Organic Vapor cartridges (*Black*).
6. Rubber boots.
7. Plastic buckets for used absorbent material.

ACTION: *First find out what material was spilled.*

All Spills

1. Tend to injured personnel. Move to fresh air. Remove contaminated clothing immediately and then flush affected body parts with water for at least 15 minutes. Seek medical attention.
2. Isolate area with hazardous material tape. Establish walkways and decon area as necessary. Don't spread the problem with your feet.
3. Contain spill as indicated by the situation. Plug floor and sink drains if necessary. Dike large liquid spill area with absorbent material or soil.
4. With flat scrapers and/or absorbent mats very carefully pick up as much spill material as possible. Transfer to clean dry containers.
5. Repeat Step 4 with additional absorbent mats and/or paper towels until absorption is complete. Transfer the used absorbents to waste containers.
6. Ventilate area until approved for occupancy.

Medium/Large Spills

1. Secure area. Evacuate area and limit access by the general public. Call Public Safety or Golden Police Department for additional assistance.
2. Stabilize the area. Ventilate, remove aggravating hazards, isolate incompatible materials, disconnect power, plug drains.
3. Assemble needed equipment and personnel. Contact other spill team members through the EHS secretary, Public Safety or Golden P.D. Contact Golden F.D. or Jeffco Hazmat if required.
4. Organize stepwise response action. Assign tasks to spill team members, use outside support when necessary, set up decon zone.
5. Contain, absorb and pick up spilled liquids, transferring to clean, dry containers. Repeat absorption with additional absorbant squares and/or paper towels until job is complete. Remove used absorbant for proper disposal.
6. Remove portable equipment for decontamination at appropriate site.
7. Decontaminate team members and secure protective equipment for cleanup or disposal as indicated.
8. Inform coordinator when spill cleanup is finished. Ventilate area until approved for occupancy. Inform occupants when re-entry is authorized. Advise them of any equipment removed and of any remaining cautions.

SOP - Toxic Powders

CAUTION: Check references specific to the material involved before proceeding.

EQUIPMENT:

1. Plastic buckets with lids to contain material.
2. Hazmat bags.
3. Scoop shovel.
4. Hazmat vacuum cleaner.
5. Tyvek suits.
6. Gloves (Check glove chart in van for appropriate choice.)
7. Full-face repirators & particulate cartridges (*Yellow/Purple or Purple*).

ACTION:

All Spills

1. Tend to injured personnel. Move to fresh air. Remove contaminated clothing immediately and then flush affected body parts with water for at least 15 minutes. Seek medical attention.
2. Isolate area with hazardous material tape. Establish walkways and decon area as necessary. Don't spread the problem with your feet.
3. Contain spill as indicated by the situation. Plug floor and sink drains if necessary. Exterior spills may require plastic sheets to protect spill from spreading by wind, or water.
4. With scoop shovel very carefully pick up as much spill material as possible. Transfer to clean dry containers. Clean up remnants with vacuum cleaner.

Medium/Large Spills

1. Secure area. Evacuate area and limit access by the general public. Call Public Safety or Golden Police Department for additional assistance.
2. Stabilize the area. Ventilate, remove aggravating hazards, isolate incompatible materials, disconnect power, plug drains. Do not allow water to contact the spilled material.
3. Assemble needed equipment and personnel. Contact other spill team members through the EHS secretary, Public Safety or Golden P.D. Contact Golden F.D. or Jeffco Hazmat if required.
4. Organize stepwise response action. Assign tasks to spill team members, use outside support when necessary, set up decon zone.
5. Contain, and pick up spilled powders, transferring to clean, dry containers.
6. Decontaminate all surfaces.
7. Remove portable equipment for decontamination at appropriate site.
8. Decontaminate team members and secure protective equipment for cleanup or disposal as indicated.
9. Inform coordinator when spill cleanup is finished. Ventilate area until approved for occupancy. Inform occupants when re-entry is authorized. Advise them of any equipment removed and of any remaining cautions.

SOP -Radioactive Friable Solids

CAUTION: This SOP applies to radioactive powder spills. For cleanup of radioactive powders the following equipment and procedures should be used. **Before cleanup determine the radionuclide in the powder and what type of emitter it is (i.e. alpha, beta, gamma).**

EQUIPMENT: (Check HMMF and then van)

1. LudLum Model 14C Geiger counter located in Chauvenet Hall room 197
1. HEPA filter vacuum (located in the special handling compartment of the HMMF)
2. Vacuum attachments (located in white 5- gallon bucket next to vacuum)
4. ProShield 2 suits (full bunny suits)
5. Gloves (both inner and outer, consult glove chart in van for proper glove selection)
6. Fullface Respirators or PAPRs with HEPA filters.
8. Plastic bags for debris

ACTION:

All Spills

1. Tend to injured personnel. Move to well ventilated area, place personnel on poly or in decon unit. **(Place injured personnel in secondary containment and provide respiratory protection as needed.)** Remove contaminated clothing immediately and place in plastic bags. Follow up with medical evaluation.
2. Isolate area with hazardous material tape. Establish walkways & decon area as necessary. **Do not spread the problem with your feet.**
3. **Plug all floor drains and sink drains and close all windows.**
4. Vacuum all surfaces from the edge of the spill area toward the center of the spill. Do not vacuum liquids with a normal HEPA vacuum. If liquids are involved, use the wet/dry HEPA vacuum. (Located in the HMMF)
5. Clean all drains that might be contaminated.
6. Establish a background radiation level by taking the meter to a spot that is near the spill area but remote enough to be unaffected by the activity from the spill and observing the meter reading for a few minutes. The average will be the background level.
7. After all surfaces have been vacuumed and all visible powder cleaned up use the meter to survey the area for activity. Continue cleaning until the activity level matches the background level. Screen the area far beyond what the limit of the visible spill residue. Be aware that other radioactive sources in the area can affect your readings.
8. Wet wipe all surfaces in the spill area and place the wipes in a sealed plastic bag.

SPECIAL MEASURES:

1. If the spill is large and the grain size is small (-400 mesh or less) the area needs to be isolated from all surrounding air space and ventilated using an intrinsically safe HEPA filtered air hog with the exhaust going directly to the outdoors.
2. Reference copy of Section 5, Chapter 12 of Operational Health Physics in van

SOP -Radioactive Liquid Spills

CAUTION: This SOP applies to radioactive liquid spills. For cleanup of radioactive liquids the following equipment and procedures should be used. **Before cleanup determine the radionuclide in the liquid and what type of emitter it is (i.e. alpha, beta, gamma). This will enable you to determine whether the meter can detect the energy given off by this radionuclide. If it is a organic then also consult organic spill SOP for additional cautions. If it is a water based liquid consult corrosive liquid spill SOP for additional cautions. Be aware that if it is an organic liquid with a high vapor pressure that there might be a fire danger.**

EQUIPMENT: (Check HMMF and then van)

1. LudLum Model 14C Geiger counter located in Chauvenet Hall room 197.
2. Appropriate roll absorbent
3. Kappler CPF III suits (full bunny suits)
4. Gloves (both inner and outer, consult glove chart in van for proper glove selection)
5. Fullface Respirators or PAPRs with combination HEPA\appropriate filters.
6. Plastic bags for used absorbent.

ACTION:

All Spills

1. Tend to injured personnel. Move to well ventilated area, place personnel on poly or in decon unit. **(Place injured personnel in secondary containment and provide respiratory protection as needed.)** Remove contaminated clothing immediately and place in plastic bags. Follow up with medical evaluation.
2. Isolate area with hazardous material tape. Establish walkways & decon area as necessary. **Do not spread the problem with your feet.**
3. **Plug all floor drains and sink drains and close all windows.**
4. Absorb from the edge of the spill area toward the center of the spill.
5. Clean all drains that might be contaminated.
6. Establish a background radiation level by taking the meter to a spot that is near the spill area but remote enough to be unaffected by the activity from the spill and observing the meter reading for a few minutes. The average will be the background level.
7. After all surfaces have been dried use the meter to survey the area for activity. Continue cleaning until the activity level matches the background level. Screen the area far beyond what the limit of the visible spill residue. Be aware that other radioactive sources in the area can affect your readings.
8. Wet wipe all surfaces in the spill area and place the wipes in a sealed plastic bag.

SPECIAL MEASURES:

1. If the spill is large and the liquid has a high vapor pressure the area needs to be isolated from all surrounding air space and ventilated using a HEPA and charcoal filtered air hog with the exhaust going directly to the outdoors.
2. Reference the copy of section 5, Chapter 12 of Operational Health Physics in the van.

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SOP – Oxidizing Acids

CAUTION: Oxidizing acids include Nitric Acid, Perchloric Acid, *Fuming* Sulfuric Acid, Red Fuming Nitric Acid. Severe contact and inhalation hazard. Violent reaction with water and organic materials. Flammable, poisonous gases may accumulate in confined spaces. May ignite other combustible materials (wood, paper, oil, etc.). Runoff to sewer may create fire or explosion hazard.

EQUIPMENT:

1. Full body suits (Kappler CPF III or equivalent)
2. Gloves (both inner and outer). Refer to glove chart in van for selection.
3. Rubber boots
4. Full-face respirators with combination gas cartridges for organic vapor/acid gas/ particulate (yellow/purple in color)
5. Flat shovels and scrapers for pickup of the acid
6. Neutralizer for acid spill, limestone, slaked (hydrated) lime, sodium bicarbonate
7. Container(s) for neutralized material
8. Broom, shovel, dustpan, etc. for pickup of neutralized material

ACTION:

All Spills

1. Tend to injured personnel. Move to fresh air. Remove contaminated clothing immediately and then flush affected body parts with water for at least 15 minutes. Seek medical attention.
2. Isolate area with hazardous material tape. Establish walkways and decon area as necessary. Don't spread the problem with your feet.
3. Contain spill as indicated by the situation. Plug floor and sink drains. Dike the spill area with absorbent or soil. Do not put water on leak or spill area.
4. With flat scrapers and very carefully pick up as much acid as possible. Transfer to clean dry containers. [Do not use absorbent mats.]
5. After Step 4, cautiously apply neutralizing absorbent or solution to the spilled acid. Neutralization will generate considerable heat. Apply enough absorbent to completely neutralize and solidify the spilled material. Transfer the neutral solid to containers using scoops, shovels, dust-pans.

Medium/Large Spills

1. Secure area. Evacuate area and limit access by the general public. Call Public Safety or Golden Police Department for additional assistance.
2. Stabilize the area. Ventilate, remove aggravating hazards, isolate incompatible materials, disconnect power, plug drains. Do not allow water to contact the spilled material.
3. Assemble needed equipment and personnel. Contact other spill team members through the EHS secretary, Public Safety or Golden P.D. Contact Golden F.D. or Jeffco Hazmat if required.
4. Organize stepwise response action. Assign tasks to spill team members, use outside support when necessary, set up decon zone.
5. Contain and pick up spilled acid, transferring to clean, dry containers. After pickup of as much of the bulk liquid as possible, apply neutralizing solid to the affected area. Collect and remove used absorbent for proper disposal.
6. Decontaminate surfaces with neutralizing solution until pH is neutral.
7. Remove portable equipment for decontamination at appropriate site.
8. Decontaminate team members and secure protective equipment for cleanup or disposal as indicated.
9. Inform coordinator when spill cleanup is finished. Inform occupants when re-entry is authorized. Advise them of any equipment removed and of any remaining cautions.

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SOP -Organometallics

CAUTION: This SOP applies to spills of organometallic materials. For cleanup of organometallic liquids the following equipment and procedures should be used. **Before cleanup determine the organic liquid present and the metal that is bonded to the carbon atom. This will enable you to determine whether there is a hazard associated with the metal present. Many organometallic compounds are air or water reactive. Some are also strong oxidizers. If it is a reactive compound, follow these guidelines for spills of 1 liter or less. If it is not a reactive organometallic compound, consult organic spill SOP for cleanup and cautions.**

EQUIPMENT: (Check HMMF and then van)

1. 4-Gas meter located in room 197 of Chauvenet Hall
2. Roll of white absorbent (Test a small piece of the white absorbent to see if an undesired reaction takes place between the organometallic and the absorbent before covering the spill with the absorbent.)
3. Brush and plastic scoop or shovel.
4. Kappler CPF III suits (full bunny suits) if liquid - Proshield 2 Bunny suits if solid
5. Gloves (both inner and outer, consult glove chart in van for proper glove selection)
6. Fullface Respirators or PAPRs with combination HEPA\acid gas\organic vapor cartridge
7. Plastic bags for used absorbent or plastic 5 gal bucket if materials will dissolve plastic bags.

ACTION:

All Spills

1. Tend to injured personnel. Move to well ventilated area. Place personnel on poly or in decon unit. Remove contaminated clothing immediately and place in plastic bags. **Place personnel in secondary containment and flush with water.** Follow up with medical evaluation.
2. Isolate area with hazardous material tape. Establish walkways & decon area as necessary. ***Do not spread the problem with your feet.***
3. **Plug all floor drains and sink drains and close all windows.**
4. Absorb or vacuum from the edge of the spill area toward the center of the spill.
5. Clean all drains that might be contaminated.
6. Wet wipe all surfaces in the spill area and place the wipes in a sealed plastic bag.

SPECIAL MEASURES:

1. If the spill is of a large amount of liquid with a high vapor pressure, the area needs to be ventilated using an intrinsically safe air mover with the exhaust going directly to the outdoors.

COLORADO SCHOOL OF MINES

ENVIRONMENTAL HEALTH AND SAFETY PROGRAM

Hazardous Material Discharge Notification Guidelines

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REGULATORY BACKGROUND

The two Appendices to this Guideline contain lists of hazardous materials and "Reportable Quantities" (RQ) for these materials. Appendix A is a list of "extremely hazardous substances" taken from 40 CFR Part 355.40 entitled "Emergency release Notification." This is a subchapter of "Superfund Amendments and Reauthorization Act" of 1986 (SARA Title III). SARA Title III contains guidance concerning Superfund, Emergency Planning, and Community Right To Know Programs.

Appendix B is a list of hazardous substances and reportable quantities found in the federal "Comprehensive Environmental Response Compensation and Liability Act" (CERCLA) Section 101 (14). The same list is found in Department of Transportation (DOT) Regulations, 49 CFR Part 172.

The lists contained in these Appendices provide a basis for decisions concerning required notification to local, state and federal agencies in the event of a spill of a hazardous material.

Colorado Hazardous Wastes Regulations 6 CCR 1007-3, Part 262.34 also contains guidance concerning notification of hazardous material spills. These regulations are administered by the Colorado Department of Health (CDH).

NOTIFICATION GUIDELINES

I. <u>Colorado Hazardous Waste Regulations Part 262.34</u>

A. In the event of a fire, explosion, or other release of hazardous waste which could threaten human health outside the facility or when the generator has knowledge that a spill has reached surface water, the generator MUST immediately notify the National Response Center (using their 24-hour toll free number 800/424-8802). The report must include the following information:

1. The name, address, and U.S. EPA Identification member of the generator;

2. Date, time and type of incident (e.g., spill or fire);

3. Quantity and type of hazardous waste involved in the incident;

4. Extent of injuries, if any; and

5. Estimated quantity and disposition of recovered materials, if any.

II. DOT Regulations, 49 CFR Part 171.15 and 171.16

§171.15 Immediate notice of certain hazardous materials incidents.

(a) At the earliest practicable moment, each carrier who transports hazardous materials (including hazardous wastes) shall give notice in accordance with paragraph (b) of this section after each incident that occurs during the course of transportation (including loading, unloading and temporary storage) in which as a direct result of hazardous materials—

(1) A person is killed;

(2) A person received injuries requiring his hospitalization;

(3) Estimated carrier or other property damage exceeds $50,000;

(4) Fire, breakage, spillage, or suspected radioactive contamination occurs involving shipment of radioactive material (See also §§174.45, 175.45, 176.48, and 177.807 of this subchapter.); or

(5) Fire, breakage, spillage, or suspected contamination occurs involving shipment of etiologic agents; or

(6) A situation exists of such a nature that, in the judgment of the carrier, it should be reported in accordance with paragraph (b) of this section even though it does not meet the criteria of paragraph (a)(1), (2), or (3) of this section; e.g., a continuing danger of life exists at the scene of the incident.

(b) Each notice required by paragraph (a) of this section shall be given to the Department by telephone (toll-free) on 800-424-8802 or (toll-call) on 202-267-2675. Notice involving etiologic agents may be given the Director, Center for Disease Control, U.S. Public Health Service, Atlanta, Ga., Area Code (404) 633-5313, in place of the notice to the Department. Each notice must include the following information:

(1) Name of reporter.

(2) Name and address of carrier represented by reporter

(3) Phone number where reportor can be contacted.

(4) Date, time, and location of incident.

(5) The extent of injuries, if any.

(6) Classification, name, and quantity of hazardous materials involved, if such information is available.

(7) Type of incident and nature of hazardous material involvement and whether a continuing danger to life exists at the scene.

(c) Each carrier making a report under this section shall also make the report required by §171.16.

NOTE: Under 40 CFR 302.6 EPA requires persons in charge of facilities (including transport vehicles, vessels, and aircraft) to report any release of a hazardous substance in a quantity equal to or greater than its reportable quantity, as soon as that person has knowledge of the release, to the U.S. Coast Guard National Response Center at (toll free) 800-424-8802 or (toll) 202-267-2675.

§171.16 Detailed hazardous materials incident reports.

(a) Each carrier who transports hazardous materials shall report in writing in duplicate on DOT Form F 5800.1 to the Department within 15 days of the date of discovery, each incident that occurs during the course of transportation (including loading, unloading, or temporary storage) in which, as a direct result of the hazardous materials, any of the circumstances set forth in §171.15(a) occurs or there has been an unintentional release of hazardous materials from a package (including a tank) or any quantity of hazardous waste has been discharged during transportation. If a report pertains to a hazardous waste discharge—

(1) A copy of the hazardous waste manifest for the waste must be attached to the report, and

(2) An estimate of the quantity of the waste removed from the scene, the name and address of the facility to which it was taken, and the manner of disposition of any unremoved waste, must be entered in Part H of the report (Form F5800.1).

(b) Each carrier making a report under this section shall send that report to the Information Systems Manager, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590.

(c) Except as provided in paragraph (d) of this section, the requirements of paragraph (a) of this section do not apply to incidents involving the unintentional release of hazardous materials being transported under the following proper shipping names:

(1) Consumer commodity

(2) Battery, *electric storage*, wet, filled with acid *or* alkali.

(3) Paint and paint related material when shipped in packagings of five gallons or less.

(d) The exceptions to incident reporting provided in paragraph (c) of this section do not apply to:

(1) Incidents required to be reported under §171.15(a);

(2) Incidents involving transportation aboard aircraft; nor

(3) Incidents involving the transportation of hazardous waste.

DEPARTMENT OF TRANSPORTATION

Form Approved OMB No. 04-5613

HAZARDOUS MATERIALS INCIDENT REPORT

INSTRUCTIONS: Submit this report in duplicate to the Director, Office of Hazardous Materials Operations, Materials Transportation Bureau, Department of Transportation, Washington, D.C. 20590, (ATTN: Op. Div.). If space provided for any item is inadequate, complete that item under Section H, "Remarks", keying to the entry number being completed. Copies of this form, in limited quantities, may be obtained from the Director, Office of Hazardous Materials Operations. Additional copies in this prescribed format may be reproduced and used, if on the same size and kind of paper.

A INCIDENT

1. TYPE OF OPERATION
1 ☐ AIR 2 ☐ HIGHWAY 3 ☐ RAIL 4 ☐ WATER 5 ☐ FREIGHT FORWARDER 6 ☐ OTHER (Identify) _____

2. DATE AND TIME OF INCIDENT (Month • Day • Year)
_____ a.m.
_____ p.m.

3. LOCATION OF INCIDENT

B REPORTING CARRIER, COMPANY OR INDIVIDUAL

4. FULL NAME

5. ADDRESS (Number, Street, City, State and Zip Code)

6. TYPE OF VEHICLE OR FACILITY

C SHIPMENT INFORMATION

7. NAME AND ADDRESS OF SHIPPER (Origin address)

8. NAME AND ADDRESS OF CONSIGNEE (Destination address)

9. SHIPPING PAPER IDENTIFICATION NO.

10. SHIPPING PAPERS ISSUED BY
☐ CARRIER ☐ SHIPPER
☐ OTHER (Identify) _____

D DEATHS, INJURIES, LOSS AND DAMAGE

DUE TO HAZARDOUS MATERIALS INVOLVED

11. NUMBER PERSONS INJURED

12. NUMBER PERSONS KILLED

13. ESTIMATED AMOUNT OF LOSS AND OR PROPERTY DAMAGE INCLUDING COST OF DECONTAMINATION (Round off in dollars)
$

14. ESTIMATED TOTAL QUANTITY OF HAZARDOUS MATERIALS RELEASED

E HAZARDOUS MATERIALS INVOLVED

15. HAZARD CLASS (*Sec. 172.101, Col. 3)	16. SHIPPING NAME (*Sec. 172.101, Col. 2)	17. TRADE NAME

F NATURE OF PACKAGING FAILURE

18. (Check all applicable boxes)

☐ (1) DROPPED IN HANDLING	☐ (2) EXTERNAL PUNCTURE	☐ (3) DAMAGE BY OTHER FREIGHT
☐ (4) WATER DAMAGE	☐ (5) DAMAGE FROM OTHER LIQUID	☐ (6) FREEZING
☐ (7) EXTERNAL HEAT	☐ (8) INTERNAL PRESSURE	☐ (9) CORROSION OR RUST
☐ (10) DEFECTIVE FITTINGS, VALVES, OR CLOSURES	☐ (11) LOOSE FITTINGS, VALVES OR CLOSURES	☐ (12) FAILURE OF INNER RECEPTACLES
☐ (13) BOTTOM FAILURE	☐ (14) BODY OR SIDE FAILURE	☐ (15) WELD FAILURE
☐ (16) CHIME FAILURE	☐ (17) OTHER CONDITIONS (Identify) _____	19. SPACE FOR DOT USE ONLY

Form DOT F 5800.1 (10-70) (9/1/76)
*Editorial change to incorporate redesignation per HM-112.

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III. CFR 40 Part 355.4 (CERCLA/SARA III)

Note: The text of these regulations refers to the lists in both Appendices A and B of this Guideline.

§ 355.40 Emergency release notification.

(a) *Applicability.* (1) The requirements of this section apply to any facility: (i) at which a hazardous chemical is produced, used or stored and (ii) at which there is release of a reportable quantity of any extremely hazardous substance or CERCLA hazardous substance.

(2) This section does not apply to: (i) Any release which results in exposure to persons solely within the boundaries of the facility. (ii) Any release which is a "federally permitted release" as defined in section 101 (10) of CERCLA. (iii) any release which is "continuous," as defined under section 103 (f) of CERCLA except for "statistically significant increases" as defined under section 103(e) of CERCLA and (v) any release exempt from CERCLA section 103(a) reporting under section 101(22) of CERCLA.

Note to paragraph (a).—Releases of CERCLA hazardous substances are subject to the release reporting requirements of CERCLA section 103, codified at 40 CFR Part 302, in addition to the requirements of this Part.

(b) *Notice requirements.* (1) The owner or operator of a facility subject to this section shall immediately notify the community emergency coordinator for the local emergency planning committee of any area likely to be affected by the release and the State emergency response commission of any State likely to be affected by the release. If there is no local emergency planning committee, notification shall be provided under this section to relevant local emergency response personnel.

(2) The notice required under this section shall include the following to the extent known at the time of notice and so long as no delay in notice or emergency response results:

(i) The chemical name or identity of any substance involved in the release.

(ii) An indication of whether the substance is an extremely hazardous substance.

(iii) An estimate of the quantity of any such substance that was released into the environment.

(iv) The time and duration of the release.

(v) The medium or media into which the release occurred.

(vi) Any known or anticipated acute or chronic health risks associated with the emergency and, where appropriate, advice regarding medical attention necessary for exposed individuals.

(vii) Proper precautions to take as a result of the release, including evacuation (unless such information is readily available to the community emergency coordination pursuant to the emergency plan).

(viii) The names and telephone number of the person or persons to be contacted for further information.

(3) As soon as practicable after a release which requires notice under (b)(1) of this section, such owner or operator shall provide a written follow-up emergency notice (or notices, as more information becomes available) setting forth and updating the information required under paragraph (b)(2) of this section, and including additional information with respect to:

(i) Actions taken to respond to and contain the release,

(ii) Any known or anticipated acute or chronic health risks associated with the release, and,

(iii) Where appropriate, advice regarding medical attention necessary for exposed individuals.

(4) Exceptions. (i) Until April 30, 1988, in lieu of the notice specified in paragraph (b)(2) of this section, any owner or operator of a facility subject to this section from which there is a release of a CERCLA hazardous substance which is not an extremely hazardous substance and has a statutory reportable quantity may provide the same notice required under CERCLA section 103(a) to the local emergency planning committee.

(ii) An owner or operator of a facility from which there is a transportation-related release may meet the requirements of this section by providing the information indicated in paragraph (b)(2) to the 911 operator, or in the absence of a 911 emergency telephone number, to the operator. For purposes of this paragraph, a "transportation-related release" means a release during transportation, or storage incident to transportation if the stored substance is moving under active shipping papers and has not reached the ultimate consignee.

APPENDIX A

APPENDIX A.—THE LIST OF EXTREMELY HAZARDOUS SUBSTANCES AND THEIR THRESHOLD PLANNING QUANTITIES

[Alphabetical Order]

CAS No.	Chemical name	Notes	Reportable quantity* (pounds)	Threshold planning quantity (pounds)
75-86-5	Acetone Cyanohydrin		10	1,000
1752-30-3	Acetone Thiosemicarbazide	e	1	1,000/10,000
107-02-8	Acrolein		1	500
79-06-1	Acrylamide	d, l	5,000	1,000/10,000
107-13-1	Acrylonitrile	d, l	100	10,000
814-68-6	Acrylyl Chloride	e, h	1	100
111-69-3	Adiponitrile	e, l	1	1,000
116-06-3	Aldicarb	c	1	100/10,000
309-00-2	Aldrin	d	1	500/10,000
107-18-6	Allyl Alcohol		100	1,000
107-11-9	Allylamine	e	1	500
20859-73-8	Aluminum Phosphide	b	100	500
54-62-6	Aminopterin	e	1	500/10,000
78-53-5	Amiton	e	1	500
3734-97-2	Amiton Oxalate	e	1	100/10,000
7664-41-7	Ammonia	l	100	500
16919-58-7	Ammonium Chloroplatinate	a, e	1	10,000
300-62-9	Amphetamine	e	1	1,000
62-53-3	Aniline	d, l	5,000	1,000
88-05-1	Aniline, 2,4,6-Trimethyl-	e	1	500
7783-70-2	Antimony Pentafluoride	e	1	500
1397-94-0	Antimycin A	c, e	1	1,000/10,000
86-88-4	ANTU		100	500/10,000
1303-28-2	Arsenic Pentoxide	d	5,000	100/10,000
1327-53-3	Arsenous Oxide	d, h	5,000	100/10,000
7784-34-1	Arsenous Trichloride	d	5,000	500
7784-42-1	Arsine	e	1	100
2642-71-9	Azinphos-Ethyl	e	1	100/10,000
86-50-0	Azinphos-Methyl		1	10/10,000
1405-87-4	Bacitracin	a, e	1	10,000
98-87-3	Benzal Chloride	d	5,000	500
98-16-8	Benzenamine, 3-(Trifluoromethyl)-	e	1	500
100-14-1	Benzene, 1-(Chloromethyl)-4-Nitro-	e	1	500/10,000
98-05-5	Benzenearsonic Acid	e	1	10/10,000
98-09-9	Benzenesulfonyl Chloride	a	100	10,000
3615-21-2	Benzimidazole, 4,5-Dichloro-2-(Trifluoromethyl)-	e, g	1	500/10,000
98-07-7	Benzotrichloride	d	1	100
100-44-7	Benzyl Chloride	d	100	500
140-29-4	Benzyl Cyanide	e, h	1	500

CAS No.	Chemical name	Notes	Reportable quantity* (pounds)	Threshold planning quantity (pounds)
15271-41-7	Bicyclo[2.2.1]Heptane-2-Carbonitrile, 5-Chloro-6-((((Methylamino)Carbonyl)Oxy)Imino)-, (1s-(1-alpha, 2-beta, 4-alpha, 5-alpha, 6E))-.	e	1	500/10,000
534-07-6	Bis(Chloromethyl) Ketone	e	1	10/10,000
4044-65-9	Bitoscanate	e	1	500/10,000
10294-34-5	Boron Trichloride	e	1	500
7637-07-2	Boron Trifluoride	e	1	500
353-42-4	Boron Trifluoride Compound With Methyl Ether (1:1)	e	1	1,000
28772-56-7	Bromadiolone	e	1	100/10,000
7726-95-6	Bromine	e, l	1	500
106-99-0	Butadiene	a, e	1	10,000
109-19-3	Butyl Isovalerate	a, e	1	10,000
111-34-2	Butyl Vinyl Ether	a, e	1	10,000
1306-19-0	Cadmium Oxide	e	1	100/10,000
2223-93-0	Cadmium Stearate	c, e	1	1,000/10,000
7778-44-1	Calcium Arsenate	d	1,000	500/10,000
8001-35-2	Camphechlor	d	1	500/10,000
56-25-7	Cantharidin	e	1	100/10,000
51-83-2	Carbachol Chloride	e	1	500/10,000
26419-73-8	Carbamic Acid, Methyl-, 0-(((2,4-Dimethyl-1, 3-Dithiolan-2-yl)Methylene)Amino)-	e	1	100/10,000
1563-66-2	Carbofuran		10	10/10,000
75-15-0	Carbon Disulfide	l	100	10,000
786-19-6	Carbophenothion	e	1	500
2244-16-8	Carvone	a, e	1	10,000
57-74-9	Chlordane	d	1	1,000
470-90-6	Chlorfenvinfos	e	1	500
7782-50-5	Chlorine		10	100
24934-91-6	Chlormephos	e	1	500
999-81-5	Chlormequat Chloride	e, h	1	100/10,000
107-20-0	Chloroacetaldehyde	a	1,000	10,000
79-11-8	Chloroacetic Acid	e	1	100/10,000
107-07-3	Chloroethanol	e	1	500
627-11-2	Chloroethyl Chloroformate	e	1	1,000
67-66-3	Chloroform	d, l	5,000	10,000
542-88-1	Chloromethyl Ether	d, h	1	100
107-30-2	Chloromethyl Methyl Ether	c, d	1	100
3691-35-8	Chlorophacinone	e	1	100/10,000
1982-47-4	Chloroxuron	e	1	500/10,000
21923-23-9	Chlorthiophos	e, h	1	500
10025-73-7	Chromic Chloride	e	1	1/10,000
7440-48-4	Cobalt	a, e	1	10,000
62207-76-5	Cobalt, ((2,2'-(1,2-Ethanediylbis (Nitrilomethylidyne))Bis(6-Fluorophenolato))(2-)-N,N',O,O')-,.	e	1	100/10,000
10210-68-1	Cobalt Carbonyl	e, h	1	10/10,000
64-86-8	Colchicine	e, h	1	10/10,000
117-52-2	Coumafuryl	a, e	1	10,000
56-72-4	Coumaphos		10	100/10,000
5836-29-3	Coumatetralyl	e	1	500/10,000
95-48-7	Cresol, o-	d	1,000	1,000/10,000
535-89-7	Crimidine	e	1	100/10,000
4170-30-3	Crotonaldehyde		100	1,000
123-73-9	Crotonaldehyde, (E)-		100	1,000
506-68-3	Cyanogen Bromide		1,000	500/10,000
506-78-5	Cyanogen Iodide	e	1	1,000/10,000
2636-26-2	Cyanophos	e	1	1,000
675-14-9	Cyanuric Fluoride	e	1	100
66-81-9	Cycloheximide	e	1	100/10,000
108-91-8	Cyclohexylamine	e, l	1	10,000
287-92-3	Cyclopentane	a, e	1	10,000
633-03-4	C. I. Basic Green 1	a, e	1	10,000
17702-41-9	Decaborane(14)	e	1	500/10,000
8065-48-3	Demeton	e	1	500
919-86-8	Demeton-S-Methyl	e	1	500
10311-84-9	Dialifor	e	1	100/10,000
19287-45-7	Diborane	e	1	100
84-74-2	Dibutyl Phthalate	a	10	10,000
8023-53-8	Dichlorobenzalkonium Chloride	a, e	1	10,000
111-44-4	Dichloroethyl Ether	d	1	10,000

CAS No.	Chemical name	Notes	Reportable quantity* (pounds)	Threshold planning quantity (pounds)
149-74-6	Dichloromethylphenylsilane	e	1	1,000
62-73-7	Dichlorvos		10	1,000
141-66-2	Dicrotophos	e	1	100
1464-53-5	Diepoxybutane	d	1	500
814-49-3	Diethyl Chlorophospate	e, h	1	500
1642-54-2	Diethylcarbamazine Citrate	e	1	100/10,000
93-05-0	Diethyl-p-Phenylenediamine	a,e	1	10,000
71-63-6	Digitoxin	c, e	1	100/10,000
2238-07-5	Diglycidyl Ether	e	1	1,000
20830-75-5	Digoxin	e, h	1	10/10,000
115-26-4	Dimefox	e	1	500
60-51-5	Dimethoate		10	500/10,000
2524-03-0	Dimethyl Phosphorochloridothioate	e	1	500
131-11-3	Dimethyl Phthalate	a	5,000	10,000
77-78-1	Dimethyl Sulfate	d	1	500
75-18-3	Dimethyl Sulfide	e	1	100
75-78-5	Dimethyldichlorosilane	e, h	1	500
57-14-7	Dimethylhydrazine	d	1	1,000
99-98-9	Dimethyl-p-Phenylenediamine	e	1	10/10,000
644-64-4	Dimetilan	e	1	500/10,000
534-52-1	Dinitrocresol		10	10/10,000
88-85-7	Dinoseb		1,000	100/10,000
1420-07-1	Dinoterb	e	1	500/10,000
117-84-0	Dioctyl Phthalate	a	5,000	10,000
78-34-2	Dioxathion	e	1	500
646-06-0	Dioxolane	a, e	1	10,000
82-66-6	Diphacinone	e	1	10/10,000
152-16-9	Diphosphoramide, Octamethyl-		100	100
298-04-4	Disulfoton		1	500
514-73-8	Dithiazanine Iodide	e	1	500/10,000
541-53-7	Dithiobiuret		100	100/10,000
316-42-7	Emetine, Dihydrochloride	e, h	1	1/10,000
115-29-7	Endosulfan		1	10/10,000
2778-04-3	Endothion	e	1	500/10,000
72-20-8	Endrin		1	500/10,000
106-89-8	Epichlorohydrin	d; l	1,000	1,000
2104-64-5	EPN	e	1	100/10,000
50-14-6	Ergocalciferol	c, e	1	1,000/10,000
379-79-3	Ergotamine Tartrate	e	1	500/10,000
1622-32-8	Ethanesulfonyl Chloride, 2-Chloro-	e	1	500
10140-87-1	Ethanol, 1,2-Dichloro-, Acetate	e	1	1,000
563-12-2	Ethion		10	1,000
13194-48-4	Ethoprophos	e	1	1,000
538-07-8	Ethylbis(2-Chloroethyl)Amine	e, h	1	500
371-62-0	Ethylene Fluorohydrin	c, e, h	1	10
75-21-8	Ethylene Oxide	d, l	1	1,000
107-15-3	Ethylenediamine		5,000	10,000
151-56-4	Ethylenimine	d	1	500
2235-25-8	Ethylmercuric Phosphate	a, e	1	10,000
542-90-5	Ethylthiocyanate	e	1	10,000
22224-92-6	Fenamiphos	e	1	10/10,000
122-14-5	Fenitrothion	e	1	500
115-90-2	Fensulfothion	e, h	1	500
4301-50-2	Fluenetil	e	1	100/10,000
7782-41-4	Fluorine	k	10	500
640-19-7	Fluoroacetamide	j	100	100/10,000
144-49-0	Fluoroacetic Acid	e	1	10/10,000
359-06-8	Fluoroacetyl Chloride	c, e	1	10
51-21-8	Fluorouracil	e	1	500/10,000
944-22-9	Fonofos	e	1	500
50-00-0	Formaldehyde	d,l	1,000	500
107-16-4	Formaldehyde Cyanohydrin	e, h	1	1,000
23422-53-9	Formetanate Hydrochloride	e,h	1	500/10,000
2540-82-1	Formothion	e	1	100
17702-57-7	Formparanate	e	1	100/10,000
21548-32-3	Fosthietan	e	1	500

CAS No.	Chemical name	Notes	Reportable quantity* (pounds)	Threshold planning quantity (pounds)
3878-19-1	Fuberidazole	e	1	100/10,000
110-00-9	Furan		100	500
13450-90-3	Gallium Trichloride	e	1	500/10,000
77-47-4	Hexachlorocyclopentadiene	d, h	1	100
1335-87-1	Hexachloronaphthalene	a, e	1	10,000
4835-11-4	Hexamethylenediamine, N,N'-Dibutyl-	e	1	500
302-01-2	Hydrazine	d	1	1,000
74-90-8	Hydrocyanic Acid		10	100
7647-01-0	Hydrogen Chloride (Gas Only)	e, l	1	500
7664-39-3	Hydrogen Fluoride		100	100
7722-84-1	Hydrogen Peroxide (Conc >52%)	e, l	1	1,000
7783-07-5	Hydrogen Selenide	e	1	10
7783-06-4	Hydrogen Sulfide	l	100	500
123-31-9	Hydroquinone	l	1	500/10,000
53-86-1	Indomethacin	a, e	1	10,000
10025-97-5	Iridium Tetrachloride	a, e	1	10,000
13463-40-6	Iron, Pentacarbonyl-	e	1	100
297-78-9	Isobenzan	e	1	100/10,000
78-82-0	Isobutyronitrile	e, h	1	1,000
102-36-3	Isocyanic Acid, 3,4-Dichlorophenyl Ester	e	1	500/10,000
465-73-6	Isodrin		1	100/10,000
55-91-4	Isofluorphate	c	100	100
4098-71-9	Isophorone Diisocyanate	b, e	1	100
108-23-6	Isopropyl Chloroformate	e	1	1,000
625-55-8	Isopropyl Formate	e	1	500
119-38-0	Isopropylmethylpyrazolyl Dimethylcarbamate	e	1	500
78-97-7	Lactonitrile	e	1	1,000
21609-90-5	Leptophos	e	1	500/10,000
541-25-3	Lewisite	c, e, h	1	10
58-89-9	Lindane	d	1	1,000/10,000
7580-67-8	Lithium Hydride	b, e	1	100
109-77-3	Malononitrile		1,000	500/10,000
12108-13-3	Manganese, Tricarbonyl Methylcyclopentadienyl	e, h	1	100
51-75-2	Mechlorethamine	c, e	1	10
950-10-7	Mephosfolan	e	1	500
1600-27-7	Mercuric Acetate	e	1	500/10,000
7487-94-7	Mercuric Chloride	e	1	500/10,000
21908-53-2	Mercuric Oxide	e	1	500/10,000
108-67-8	Mesitylene	a, e	1	10,000
10476-95-6	Methacrolein Diacetate	e	1	1,000
760-93-0	Methacrylic Anhydride	e	1	500
126-98-7	Methacrylonitrile	h	1	500
920-46-7	Methacryloyl Chloride	e	1	100
30674-80-7	Methacryloyloxyethyl Isocyanate	e, h	1	100
10265-92-6	Methamidophos	e	1	100/10,000
558-25-8	Methanesulfonyl Fluoride	e	1	1,000
950-37-8	Methidathion	e	1	500/10,000
2032-65-7	Methiocarb		10	500/10,000
16752-77-5	Methomyl	h	100	500/10,000
151-38-2	Methoxyethylmercuric Acetate	e	1	500/10,000
80-63-7	Methyl 2-Chloroacrylate	e	1	500
74-83-9	Methyl Bromide	l	1,000	1,000
79-22-1	Methyl Chloroformate	d, h	1,000	500
624-92-0	Methyl Disulfide	e	1	100
60-34-4	Methyl Hydrazine		10	500
624-83-9	Methyl Isocyanate	f	1	500
556-61-6	Methyl Isothiocyanate	b, e	1	500
74-93-1	Methyl Mercaptan		100	500
3735-23-7	Methyl Phenkapton	e	1	500
676-97-1	Methyl Phosphonic Dichloride	b, e	1	100
556-64-9	Methyl Thiocyanate	e	1	10,000
78-94-4	Methyl Vinyl Ketone	e	1	10
502-39-6	Methylmercuric Dicyanamide	e	1	500/10,000
75-79-6	Methyltrichlorosilane	e, h	1	500
1129-41-5	Metolcarb	e	1	100/10,000
7786-34-7	Mevinphos		10	500

CAS No.	Chemical name	Notes	Reportable quantity* (pounds)	Threshold planning quantity (pounds)
315-18-4	Mexacarbate		1,000	500/10,000
50-07-7	Mitomycin C	d	1	500/10,000
6923-22-4	Monocrotophos	e	1	10/10,000
2763-96-4	Muscimol	a, h	1,000	10,000
505-60-2	Mustard Gas	e, h	1	500
7440-02-0	Nickel	a, d	1	10,000
13463-39-3	Nickel Carbonyl	d	1	1
54-11-5	Nicotine	c	100	100
65-30-5	Nicotine Sulfate	e	1	100/10,000
7697-37-2	Nitric Acid		1,000	1,000
10102-43-9	Nitric Oxide	c	10	100
98-95-3	Nitrobenzene	l	1,000	10,000
1122-60-7	Nitrocyclohexane	e	1	500
10102-44-0	Nitrogen Dioxide		10	100
62-75-9	Nitrosodimethylamine	d, h	1	1,000
991-42-4	Norbormide	e	1	100/10,000
0	Organorhodium Complex (PMN-82-147)	e	1	10/10,000
65-86-1	Orotic Acid	a, e	1	10,000
20816-12-0	Osmium Tetroxide	a	1,000	10,000
630-60-4	Ouabain	c, e	1	100/10,000
23135-22-0	Oxamyl	e	1	100/10,000
78-71-7	Oxetane, 3,3-Bis(Chloromethyl)-	l	e	500
2497-07-6	Oxydisulfoton	e, h	1	500
10028-15-6	Ozone	e	1	100
1910-42-5	Paraquat	e	1	10/10,000
2074-50-2	Paraquat Methosulfate	e	1	10/10,000
56-38-2	Parathion	c, d	1	100
298-00-0	Parathion-Methyl	c	100	100/10,000
2002-03-8	Paris Green	d	100	500/10,000
19624-22-7	Pentaborane	e	1	500
76-01-7	Pentachloroethane	a, d	1	10,000
87-86-5	Pentachlorophenol	a, d	10	10,000
2570-26-5	Pentadecylamine	e	1	100/10,000
79-21-0	Peracetic Acid	e	1	500
594-42-3	Perchloromethylmercaptan		100	500
108-95-2	Phenol		1,000	500/10,000
97-18-7	Phenol, 2,2'-Thiobis(4,6-Dichloro-	e	1	100/10,000
4418-66-0	Phenol, 2,2'-Thiobis(4-Chloro-6-Methyl-Phenol, 2,2'-Thiobis (4-Chloro-6-Methyl)-	e	1	100/10,000
64-00-6	Phenol, 3-(1-Methylethyl)-, Methylcarbamate	e	1	500/10,000
58-36-6	Phenoxarsine, 10,10'-Oxydi-	e	1	500/10,000
696-28-6	Phenyl Dichloroarsine	d, h	1	500
59-88-1	Phenylhydrazine Hydrochloride	e	1	1,000/10,000
62-38-4	Phenylmercury Acetate		100	500/10,000
2097-19-0	Phenylsilatrane	e, h	1	100/10,000
103-85-5	Phenylthiourea		100	100/10,000
298-02-2	Phorate		10	10
4104-14-7	Phosacetim	e	1	100/10,000
947-02-4	Phosfolan	e	1	100/10,000
75-44-5	Phosgene	l	10	10
732-11-6	Phosmet	e	1	10/10,000
13171-21-6	Phosphamidon	e	1	100
7803-51-2	Phosphine		100	500
2703-13-1	Phosphonothioic Acid, Methyl-, O-Ethyl O-(4-(Methylthio)Phenyl) Ester	e	1	500
50782-69-9	Phosphonothioic Acid, Methyl-, S-(2-(Bis(1-Methylethyl)Amino)Ethyl O-Ethyl Ester	e	1	100
2665-30-7	Phosphonothioic Acid, Methyl-, O-(4-Nitrophenyl) O-Phenyl Ester	e	1	500
3254-63-5	Phosphoric Acid, Dimethyl 4-(Methylthio) Phenyl Ester	e	1	500
2587-90-8	Phosphorothioic Acid, O,O-Dimethyl-S-(2-Methylthio) Ethyl Ester	c, e, g	1	500
7723-14-0	Phosphorus	b, h	1	100
10025-87-3	Phosphorus Oxychloride	d	1,000	500
10026-13-8	Phosphorus Pentachloride	b, e	1	500
1314-56-3	Phosphorus Pentoxide	b, e	1	10
7719-12-2	Phosphorus Trichloride		1,000	1,000
84-80-0	Phytloquinone	a, e	1	10,000
57-47-6	Physostigmine	e	1	100/10,000
57-64-7	Physostigmine, Salicylate (1:1)	e	1	100/10,000
124-87-8	Picrotoxin	e	1	500/10,000

CAS No.	Chemical name	Notes	Reportable quantity* (pounds)	Threshold planning quantity (pounds)
110-89-4	Piperidine	e	1	1,000
5281-13-0	Piprotal	e	1	100/10,000
23505-41-1	Pirimifos-Ethyl	e	1	1,000
10025-65-7	Platinous Chloride	a, e	1	10,000
13454-96-1	Platinum Tetrachloride	a, e	1	10,000
10124-50-2	Potassium Arsenite	d	1,000	500/10,000
151-50-8	Potassium Cyanide	b	10	100
506-61-6	Potassium Silver Cyanide	b	1	500
2631-37-0	Promecarb	e, h	1	500/10,000
106-96-7	Propargyl Bromide	e	1	10
57-57-8	Propiolactone, Beta-	e	1	500
107-12-0	Propionitrile		10	500
542-76-7	Propionitrile, 3-Chloro-		1,000	1,000
70-69-9	Propiophenone, 4-Amino-	e, g	1	100/10,000
109-61-5	Propyl Chloroformate	e	1	500
1331-17-5	Propylene Glycol, Allyl Ether	a, e	1	10,000
75-56-9	Propylene Oxide	l	100	10,000
75-55-8	Propyleneimine	d	1	10,000
2275-18-5	Prothoate	e	1	100/10,000
95-63-6	Pseudocumene	a, e	1	10,000
129-00-0	Pyrene	c	5,000	1,000/10,000
140-76-1	Pyridine, 2-Methyl-5-Vinyl-	e	1	500
504-24-5	Pyridine, 4-Amino-	h	1,000	500/10,000
1124-33-0	Pyridine, 4-Nitro-, 1-Oxide	e	1	500/10,000
53558-25-1	Pyriminil	e, h	1	100/10,000
10049-07-7	Rhodium Trichloride	a, e	1	10,000
14167-18-1	Salcomine	e	1	500/10,000
107-44-8	Sarin	e, h	1	10
7783-00-8	Selenious Acid		10	1,000/10,000
7791-23-3	Selenium Oxychloride	e	1	500
563-41-7	Semicarbazide Hydrochloride	e	1	1,000/10,000
3037-72-7	Silane, (4-Aminobutyl)Diethoxymethyl-	e	1	1,000
128-56-3	Sodium Anthraquinone-1-Sulfonate	a, e	1	10,000
7631-89-2	Sodium Arsenate	d	1,000	1,000/10,000
7784-46-5	Sodium Arsenite	d	1,000	500/10,000
26628-22-8	Sodium Azide (Na(N3))	b	1,000	500
124-65-2	Sodium Cacodylate	e	1	100/10,000
143-33-9	Sodium Cyanide (Na(CN))	b	10	100
62-74-8	Sodium Fluoroacetate		10	10/10,000
131-52-2	Sodium Pentachlorophenate	e	1	100/10,000
13410-01-0	Sodium Selenate	e	1	100/10,000
10102-18-8	Sodium Selenite	h	100	100/10,000
10102-20-2	Sodium Tellurite	e	1	500/10,000
900-95-8	Stannane, Acetoxytriphenyl-	e, g	1	500/10,000
57-24-9	Strychnine	c	10	100/10,000
60-41-3	Strychnine, Sulfate	e	1	100/10,000
3689-24-5	Sulfotep		100	500
3569-57-1	Sulfoxide, 3-Chloropropyl Octyl	e	1	500
7446-09-5	Sulfur Dioxide	e, l	1	500
7783-60-0	Sulfur Tetrafluoride	e	1	100
7446-11-9	Sulfur Trioxide	b, e	1	100
7664-93-9	Sulfur Acid		1,000	1,000
77-81-6	Tabun	c, e, h	1	10
13494-80-9	Tellurium	e	1	500/10,000
7783-80-4	Tellurium Hexafluoride	e, k	1	100
107-49-3	TEPP		10	100
13071-79-9	Terbufos	e, h	1	100
78-00-2	Tetraethyllead	c, d	10	100
597-64-8	Tetraethyltin	c, e	1	100
75-74-1	Tetramethyllead	c, e, l	1	100
509-14-8	Tetranitromethane		10	500
1314-32-5	Thallic Oxide	a	100	10,000
10031-59-1	Thallium Sulfate	h	100	100/10,000
6533-73-9	Thallous Carbonate	c, h	100	100/10,000
7791-12-0	Thallous Chloride	c, h	100	100/10,000

CAS No.	Chemical name	Notes	Reportable quantity* (pounds)	Threshold planning quantity (pounds)
2757-18-8	Thallous Malonate	c, e, h	1	100/10,000
7446-18-6	Thallous Sulfate		100	100/10,000
2231-57-4	Thiocarbazide	e	1	1,000/10,000
21564-17-0	Thiocyanic Acid, 2-(Benzothiazolylthio)Methyl Ester	a, e	1	10,000
39196-18-4	Thiofanox		100	100/10,000
640-15-3	Thiometon	a, e	1	10,000
297-97-2	Thionazin		100	500
108-98-5	Thiophenol		100	500
79-19-6	Thiosemicarbazide		100	100/10,000
5344-82-1	Thiourea, (2-Chlorophenyl)-		100	100/10,000
614-78-8	Thiourea, (2-Methylphenyl)-	e	1	500/10,000
7550-45-0	Titanium Tetrachloride	e	1	100
584-84-9	Toluene 2,4-Diisocyanate		100	500
91-08-7	Toluene 2,6-Diisocyanate		100	100
110-57-6	Trans-1,4-Dichlorobutene	e	1	500
1031-47-6	Triamiphos	e	1	500/10,000
24017-47-8	Triazofos	e	1	500
76-02-8	Trichloroacety Chloride	e	1	500
115-21-9	Trichloroethylsilane	e, h	1	500
327-98-0	Trichloronate	e, k	1	500
98-13-5	Trichlorophenylsilane	e, h	1	500
52-68-6	Trichlorophon	a	100	10,000
1558-25-4	Trichloro(Chloromethyl)Silane	e	1	100
27137-85-5	Trichloro(Dichlorophenyl)Silane	e	1	500
998-30-1	Triethoxysilane	e	1	500
75-77-4	Trimethylchlorosilane	e	1	1,000
824-11-3	Trimethylolpropane Phosphite	e, h	1	100/10,000
1066-45-1	Trimethyltin Chloride	e	1	500/10,000
639-58-7	Triphenyltin Chloride	e	1	500/10,000
555-77-1	Tris(2-Chloroethyl)Amine	e, h	1	100
2001-95-8	Valinomycin	c, e	1	1,000/10,000
1314-62-1	Vanadium Pentoxide		1,000	100/10,000
108-05-4	Vinyl Acetate Monomer	d, l	5,000	1,000
3048-64-4	Vinylnorbornene	a, e	1	10,000
81-81-2	Warfarin		100	500/10,000
129-06-6	Warfarin Sodium	e, h	1	100/10,000
28347-13-9	Xylylene Dichloride	e	1	100/10,000
58270-08-9	Zinc, Dichloro(4,4-Dimethyl-5((((Methylamino) Carbonyl)Oxy)Imino)Pentanenitrile)-,(T-4)-	e	1	100/10,000
1314-84-7	Zinc Phosphide	b	100	500

*Only the statutory or final RQ is shown. For more information, see 40 CFR Table 302.4

Notes:

a This chemical does not meet acute toxicity criteria. Its TPQ is set at 10,000 pounds.

b This material is a reactive solid. The TPQ does not default to 10,000 pounds for non-powder, non-molten, non-solution form.

c The calculated TPQ changed after technical review as described in the technical support document.

d Indicates that the RQ is subject to change when the assessment of potential carcinogenicity and/or other toxicity is completed.

e Statutory reportable quantity for purposes of notification under SARA sect 304(a)(2).

f The statutory 1 pound reportable quantity for methyl isocyanate may be adjusted in a future rulemaking action.

g New chemicals added that were not part of the original list of 402 substances.

h Revised TPQ based on new or re-evaluated toxicity data.

j TPQ is revised to its calculated value and does not change due to technical review as in proposed rule.

k The TPQ was revised after proposal due to calculation error.

l Chemicals on the original list that do not meet toxicity criteria but because of their high production volume and recognized toxicity are considered chemicals of concern ("Other chemicals").

APPENDIX B.—THE LIST OF EXTREMELY HAZARDOUS SUBSTANCES AND THEIR THRESHOLD PLANNING QUANTITIES

[CAS Number Order]

CAS No.	Chemical name	Notes	Reportable quantity* (pounds)	Threshold planning quantity (pounds)
0	Organorhodium Complex (PMN-82-147)	e	1	10/10,000
50-00-0	Formaldehyde	d, l	1,000	500
50-07-7	Mitomycin C	d	1	500/10,000
50-14-6	Ergocalciferol	c, e	1	1,000/10,000

CAS No.	Chemical name	Notes	Reportable quantity* (pounds)	Threshold planning quantity (pounds)
51-21-8	Fluorouracil	e	1	500/10,000
51-75-2	Mechlorethamine	c, e	1	10
51-83-2	Carbachol Chloride	e	1	500/10,000
52-68-6	Trichlorophon	a	100	10,000
53-86-1	Indomethacin	a, e	1	10,000
54-11-5	Nicotine	c	100	100
54-62-6	Aminopterin	e	1	500/10,000
55-91-4	Isofluorophate	c	100	100
56-25-7	Cantharidin	e	1	100/10,000
56-38-2	Parathion	c, d	1	100
56-72-4	Coumaphos		10	100/10,000
57-14-7	Dimethylhydrazine	d	1	1,000
57-24-9	Strychnine	c	10	100/10,000
57-47-6	Physostigmine	e	1	100/10,000
57-57-8	Propiolactone, Beta-	e	1	500
57-64-7	Physostigmine, Salicylate (1:1)	e	1	100/10,000
57-74-9	Chlordane	d	1	1,000
58-36-6	Phenoxarsine, 10,10'-Oxydi-	e	1	500/10,000
58-89-9	Lindane	d	1	1,000/10,000
59-88-1	Phenylhydrazine Hydrochloride	e	1	1,000/10,000
60-34-4	Methyl Hydrazine		10	500
60-41-3	Strychnine, Sulfate	e	1	100/10,000
60-51-5	Dimethoate		10	500/10,000
62-38-4	Phenylmercury Acetate		100	500/10,000
62-53-3	Aniline	d, l	5,000	1,000
62-73-7	Dichlorvos		10	1,000
62-74-8	Sodium Fluoroacetate		10	10/10,000
62-75-9	Nitrosodimethylamine	d, h	1	1,000
64-00-6	Phenol, 3-(1-Methylethyl)-, Methylcarbamate	e	1	500/10,000
64-86-8	Colchicine	e, h	1	10/10,000
65-30-5	Nicotine Sulfate	e	1	100/10,000
65-86-1	Orotic Acid	a, e	1	10,000
66-81-9	Cycloheximide	e	1	100/10,000
67-66-3	Chloroform	d, l	5,000	10,000
70-69-9	Propiophenone, 4-Amino-	e, g	1	100/10,000
71-63-6	Digitoxin	c, e	1	100/10,000
72-20-8	Endrin		1	500/10,000
74-83-9	Methyl bromide	l	1,000	1,000
74-90-8	Hydrocyanic Acid		10	100
74-93-1	Methyl Mercaptan		100	500
75-15-0	Carbon Disulfide	l	100	10,000
75-18-3	Dimethyl Sulfide	e	1	100
75-21-8	Ethylene Oxide	d, l	1	1,000
75-44-5	Phosgene	l	10	10
75-55-8	Propyleneimine	d	1	10,000
75-56-9	Propylene Oxide	l	100	10,000
75-74-1	Tetramethyllead	c, e, l	1	100
75-77-4	Trimethylchlorosilane	e	1	1,000
75-78-5	Dimethyldichlorosilane	e, h	1	500
75-79-6	Methyltrichlorosilane	e, h	1	500
75-86-5	Acetone Cyanohydrin		10	1,000
76-01-7	Pentachloroethane	a, d	1	10,000
76-02-8	Trichloroacetyl Chloride	e	1	500
77-47-4	Hexachlorocyclopentadiene	d, h	1	100
77-78-1	Dimethyl Sulfate	d	1	500
77-81-6	Tabun	c, e, h	1	10
78-00-2	Tetraethyllead	c, d	10	100
78-94-2	Dioxathion	e	1	500
78-53-5	Amiton	e	1	500
78-71-7	Oxetane, 3,3-Bis(Chloromethyl)-	e	1	500
78-82-0	Isobutyronitrile	a, h	1	1,000
78-94-4	Methyl Vinyl Ketone	e	1	10
78-97-7	Lactonitrile	e	1	1,000
79-06-1	Acrylamide	d, l	5,000	1,000/10,000
79-11-8	Chloroacetic Acid	e	1	100/10,000
79-19-6	Thiosemicarbazide		100	100/10,000

CAS No.	Chemical name	Notes	Reportable quantity* (pounds)	Threshold planning quantity (pounds)
79-21-0	Peracetic Acid	e	1	500
79-22-1	Methyl Chloroformate	d, h	1,000	500
80-63-7	Methyl 2-Chloroacrylate	e	1	500
81-81-2	Warfarin		100	500/10,000
82-66-6	Diphacinone	e	1	10/10,000
84-74-2	Dibutyl Phthalate	a	10	10,000
84-80-0	Phylloquinone	a, e	1	10,000
86-50-0	Azinphos-Methyl		1	10/10,000
86-88-4	ANTU		100	500/10,000
87-86-5	Pentachlorophenol	a, d	10	10,000
88-05-1	Aniline, 2,4,6-Trimethyl-	e	1	500
88-85-7	Dinoseb		1,000	100/10,000
91-08-7	Toluene 2,6-Diisocyanate		100	100
93-05-0	Diethyl-p-Phenylenediamine	a, e	1	10,000
95-48-7	Cresol, o-	d	1,000	1,000/10,000
95-63-6	Pseudocumene	a, e	1	10,000
97-18-7	Phenol, 2,2'-Thiobis(4,6-Dichloro-(4,6-dichloro)-	e	1	100/10,000
98-05-5	Benzenearsonic Acid	e	1	10/10,000
98-07-7	Benzotrichloride	d	1	100
98-09-9	Benzenesulfonyl Chloride	a	100	10,000
98-13-5	Trichlorophenylsilane	e, h	1	500
98-16-8	Benzenamine, 3-(Trifluoromethyl)-	e	1	500
98-87-3	Benzal Chloride	d	5,000	500
98-95-3	Nitrobenzene	l	1,000	10,000
99-98-9	Dimethyl-p-Phenylenediamine	e	1	10/10,000
100-14-1	Benzene, 1-(Chloromethyl)-4-Nitro-	e	1	500/10,000
100-44-7	Benzyl Chloride	d	100	500
102-36-3	Isocyanic Acid, 3,4-Dichlorophenyl Ester	e	1	500/10,000
103-85-5	Phenylthiourea		100	100/10,000
106-89-8	Epichlorohydrin	d, l	1,000	1,000
106-96-7	Propargyl Bromide	e	1	10
106-99-0	Butadiene	a, e	1	10,000
107-02-8	Acrolein		1	500
107-07-3	Chloroethanol	e	1	500
107-11-9	Allylamine	e	1	500
107-12-0	Propionitrile		10	500
107-13-1	Acrylonitrile	d, l	100	10,000
107-15-3	Ethylenediamine		5,000	10,000
107-16-4	Formaldehyde Cyanohydrin	e, h	1	1,000
107-18-6	Allyl Alcohol		100	1,000
107-20-0	Chloroacetaldehyde	a	1,000	10,000
107-30-2	Chloromethyl Methyl Ether	c, d	1	100
107-44-8	Sarin	e, h	1	10
107-49-3	TEPP		10	100
108-05-4	Vinyl Acetate Monomer	d, l	5,000	1,000
108-23-6	Isopropyl Chloroformate	e	1	1,000
108-67-8	Mesitylene	a, e	1	10,000
108-91-8	Cyclohexylamine	e, l	1	10,000
108-95-2	Phenol		1,000	500/10,000
108-98-5	Thiophenol		100	500
109-19-3	Butyl Isovalerate	a, e	1	10,000
109-61-5	Propyl Chloroformate	e	1	500
109-77-3	Malononitrile		1,000	500/10,000
110-00-9	Furan		100	500
110-57-6	Trans-1,4-Dichlorobutene	e	1	500
110-89-4	Piperidine	e	1	1,000
111-34-2	Butyl Vinyl Ether	a, e	1	10,000
111-44-4	Dichloroethyl Ether	d	1	10,000
111-69-3	Adiponitrile	e, l	1	1,000
115-21-9	Trichloroethylsilane	e, h	1	500
115-26-4	Dimefox	e	1	500
115-29-7	Endosulfan		1	10/10,000
115-90-2	Fensulfothion	e, h	1	500
116-06-3	Aldicarb	c	1	100/10,000
117-52-2	Coumafuryl	a, e	1	10,000
117-84-0	Dioctyl Phthalate	a	5,000	10,000
119-38-0	Isopropylmethylpyrazolyl Dimethylcarbamate	e	1	500

CAS No.	Chemical name	Notes	Reportable quantity* (pounds)	Threshold planning quantity (pounds)
122-14-5	Fenitrothion	e	1	500
123-31-9	Hydroquinone	l	1	500/10,000
123-73-9	Crotonaldehyde, (E)-		100	1,000
124-65-2	Sodium Cacodylate	e	1	100/10,000
124-87-8	Picrotoxin	e	1	500/10,000
126-98-7	Methacrylonitrile	h	1	500
128-56-3	Sodium Anthraquinone-1-Sulfonate	a, e	1	10,000
129-00-0	Pyrene	c	5,000	1,000/10,000
129-06-6	Warfarin Sodium	e, h	1	100/10,000
131-11-3	Dimethyl Phthalate	a	5,000	10,000
131-52-2	Sodium Pentachlorophenate	e	1	100/10,000
140-29-4	Benzyl Cyanide	e, h	1	500
140-76-1	Pyridine, 2-Methyl-5-Vinyl-	e	1	500
141-66-2	Dicrotophos	e	1	100
143-33-9	Sodium Cyanide (Na(CN))	b	10	100
144-49-0	Fluoroacetic Acid	e	1	10/10,000
149-74-6	Dichloromethyphenylsilane	e	1	1,000
151-38-2	Methoxyethylmercuric Acetate	e	1	500/10,000
151-50-8	Potassium Cyanide	b	10	100
151-56-4	Ethyleneimine	d	1	500
152-16-9	Diphosphoramide, Octamethyl-		100	100
287-92-3	Cyclopentane	a, e	1	10,000
297-78-9	Isobenzan	e	1	100/10,000
297-97-2	Thionazin		100	500
298-00-0	Parathion-Methyl	c	100	100/10,000
298-02-2	Phorate		10	10
298-04-4	Disulfoton		1	500
300-62-9	Amphetamine	e	1	1,000
302-01-2	Hydrazine	d	1	1,000
309-00-2	Aldrin	d	1	500/10,000
315-18-4	Mexacarbate		1,000	500/10,000
316-42-7	Emetine, Dihydrochloride	e, h	1	1/10,000
327-98-0	Trichloronate	e, k	1	500
353-42-4	Boron Trifluoride Compound With Methyl Ether (1:1)	e	1	1,000
359-06-8	Fluoroacetyl Chloride	c, e	1	10
371-62-0	Ethylene Fluorohydrin	c, e, h	1	10
379-79-3	Ergotamine Tartrate	e	1	500/10,000
465-73-6	Isodrin		1	100/10,000
470-90-6	Chlorfenvinfos	e	1	500
502-39-6	Methylmercuric Dicyanamide	e	1	500/10,000
504-24-5	Pyridine, 4-Amino-	h	1,000	500/10,000
505-60-2	Mustard Gas	a, h	1	500
506-61-6	Potassium Silver Cyanide	b	1	500
506-68-3	Cyanogen Bromide		1,000	500/10,000
506-78-5	Cyanogen Iodide	e	1	1,000/10,000
509-14-8	Tetranitromethane		10	500
514-73-8	Dithiazanine Iodide	e	1	500/10,000
534-07-6	Bis(Chloromethyl) Ketone	e	1	10/10,000
534-52-1	Dinitrocresol		10	10/10,000
535-89-7	Crimidine	e	1	100/10,000
538-07-8	Ethylbis(2-Chloroethyl)Amine	a, b	1	500
541-25-3	Lewisite	c, e, h	1	10
541-53-7	Dithiobiuret		100	100/10,000
542-76-7	Propionitrile, 3-Chloro-		1,000	1,000
542-88-1	Chloromethyl Ether	d, h	1	100
542-90-5	Ethylthiocyanate	e	1	10,000
555-77-1	Tris(2-Chloroethyl)Amine	e, h	1	100
556-61-6	Methyl Isothiocyanate	h, e	1	500
556-64-9	Methyl Thiocyanate	e	1	10,000
558-25-8	Methanesulfonyl Fluoride	e	1	1,000
563-12-2	Ethion		10	1,000
563-41-7	Semicarbazide Hydrochloride	e	1	1,000/10,000
584-84-9	Toluene 2,4-Diisocyanate		100	500
594-42-3	Perchloromethylmercaptan		100	500
597-64-8	Tetraethyltin	c, e	1	100

CAS No.	Chemical name	Notes	Reportable quantity* (pounds)	Threshold planning quantity (pounds)
614-78-8	Thiourea, (2-Methylphenyl)-	e	1	500/10,000
624-83-9	Methyl Isocyanate	f	1	500
624-92-0	Methyl Disulfide	e	1	100
625-55-8	Isopropyl Formate	e	1	500
627-11-2	Chloroethyl Chloroformate	e	1	1,000
630-60-4	Ouabain	c, e	1	100/10,000
633-03-4	C. I. Basic Green 1	a, e	1	10,000
639-58-7	Triphenyltin Chloride	e	1	500/10,000
640-15-3	Thiometon	a, e	1	10,000
640-19-7	Fluoroacetamide	j	100	100/10,000
644-64-4	Dimetilan	e	1	500/10,000
646-06-0	Dioxolane	a, e	1	10,000
675-14-9	Cyanuric Fluoride	e	1	100
676-97-1	Methyl Phosphonic Dichloride	b, e	1	100
696-28-6	Phenyl Dichloroarsine	d, h	1	500
732-11-6	Phosmet	e	1	10/10,000
760-93-0	Methacrylic Anhydride	e	1	500
786-19-6	Carbophenothion	e	1	500
814-49-3	Diethyl Chlorophosphate	e, h	1	500
814-68-6	Acrylyl Chloride	e, h	1	100
824-11-3	Trimethylolpropane Phosphite	e, h	1	100/10,000
900-95-8	Stannane, Acetoxytriphenyl-	e, g	1	500/10,000
919-86-8	Demeton-S-Methyl	e	1	500
920-46-7	Methacryloyl Chloride	e	1	100
944-22-9	Fonofos	e	1	500
947-02-4	Phosfolan	e	1	100/10,000
950-10-7	Mephosfolan	e	1	500
950-37-8	Methidathion	e	1	500/10,000
991-42-4	Norbormide	e	1	100/10,000
998-30-1	Triethoxysilane	e	1	500
999-81-5	Chlormequat Chloride	e, h	1	100/10,000
1031-47-6	Triamiphos	e	1	500/10,000
1066-45-1	Trimethyltin Chloride	e	1	500/10,000
1122-60-7	Nitrocyclohexane	e	1	500
1124-33-0	Pyridine, 4-Nitro-, 1-Oxide	e	1	500/10,000
1129-41-5	Metolcarb	e	1	100/10,000
1303-28-2	Arsenic Pentoxide	d	5,000	100/10,000
1306-19-0	Cadmium Oxide	e	1	100/10,000
1314-32-5	Thallic Oxide	a	100	10,000
1314-56-3	Phosphorus Pentoxide	b, e	1	10
1314-62-1	Vanadium Pentoxide		1,000	100/10,000
1314-84-7	Zinc Phosphide	b	100	500
1327-53-3	Arsenous Oxide	d, h	5,000	100/10,000
1331-17-5	Propylene Glycol, Allyl Ether	a, e	1	10,000
1335-87-1	Hexachloronaphthalene	a, e	1	10,000
1397-94-0	Antimycin A	c, e	1	1,000/10,000
1405-87-4	Bacitracin	a, e	1	10,000
1420-07-1	Dinoterb	e	1	500/10,000
1464-53-5	Diepoxybutane	d	1	500
1558-25-4	Trichloro(Chloromethyl)Silane	e	1	100
1563-66-2	Carbofuran		10	10/10,000
1600-27-7	Mercuric Acetate	e	1	500/10,000
1622-32-8	Ethanesulfonyl Chloride, 2-Chloro-	e	1	500
1642-54-2	Diethylcarbamazine Citrate	e	1	100/10,000
1752-30-3	Acetone Thiosemicarbazide	e	1	1,000/10,000
1910-42-5	Paraquat	e	1	10/10,000
1982-47-4	Chloroxuron	e	1	500/10,000
2001-95-8	Valinomycin	c, e	1	1,000/10,000
2032-65-7	Methiocarb		10	500/10,000
2074-50-2	Paraquat Methosulfate	e	1	10/10,000
2097-19-0	Phenylsilatrane	e, h	1	100/10,000
2104-64-5	EPN	e	1	100/10,000
2223-93-0	Cadmium Stearate	c, e	1	1,000/10,000
2231-57-4	Thiocarbazide	e	1	1,000/10,000
2235-25-8	Ethylmercuric Phosphate	a, e	1	10,000
2238-07-5	Diglycidyl Ether	e	1	1,000
2244-16-8	Carvone	a, e	1	10,000

CAS No.	Chemical name	Notes	Reportable quantity* (pounds)	Threshold planning quantity (pounds)
2275-18-5	Prothoate	e	1	100/10,000
2497-07-6	Oxydisulfoton	e, h	1	500
2524-03-0	Dimethyl Phosphorochloridothioate	e	1	500
2540-82-1	Formothion	e	1	100
2570-26-5	Pentadecylamine	e	1	100/10,000
2587-90-8	Phosphorothioic Acid, O,O-Dimethyl-S-(2-Methylthio) Ethyl Ester	c, e, g	1	500
2631-37-0	Promecarb	e, h	1	500/10,000
2636-26-2	Cyanophos	e	1	1,000
2642-71-9	Azinphos-Ethyl	e	1	100/10,000
2665-30-7	Phosphonothioic Acid, Methyl-,O-(4-Nitrophenyl) O-Phenyl Ester	e	1	500
2703-13-1	Phosphonothioic Acid, Methyl-,O-Ethyl O-(4-(Methylthio)Phenyl) Ester	e	1	500
2757-18-8	Thallous Malonate	c, e, h	1	100/10,000
2763-96-4	Muscimol	a, h	1,000	10,000
2778-04-3	Endothion	e	1	500/10,000
3037-72-7	Silane, (4-Aminobutyl)Diethoxymethyl-	e	1	1,000
3048-64-4	Vinylnorbornene	a, e	1	10,000
3254-63-5	Phosphoric Acid, Dimethyl 4-(Methylthio) Phenyl Ester	e	1	500
3569-57-1	Sulfoxide, 3-Chloropropyl Octyl	e	1	500
3615-21-2	Benzimidazole, 4,5-Dichloro-2-(Trifluoromethyl)-	e, g	1	500/10,000
3689-24-5	Sulfotep		100	500
3691-35-8	Chlorophacinone	e	1	100/10,000
3734-97-2	Amiton Oxalate	e	1	100/10,000
3735-23-7	Methyl Phenkapton	e	1	500
3878-19-1	Fuberidazole	e	1	100/10,000
4044-65-9	Bitoscanate	e	1	500/10,000
4098-71-9	Isophorone Diisocyanate	b, e	1	100
4104-14-7	Phosacetim	e	1	100/10,000
4170-30-3	Crotonaldehyde		100	1,000
4301-50-2	Fluenetil	e	1	100/10,000
4418-66-0	Phenol, 2,2'-Thiobis(4-Chloro-6-Methyl)-	e	1	100/10,000
4835-11-4	Hexamethylenediamine, N,N'-Dibutyl-	e	1	500
5281-13-0	Piprotal	e	1	100/10,000
5344-82-1	Thiourea, (2-Chlorophenyl)-		100	100/10,000
5836-29-3	Coumatetralyl	e	1	500/10,000
6533-73-9	Thallous Carbonate	c, h	100	100/10,000
6923-22-4	Monocrotophos	e	1	10/10,000
7440-02-0	Nickel	a, d	1	10,000
7440-48-4	Cobalt	a, e	1	10,000
7446-09-5	Sulfur Dioxide	e, l	1	500
7446-11-9	Sulfur Trioxide	b, e	1	100
7446-18-6	Thallous Sulfate		100	100/10,000
7487-94-7	Mercuric Chloride	e	1	500/10,000
7550-45-0	Titanium Tetrachloride	e	1	100
7580-67-8	Lithium Hydride	b, e	1	100
7631-89-2	Sodium Arsenate	d	1,000	1,000/10,000
7637-07-2	Boron Trifluoride	e	1	500
7647-01-0	Hydrogen Chloride (Gas Only)	e, l	1	500
7664-39-3	Hydrogen Fluoride		100	100
7664-41-7	Ammonia	l	100	500
7664-93-9	Sulfuric Acid		1,000	1,000
7697-37-2	Nitric Acid		1,000	1,000
7719-12-2	Phosphorus Trichloride		1,000	1,000
7722-84-1	Hydrogen Peroxide (Conc >52%)	e, l	1	1,000
7723-14-0	Phosphorus	b, h	1	100
7726-95-6	Bromine	e, l	1	500
7778-44-1	Calcium Arsenate	d	1,000	500/10,000
7782-41-4	Fluorine	k	10	500
7782-50-5	Chlorine		10	100
7783-00-8	Selenious Acid		10	1,000/10,000
7783-06-4	Hydrogen Sulfide	l	100	500
7783-07-5	Hydrogen Selenide	e	1	10
7783-60-0	Sulfur Tetrafluoride	e	1	100
7783-70-2	Antimony Pentafluoride	e	1	500
7783-80-4	Tellurium Hexafluoride	e, k	1	100
7784-34-1	Arsenous Trichloride	d	5,000	500

CAS No.	Chemical name	Notes	Reportable quantity* (pounds)	Threshold planning quantity (pounds)
7784-42-1	Arsine	e	1	100
7784-46-5	Sodium Arsenite	d	1,000	500/10,000
7786-34-7	Mevinphos		10	500
7791-12-0	Thallous Chloride	c, h	100	100/10,000
7791-23-3	Selenium Oxychloride	e	1	500
7803-51-2	Phosphine		100	500
8001-35-2	Camphechlor	d	1	500/10,000
8023-53-8	Dichlorobenzalkonium Chloride	a, e	1	10,000
8065-48-3	Demeton	e	1	500
10025-65-7	Plantinous Chloride	a, e	1	10,000
10025-73-7	Chromic Chloride	e	1	1/10,000
10025-87-3	Phosphorus Oxychloride	d	1,000	500
10025-97-5	Iridium Tetrachloride	a,e	1	10,000
10026-13-8	Phosphorus Pentachloride	b, e	1	500
10028-15-6	Ozone	e	1	100
10031-59-1	Thallium Sulfate	h	100	100/10,000
10049-07-7	Rhodium Trichloride	a, e	1	10,000
10102-18-8	Sodium Selenite	h	100	100/10,000
10102-20-2	Sodium Tellurite	e	1	500/10,000
10102-43-9	Nitric Oxide	c	10	100
10102-44-0	Nitrogen Dioxide		10	100
10124-50-2	Potassium Arsenite	d	1,000	500/10,000
10140-87-1	Ethanol, 1,2-Dichloro-, Acetate	e	1	1,000
10210-68-1	Cobalt Carbonyl	a, h	1	10/10,000
10265-92-6	Methamidophos	e	1	100/10,000
10294-34-5	Boron Trichloride	e	1	500
10311-84-9	Dialifor	e	1	100/10,000
10476-95-6	Methacrolein Diacetate	e	1	1,000
12002-03-8	Paris Green	d	100	500/10,000
12108-13-3	Manganese, Tricarbonyl Methylcyclopentadienyl	a, h	1	100
13071-79-9	Terbufos	a, h	1	100
13171-21-6	Phosphamidon	e	1	100
13194-48-4	Ethoprophos	e	1	1,000
13410-01-0	Sodium Selenate	e	1	100/10,000
13450-90-3	Gallium Trichloride	e	1	500/10,000
13454-96-1	Platinum Tetrachloride	a, e	1	10,000
13463-39-3	Nickel Carbonyl	d	1	1
13463-40-6	Iron, Pentacarbonyl	e	1	100
13494-80-9	Tellurium	e	1	500/10,000
14167-18-1	Salcomine	e	1	500/10,000
15271-41-7	Bicyclo[2.2.1]Heptane-2-Carbonitrile, 5-Chloro-6-(((Methylamino)Carbonyl)Oxy)Imino)-, (1s-(1-alpha, 2-beta, 4-alpha, 5-alpha, 6E))-.	e	1	500/10,000
16752-77-5	Methomyl	h	100	500/10,000
16919-58-7	Ammonium Chloroplatinate	a, e	1	10,000
17702-41-9	Decaborane(14)	e	1	500/10,000
17702-57-7	Formparanate	e	1	100/10,000
19287-45-7	Diborane	e	1	100
19624-22-7	Pentaborane	e	1	500
20816-12-0	Osmium Tetroxide	a	1,000	10,000
20830-75-5	Digoxin	e, h	1	10/10,000
20859-73-8	Aluminum Phosphide	b	100	500
21548-32-3	Fosthietan	e	1	500
21564-17-0	Thiocyanic Acid, 2-(Benzothiazolylthio)Methyl Ester	a, e	1	10,000
21609-90-5	Leptophos	e	1	500/10,000
21908-53-2	Mercuric Oxide	e	1	500/10,000
21923-23-9	Chlorthiophos	e, h	1	500
22224-92-6	Fenamiphos	e	1	10/10,000
23135-22-0	Oxamyl	e	1	100/10,000
23422-53-9	Formetanate Hydrochloride	e,h	1	500/10,000
23505-41-1	Pirimifos-Ethyl	e	1	1,000
24017-47-8	Triazofos	e	1	500
24934-91-6	Chlormephos	e	1	500
26419-73-8	Carbamic Acid, Methyl-, O-(((2,4-Dimethyl-1, 3-Dithiolan-2-yl)Methylene)Amino)-	e	1	100/10,000
26628-22-8	Sodium Azide ($Na(N_3)$)	b	1,000	500
27137-85-5	Trichloro(Dichlorophenyl)Silane	e	1	500
28347-13-9	Xylylene Dichloride	e	1	100/10,000
28772-56-7	Bromadiolone	e	1	100/10,000

CAS No.	Chemical name	Notes	Reportable quantity* (pounds)	Threshold planning quantity (pounds)
30674-80-7	Methacryloyloxyethyl Isocyanate	e, h	1	100
39196-18-4	Thiofanox		100	100/10,000
50782-69-9	Phosphonothioic Acid, Methyl-, S-(2-(Bis(1-Methylethyl)Amino)Ethyl) O-Ethyl Ester	e	1	100
53558-25-1	Pyriminil	e, h	1	100/10,000
58270-08-9	Zinc, Dichloro(4,4-Dimethyl-5(((Methylamino)Carbonyl)Oxy)Imino)Pentanenitrile)-, (T-4)-	e	1	100/10,000
62207-76-5	Cobalt, ((2,2'-(1,2-Ethanediylbis(Nitrilomethylidyne))Bis(6-Fluorophenolato))(2-)-N,N',O,O')-.	e	1	100/10,000

* Only the statutory or final RQ is shown. For more information, see 40 CFR Table 302.4.

Notes:

a This chemical does not meet acute toxicity criteria. Its TPQ is set at 10,000 pounds.
b This material is a reactive solid. The TPQ does not default to 10,000 pounds for non-powder, non-molten, non-solution form.
c The calculated TPQ changed after technical review as described in the technical support document.
d Indicates that the RQ is subject to change when the assessment of potential carcinogenicity and/or other toxicity is completed.
e Statutory reportable quantity for purposes of notification under SARA sect 304(a)(2).
f The statutory 1 pound reportable quantity for methyl isocyanate may be adjusted in a future rulemaking action.
g New chemicals added that were not part of the original list of 402 substances.
h Revised TPQ based on new or re-evaluated toxicity data.
j TPQ is revised to its calculated value and does not change due to technical review as in proposed rule.
k The TPQ was revised after proposal due to calculation error.
l Chemicals on the original list that do not meet the toxicity criteria but because of their high production volume and recognized toxicity are considered chemicals of concern ("Other chemicals").

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APPENDIX B

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES

Hazardous Substance	Synonyms	Reportable Quantity (RQ) Pounds (Kilograms)
Acenaphthene		100 (45.4)
Acenaphthylene		5000 (2270)
Acetaldehyde *	Ethanal	1000 (454)
Acetaldehyde, chloro-	Chloroacetaldehyde	1000 (454)
Acetaldehyde, trichloro-	Chloral	1 (0.454)
Acetamide, N-(aminothioxomethyl)-	1-Acetyl-2-thiourea	1000 (454)
Acetamide, N-(4-ethoxyphenyl)-	Phenacetin	1 (0.454)
Acetamide, N-fluoren-2-yl-	2-Acetylaminofluorene	1 (0.454)
Acetamide, 2-fluoro-	Fluoroacetamide	100 (45.4)
Acetic acid *		5000 (2270)

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity(RQ) Pounds(Kilograms)
Acetic acid, ethyl ester	Ethyl acetate	5000 (2270)
Acetic acid, fluoro-, sodium salt	Fluoroacetic acid, sodium salt	10 (4.54)
Acetic acid, lead salt	Lead acetate	5000 (2270)
Acetic acid, thallium(I) salt	Thallium(I) acetate	100 (45.4)
Acetic anhydride *		5000 (2270)
Acetimidic acid, N-[(methylcarbamoyl)oxy]thio-methyl ester	Methomyl	100 (45.4)
Acetone *	2-Propanone	5000 (2270)
Acetone cyanohydrin *	Propanenitrile, 2-hydroxy-2-methyl- 2-Methyllactonitrile	10 (4.54)
Acetonitrile *	Ethanenitrile	5000 (2270)
3-(alpha-Acetonylbenzyl)-4-hydroxycoumarin and salts	Warfarin	100 (45.4)
Acetophenone	Ethanone, 1-phenyl-	5000 (2270)
2-Acetylaminofluorene	Acetamide, N-fluoren-2-yl-	1 (0.454)
Acetyl bromide *		5000 (2270)
Acetyl chloride *	Ethanoyl chloride	5000 (2270)
1-Acetyl-2-thiourea	Acetamide, N-(aminothioxomethyl)-	1000 (454)
Acrolein *	2-Propenal	1 (0.454)
Acrylamide	2-Propenamide	5000 (2270)
Acrylic acid *	2-Propenoic acid	5000 (2270)
Acrylonitrile *	2-Propenenitrile	100 (45.4)
Adipic acid		5000 (2270)
Alanine, 3-[p-bis(2-chloroethyl)amino]phenyl-, L-	Melphalan	1 (0.454)
Aldicarb	Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime	1 (0.454)
Aldrin *	1,2,3,4,10-10-Hexachloro-1,4,4a,5,8,8a-hexahydro- 1,4:5,8-endo,exo-dimethanonaphthalene	1 (0.454)
Allyl alcohol *	2-Propen-1-ol	100 (45.4)
Allyl chloride *		1000 (454)
Aluminum phosphide *		100 (45.4)
Aluminum sulfate *		5000 (2270)
2-Amino-1-methyl benzene	o-Toluidine	1 (0.454)
4-Amino-1-methyl benzene	p-Toluidine	1 (0.454)
5-(Aminomethyl)-3-isoxazolol	3(2H)-Isoxazolone, 5-(aminomethyl)-	1000 (454)
4-Aminopyridine	4-Pyridinamine	1000 (454)
Amitrole	1H-1,2,4-Triazol-3-amine	1 (0.454)
Ammonia *		100 (45.4)
Ammonium acetate		5000 (2270)
Ammonium benzoate		5000 (2270)
Ammonium bicarbonate		5000 (2270)
Ammonium bichromate	Ammonium dichromate @	1000 (454)
Ammonium bifluoride *		100 (45.4)
Ammonium bisulfite *		5000 (2270)
Ammonium carbamate *		5000 (2270)
Ammonium carbonate *		5000 (2270)
Ammonium chloride		5000 (2270)
Ammonium chromate		1000 (454)
Ammonium citrate, dibasic		5000 (2270)
Ammonium dichromate @	Ammonium bichromate	1000 (454)
Ammonium fluoborate *		5000 (2270)
Ammonium fluoride *		100 (45.4)
Ammonium hydroxide *		1000 (454)
Ammonium oxalate *		5000 (2270)
Ammonium picrate *	Phenol, 2,4,6-trinitro-, ammonium salt	10 (4.54)
Ammonium silicofluoride *		1000 (454)
Ammonium sulfamate		5000 (2270)
Ammonium sulfide *		100 (45.4)
Ammonium sulfite		5000 (2270)
Ammonium tartrate		5000 (2270)
Ammonium thiocyanate		5000 (2270)
Ammonium thiosulfate		5000 (2270)
Ammonium vanadate	Vanadic acid, ammonium salt	1000 (454)
Amyl acetate *		5000 (2270)
iso-Amyl acetate		
sec-Amyl acetate		
tert-Amyl acetate		
Aniline *	Benzenamine	5000 (2270)
Anthracene		5000 (2270)
Antimony *		5000 (2270)
Antimony pentachloride *		1000 (454)
Antimony potassium tartrate *		100 (45.4)
Antimony tribromide *		1000 (454)
Antimony trichloride *		1000 (454)
Antimony trifluoride *		1000 (454)
Antimony triiodide		1000 (454)
Aroclor 1016	POLYCHLORINATED BIPHENYLS (PCBs)	10 (4.54)
Aroclor 1221	POLYCHLORINATED BIPHENYLS (PCBs)	10 (4.54)
Aroclor 1232	POLYCHLORINATED BIPHENYLS (PCBs)	10 (4.54)
Aroclor 1242	POLYCHLORINATED BIPHENYLS (PCBs)	10 (4.54)
Aroclor 1248	POLYCHLORINATED BIPHENYLS (PCBs)	10 (4.54)
Aroclor 1254	POLYCHLORINATED BIPHENYLS (PCBs)	10 (4.54)
Aroclor 1260	POLYCHLORINATED BIPHENYLS (PCBs)	10 (4.54)
Arsenic *		1 (0.454)
Arsenic acid *		1 (0.454)
Arsenic disulfide *		5000 (2270)
Arsenic(III) oxide	Arsenic trioxide *	5000 (2270)
Arsenic(V) oxide	Arsenic pentoxide *	5000 (2270)
Arsenic pentoxide *	Arsenic(V) oxide	5000 (2270)
Arsenic trichloride *		5000 (2270)
Arsenic triiodide *	Arsenic(III) oxide	5000 (2270)
Arsenic trisulfide *		5000 (2270)

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity(RQ) Pounds(Kilograms)
Benzyl chloride *	Benzene, chloromethyl-	100 (45.4)
Beryllium ¢	Beryllium dust ¢	1 (0.454)
Beryllium chloride *		5000 (2270)
Beryllium dust ¢	Beryllium ¢	1 (0.454)
Beryllium fluoride *		5000 (2270)
Beryllium nitrate *		5000 (2270)
alpha - BHC		1 (0.454)
beta - BHC		1 (0.454)
delta - BHC		1 (0.454)
gamma - BHC	Hexachlorocyclohexane (gamma isomer)	1 (0.454)
	Lindane *	
2,2'-Bioxirane	1,2:3,4-Diepoxybutane	1 (0.454)
(1,1'-Biphenyl)-4,4'-diamine	Benzidine *	1 (0.454)
(1,1'-Biphenyl)-4,4'-diamine,3,3'-dichloro-	3,3'-Dichlorobenzidine	1 (0.454)
(1,1'-Biphenyl)-4,4'-diamine,3,3'-dimethoxy-	3,3'-Dimethoxybenzidine	1 (0.454)
(1,1'-Biphenyl)-4,4'-diamine,3,3'-dimethyl-	3,3'-Dimethylbenzidine	1 (0.454)
Bis(2-chloroethoxy) methane	Ethane, 1,1'-[methylenebis(oxy)]bis(2-chloro-	1000 (454)
Bis(2-chloroethyl) ether	Dichloroethyl ether	1 (0.454)
	Ethane, 1,1'-oxybis(2-chloro-	
Bis(2-chloroisopropyl) ether	Propane, 2,2'-oxybis(2-chloro-	1000 (454)
Bis(chloromethyl) ether	Methane, oxybis(chloro-	1 (0.454)
Bis(dimethylthiocarbamoyl) disulfide	Thiram	10 (4.54)
Bis(2-ethylhexyl)phthalate	1,2-Benzenedicarboxylic acid, [bis(2-ethylhexyl)]ester	1 (0.454)
Bromine cyanide	Cyanogen bromide *	1000 (454)
Bromoacetone *	2-Propanone, 1-bromo-	1000 (454)
Bromoform	Methane, tribromo-	100 (45.4)
4-Bromophenyl phenyl ether	Benzene, 1-bromo-4-phenoxy-	100 (45.4)
Brucine	Strychnidin-10-one, 2,3-dimethoxy-	100 (45.4)
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	Hexachlorobutadiene *	1(0.454)
1-Butanamine, N-butyl-N-nitroso-	N-Nitrosodi-n-butylamine	1 (0.454)
Butanoic acid, 4-[bis(2-chloroethyl)amino]benzene-	Chlorambucil	1 (0.454)
1-Butanol	n-Butyl alcohol *	5000 (2270)
2-Butanone	Ethyl methyl ketone @	5000 (2270)
	Methyl ethyl ketone *	
2-Butanone peroxide	Methyl ethyl ketone peroxide *	10 (4.54)
2-Butenal	Crotonaldehyde *	100 (45.4)
2-Butene, 1,4-dichloro-	1,4-Dichloro-2-butene	1 (0.454)
Butyl acetate *		5000 (2270)
iso-Butyl acetate		
sec-Butyl acetate		
tert-Butyl acetate		
n-Butyl alcohol *	1-Butanol	5000 (2270)
Butylamine *		1000 (454)
iso-Butylamine		
sec-Butylamine		
tert-Butylamine		
Butyl benzyl phthalate		100 (45.4)
n-Butyl phthalate	Di-n-butyl phthalate	10 (4.54)
	Dibutyl phthalate	
	1,2-Benzenedicarboxylic acid, dibutyl ester	
Butyric acid *		5000 (2270)
iso-Butyric acid		
Cacodylic acid	Hydroxydimethylarsine oxide	1 (0.454)
Cadmium ¢		1 (0.454)
Cadmium acetate		100 (45.4)
Cadmium bromide		100 (45.4)
Cadmium chloride		100 (45.4)
Calcium arsenate *		1000 (454)
Calcium arsenite *		1000 (454)
Calcium carbide *		10 (4.54)
Calcium chromate	Chromic acid, calcium salt	1000 (454)
Calcium cyanide *		10 (4.54)
Calcium dodecylbenzene sulfonate		1000 (454)
Calcium hypochlorite *		10 (4.54)
Camphene, octachloro-	Toxaphene *	1 (0.454)
Captan		10 (4.54)
Carbamic acid, ethyl ester	Ethyl carbamate (Urethan)	1 (0.454)
Carbamic acid, methylnitroso-, ethyl ester	N-Nitroso-N-methylurethane	1 (0.454)
Carbamide, N-ethyl-N-nitroso-	N-Nitroso-N-ethylurea	1 (0.454)
Carbamide, N-methyl-N-nitroso-	N-Nitroso-N-methylurea	1 (0.454)
Carbamide, thio-	Thiourea	1 (0.454)
Carbamimidoselenoic acid	Selenourea	1000 (454)
Carbamoyl chloride, dimethyl-	Dimethylcarbamoyl chloride	1 (0.454)
Carbaryl *		100 (45.4)
Carbofuran *		10 (4.54)
Carbon bisulfide *	Carbon disulfide *	100 (45.4)
Carbon disulfide *	Carbon bisulfide *	100 (45.4)
Carbonic acid, dithallium (I) salt	Thallium(I) carbonate	100(45.4)
Carbonochloridic acid, methyl ester	Methyl chlorocarbonate *	1000 (454)
	Methyl chloroformate @	
Carbon oxyfluoride	Carbonyl fluoride	1000 (454)
Carbon tetrachloride *	Methane, tetrachloro-	5000 (2270)
Carbonyl chloride	Phosgene *	10 (4.54)
Carbonyl fluoride	Carbon oxyfluoride	1000 (454)
Chloral	Acetaldehyde, trichloro-	1 (0.454)
Chlorambucil	Butanoic acid, 4-[bis(2-chloroethyl)amino]benzene-	1 (0.454)
Chlordane *	Chlordane, technical *	1 (0.454)
	4,7-Methanoindan, 1,2,4,5,6,7,8,8-octachloro-3a,4,7,7a-tetrahydro-	
Chlordane, technical *	Chlordane *	1 (0.454)
	4,7-Methanoindan, 1,2,4,5,6,7,8,8-octachloro-3a,4,7,7a-tetrahydro-	

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity (RQ) Pounds (Kilograms)
Arsine, diethyl-	Diethylarsine	1 (0.454)
Asbestos * **		1 (0.454)
Auramine	Benzenamine, 4,4'-carbonimidoylbis (N,N-dimethyl-	1(0.454)
Azaserine	L-Serine, diazoacetate (ester)	1 (0.454)
Azindane	Ethylenimine	1 (0.454)
Azinphos methyl @	Guthion *	1 (0.454)
Azirino(2',3':3,4)pyrrolo(1,2-a)indole-4,7-dione,6-amino-8-[((aminocarbonyl)oxy)methyl]-1,1a,2,8,8a, 8b-hexahydro-8a-methoxy-5-methyl-.	Mitomycin C	1 (0.454)
Barium cyanide *		10 (4.54)
Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	3-Methylcholanthrene	1 (0.454)
Benz[c]acridine	3,4-Benzacridine	1 (0.454)
3,4-Benzacridine	Benz[c]acridine	1 (0.454)
Benzal chloride	Benzene, dichloromethyl-	5000 (2270)
Benz[a]anthracene	Benzo[a]anthracene	1 (0.454)
	1,2-Benzanthracene	
1,2-Benzanthracene	Benz[a]anthracene	1 (0.454)
	Benzo[a]anthracene	
1,2-Benzanthracene, 7,12-dimethyl-	7,12-Dimethylbenz[a]anthracene	1 (0.454)
Benzenamine	Aniline *	5000 (2270)
Benzenamine, 4,4'-carbonimidoylbis (N,N-dimethyl-	Auramine	1(0.454)
Benzenamine, 4-chloro-	p-Chloroaniline	1000 (454)
Benzenamine, 4-chloro-2-methyl-, hydrochloride	4-Chloro-o-toluidine, hydrochloride	1 (0.454)
Benzenamine, N,N-dimethyl-4-phenylazo-	Dimethylaminoazobenzene	1 (0.454)
Benzenamine, 4,4'-methylenebis(2-chloro-	4,4'-Methylenebis(2-chloroaniline)	1 (0.454)
Benzenamine, 2-methyl-, hydrochloride	o-Toluidine hydrochloride	1 (0.454)
Benzenamine, 2-methyl-5-nitro-	5-Nitro-o-toluidine	1 (0.454)
Benzenamine, 4-nitro-	p-Nitroaniline	5000 (2270)
Benzene *		1000 (454)
Benzene, 1-bromo-4-phenoxy-	4-Bromophenyl phenyl ether	100 (45.4)
Benzene, chloro-	Chlorobenzene *	100 (45.4)
Benzene, chloromethyl-	Benzyl chloride *	100 (45.4)
Benzene, 1,2-dichloro-	o-Dichlorobenzene *	100 (45.4)
	1,2-Dichlorobenzene	
Benzene, 1,3-dichloro-	m-Dichlorobenzene	100 (45.4)
	1,3-Dichlorobenzene	
Benzene, 1,4-dichloro-	p-Dichlorobenzene *	100 (45.4)
	1,4-Dichlorobenzene	
Benzene, dichloromethyl-	Benzal chloride	5000 (2270)
Benzene, 2,4-diisocyanatomethyl-	Toluene diisocyanate *	100 (45.4)
Benzene, dimethyl-	Xylene * (mixed)	1000 (454)
m-	m-	
o-	o-	
p-	p-	
Benzene, hexachloro-	Hexachlorobenzene	1 (0.454)
Benzene, hexahydro-	Cyclohexane *	1000 (454)
Benzene, hydroxy-	Phenol *	1000 (454)
Benzene, methyl-	Toluene *	1000 (454)
Benzene, 1-methyl-2,4-dinitro-	2,4-Dinitrotoluene	1000 (454)
Benzene, 1-methyl-2,6-dinitro-	2,6-Dinitrotoluene	1000 (454)
Benzene, 1,2-methylenedioxy-4-allyl-	Safrole	1 (0.454)
Benzene, 1,2-methylenedioxy-4-propenyl-	Isosafrole	1 (0.454)
Benzene, 1,2-methylenedioxy-4-propyl-	Dihydrosafrole	1 (0.454)
Benzene, 1-methylethyl-	Cumene	5000 (2270)
Benzene, nitro-	Nitrobenzene *	1000 (454)
Benzene, pentachloro-	Pentachlorobenzene	10 (4.54)
Benzene, pentachloronitro-	Pentachloronitrobenzene	1 (0.454)
Benzene, 1,2,4,5-tetrachloro-	1,2,4,5-Tetrachlorobenzene	5000 (2270)
Benzene, trichloromethyl-	Benzotrichloride	1 (0.454)
Benzene, 1,3,5-trinitro-	sym-Trinitrobenzene *	10 (4.54)
Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-, ethyl ester	Ethyl 4,4'-dichlorobenzilate	1 (0.454)
1,2-Benzenedicarboxylic acid anhydride	Phthalic anhydride	5000 (2270)
1,2-Benzenedicarboxylic acid, [bis(2-ethylhexyl)] ester	Bis(2-ethylhexyl)phthalate	1 (0.454)
1,2-Benzenedicarboxylic acid, dibutyl ester	Di-n-butyl phthalate	10 (4.54)
	Dibutyl phthalate	
	n-Butyl phthalate	
1,2-Benzenedicarboxylic acid, diethyl ester	Diethyl phthalate	1000 (454)
1,2-Benzenedicarboxylic acid, dimethyl ester	Dimethyl phthalate	5000 (2270)
1,2-Benzenedicarboxylic acid, di-n-octyl ester	Di-n-octyl phthalate	5000 (2270)
1,3-Benzenediol	Resorcinol	5000 (2270)
1,2-Benzenediol,4-[1-hydroxy-2-(methylamino)ethyl]-	Epinephrine	1000 (454)
Benzenesulfonic acid chloride	Benzenesulfonyl chloride	100 (45.4)
Benzenesulfonyl chloride	Benzenesulfonic acid chloride	100 (45.4)
Benzenethiol	Phenyl mercaptan @	100 (45.4)
	Thiophenol	
Benzidine *	(1,1'-Biphenyl)-4,4'-diamine	1 (0.454)
1,2-Benzisothiazolin-3-one,1,1-dioxide, and salts	Saccharin and salts	1 (0.454)
Benzo[a]anthracene	Benz[a]anthracene	1 (0.454)
	1,2-Benzanthracene	
Benzo[b]fluoranthene		1 (0.454)
Benzo[k]fluoranthene		1 (0.454)
Benzo[j,k]fluorene	Fluoranthene	100 (45.4)
Benzoic acid		5000 (2270)
Benzonitrile *		5000 (2270)
Benzo[g,h,i]perylene		5000 (2270)
Benzo[a]pyrene	3,4-Benzopyrene	1 (0.454)
3,4-Benzopyrene	Benzo[a]pyrene	1 (0.454)
p-Benzoquinone	1,4-Cyclohexadienedione	10 (4.54)
Benzotrichloride	Benzene, trichloromethyl-	1 (0.454)
Benzoyl chloride *		1000 (454)
1,2-Benzphenanthrene	Chrysene	1 (0.454)

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity (RQ) Pounds (Kilograms)
Chlorine *		10 (4.54)
Chlorine cyanide	Cyanogen chloride *	10 (4.54)
Chlornaphazine	2-Naphthylamine, N,N-bis(2-chloroethyl)-	1 (0.454)
Chloroacetaldehyde	Acetaldehyde, chloro-	1000 (454)
p-Chloroaniline	Benzenamine, 4-chloro-	1000 (454)
Chlorobenzene *	Benzene, chloro-	100 (45.4)
4-Chloro-m-cresol	p-Chloro-m-cresol	5000 (2270)
	Phenol, 4-chloro-3-methyl-	
p-Chloro-m-cresol	Phenol, 4-chloro-3-methyl-	5000 (2270)
	4-Chloro-m-cresol	
Chlorodibromomethane		100 (45.4)
1-Chloro-2,3-epoxypropane	Epichlorohydrin *	1000 (454)
	Oxirane, 2-(chloromethyl)-	
Chloroethane	Ethyl chloride @	100 (45.4)
2-Chloroethyl vinyl ether	Ethene, 2-chloroethoxy-	1000 (454)
Chloroform *	Methane, trichloro-	5000 (2270)
Chloromethane	Methane, chloro-	1 (0.454)
	Methyl chloride *	
Chloromethyl methyl ether	Methane, chloromethoxy-	1 (0.454)
	Methylchloromethyl ether @	
beta-Chloronaphthalene	Naphthalene, 2-chloro-	5000 (2270)
	2-Chloronaphthalene	
2-Chloronaphthalene	beta-Chloronaphthalene	5000 (2270)
	Naphthalene, 2-chloro-	
2-Chlorophenol	o-Chlorophenol	100 (45.4)
	Phenol, 2-chloro-	
o-Chlorophenol	Phenol, 2-chloro-	100 (45.4)
	2-Chlorophenol	
4-Chlorophenyl phenyl ether		5000 (2270)
1-(o-Chlorophenyl)thiourea	Thiourea, (2-chlorophenyl)-	100 (45.4)
3-Chloropropionitrile	Propanenitrile, 3-chloro-	1000 (454)
Chlorosulfonic acid *		1000 (454)
4-Chloro-o-toluidine, hydrochloride	Benzenamine, 4-chloro-2-methyl-, hydrochloride	1 (0.454)
Chlorpyrifos *		1 (0.454)
Chromic acetate		1000 (454)
Chromic acid *		1000 (454)
Chromic acid, calcium salt	Calcium chromate	1000 (454)
Chromic sulfate		1000 (454)
Chromium ¢		1 (0.454)
Chromous chloride		1000 (454)
Chrysene	1,2-Benzophenanthrene	1 (0.454)
Cobaltous bromide		1000 (454)
Cobaltous formate		1000 (454)
Cobaltous sulfamate		1000 (454)
Coke Oven Emissions		1 (0.454)
Copper ¢		5000 (2270)
Copper cyanide *		10 (4.54)
Coumaphos *		10 (4.54)
Creosote		1 (0.454)
Cresols *	Cresylic acid	1000 (454)
m-Cresols	m-Cresylic acid	
o-Cresols	o-Cresylic acid	
p-Cresols	p-Cresylic acid	
Cresylic acid	Cresols *	1000 (454)
m-Cresols	m-Cresylic acid	
o-Cresols	o-Cresylic acid	
p-Cresols	p-Cresylic acid	
Crotonaldehyde *	2-Butenal	100 (45.4)
Cumene	Benzene, 1-methylethyl-	5000 (2270)
Cupric acetate		100 (45.4)
Cupric acetoarsenite *		100 (45.4)
Cupric chloride *		10 (4.54)
Cupric nitrate *		100 (45.4)
Cupric oxalate		100 (45.4)
Cupric sulfate		10 (4.54)
Cupric sulfate ammoniated		100 (45.4)
Cupric tartrate		100 (45.4)
Cyanides (soluble cyanide salts), not elsewhere specified *		10 (4.54)
Cyanogen *		100 (45.4)
Cyanogen bromide *	Bromine cyanide	1000 (454)
Cyanogen chloride *	Chlorine cyanide	10 (4.54)
1,4-Cyclohexadienedione	p-Benzoquinone	10 (4.54)
Cyclohexane *	Benzene, hexahydro-	1000 (454)
Cyclohexanone		5000 (2270)
1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	Hexachlorocyclopentadiene *	1 (0.454)
Cyclophosphamide	2H-1,3,2-Oxazaphosphorine,2-[bis(2-chloroethyl)amino] tetrahydro-2-oxide	1 (0.454)
2,4-D Acid	2,4-D *, salts and esters	100 (45.4)
	2,4-Dichlorophenoxyacetic acid *, salts and esters	
2,4-D Esters		100 (45.4)
2,4-D *, salts and esters	2,4-D Acid	100 (45.4)
	2,4-Dichlorophenoxyacetic acid *, salts and esters	
Daunomycin	5,12-Naphthacenedione, (8S-cis)-8-acetyl-10-[3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-.	1 (0.454)
DDD	Dichlorodiphenyl dichloroethane	1(0.454)
	TDE *	
4 4'-DDD	4,4'-DDD	
	DDD	1(0.454)
	Dichlorodiphenyl dichloroethane	
DDE	TDE *	
	4,4'-DDE	1 (0.454)

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity(RQ) Pounds(Kilograms)
4,4'-DDE	DDE	1 (0.454)
DDT *	Dichlorodiphenyl trichloroethane *	1 (0.454)
	4,4'-DDT	
4,4'-DDT	DDT *	1 (0.454)
	Dichlorodiphenyl trichloroethane *	
Decachlorooctahydro-1,3,4-methano-2H-cyclobuta[c,d]-pentalen-2-one	Kepone *	1 (0.454)
Diallate	S-(2,3-Dichloroallyl) diisopropylthiocarbamate	1 (0.454)
Diamine	Hydrazine *	1 (0.454)
Diaminotoluene	Toluenediamine *	1 (0.454)
Diazinon *		1 (0.454)
Dibenz[a,h]anthracene	Dibenzo[a,h]anthracene	1 (0.454)
	1,2:5,6-Dibenzanthracene	
1,2:5,6-Dibenzanthracene	Dibenz[a,h]anthracene	1 (0.454)
	Dibenzo[a,h]anthracene	
Dibenzo[a,h]anthracene	Dibenz[a,h]anthracene	1 (0.454)
	1,2:5,6-Dibenzanthracene	
1,2:7,8-Dibenzopyrene	Dibenz[a,i]pyrene	1 (0.454)
Dibenz[a,i]pyrene	1,2:7,8-Dibenzopyrene	1 (0.454)
1,2-Dibromo-3-chloropropane	Propane, 1,2-dibromo-3-chloro-	1(0.454)
Dibutyl phthalate	Di-n-butyl phthalate	10 (4.54)
	n-Butyl phthalate *	
	1,2-Benzenedicarboxylic acid, dibutyl ester	
Di-n-butyl phthalate	Dibutyl phthalate	10 (4.54)
	n-Butyl phthalate *	
	1,2-Benzenedicarboxylic acid, dibutyl ester	
Dicamba		1000 (454)
Dichobenil		100 (45.4)
Dichlone		1 (0.454)
S-(2,3-Dichloroallyl) diisopropylthiocarbamate	Diallate	1 (0.454)
3,5-Dichloro-N-(1,1-dimethyl-2-propynyl)benzamide	Pronamide	5000 (2270)
Dichlorobenzene (mixed)		100 (45.4)
1,2-Dichlorobenzene	Benzene, 1,2-dichloro-	100 (45.4)
	o-Dichlorobenzene *	
1,3-Dichlorobenzene	Benzene, 1,3-dichloro-	100 (45.4@
	m-Dichlorobenzene	
1,4-Dichlorobenzene	Benzene, 1,4-dichloro-	100 (45.4)
	p-Dichlorobenzene *	
m-Dichlorobenzene	Benzene, 1,3-dichloro-	100 (45.4)
	1,3-Dichlorobenzene	
o-Dichlorobenzene *	Benzene, 1,2-dichloro-	100 (45.4)
	1,2-Dichlorobenzene	
p-Dichlorobenzene *	Benzene, 1,4-dichloro-	100 (45.4)
	1,4-Dichlorobenzene	
3,3'-Dichlorobenzidine	(1,1'-Biphenyl)-4,4'-diamine,3,3'-dichloro-	1 (0.454)
Dichlorobromomethane		5000 (2270)
1,4-Dichloro-2-butene	2-Butene, 1,4-dichloro-	1 (0.454)
Dichlorodifluoromethane *	Methane, dichlorodifluoro-	5000 (2270)
Dichlorodiphenyl dichloroethane	DDD	1(0.454)
	TDE *	
	4,4'-DDD	
Dichlorodiphenyl trichloroethane *	DDT *	1 (0.454)
	4,4'-DDT	
1,1-Dichloroethane	Ethane, 1,1-dichloro-	1000 (454)
	Ethylidene dichloride	
1,2-Dichloroethane	Ethane, 1,2-dichloro-	5000 (2270)
	Ethylene dichloride *	
1,1-Dichloroethylene	Ethene, 1,1-dichloro-	5000 (2270)
	Vinylidene chloride *	
1,2-trans-Dichloroethylene	Ethene, trans-1,2-dichloro-	1000 (454)
Dichloroethyl ether	Bis (2-chloroethyl) ether	1 (0.454)
	Ethane, 1,1'-oxybis(2-chloro-	
2,4-Dichlorophenol	Phenol, 2,4-dichloro-	100 (45.4)
2,6-Dichlorophenol	Phenol, 2,6-dichloro-	100 (45.4)
2,4-Dichlorophenoxyacetic acid *, salts and esters	2,4-D Acid	100 (45.4)
	2,4-D *, salts and esters	
Dichlorophenylarsine	Phenyl dichloroarsine *	1 (0.454)
Dichloropropane *		1000 (454)
1,1-Dichloropropane		
1,3-Dichloropropane		
1,2-Dichloropropane	Propylene dichloride *	1000 (454)
Dichloropropane - Dichloropropene (mixture)		100 (45.4)
Dichloropropene(s) *		100 (45.4)
2,3-Dichloropropene (isomer)		
1,3-Dichloropropene	Propene, 1,3-dichloro-	100 (45.4)
2,2-Dichloropropionic acid *		5000 (2270)
Dichlorvos *		10 (4.54)
Dieldrin *	1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo,exo-1,4:5,8-dimethanonaphthalene.	1 (0.454)
1,2:3,4-Diepoxybutane	2,2'-Bioxirane	1 (0.454)
Diethylamine *		100 (45.4)
Diethylarsine	Arsine, diethyl-	1 (0.454)
1,4-Diethylene dioxide	1,4-Dioxane	1 (0.454)
O,O-Diethyl S-[2-(ethylthio)ethyl] phosphorodithioate	Disulfoton *	1 (0.454)
N,N'-Diethylhydrazine	Hydrazine, 1,2-diethyl-	1 (0.454)
O,O-Diethyl S-methyl dithiophosphate	Phosphorodithioic acid, O,O-diethyl S-methyl ester	5000 (2270)
Diethyl-p-nitrophenyl phosphate	Phosphonic acid, diethyl p-nitrophenyl ester	100 (45.4)
Diethyl phthalate	1,2-Benzenedicarboxylic acid, diethyl ester	1000 (454)
O,O-Diethyl O-pyrazinyl phosphorothioate	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	100 (45.4)
Diethylstilbestrol	4,4'-Stilbenediol, alpha,alpha'-diethyl-	1 (0.454)
1,2-Dihydro-3,6-pyridazinedione	Maleic hydrazide	5000 (2270)

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity (RQ) Pounds (Kilograms)
Dihydrosafrole	Benzene, 1,2-methylenedioxy-4-propyl-	1 (0.454)
Diisopropyl fluorophosphate	Phosphorofluoridic acid, bis(1-methylethyl) ester	100 (45.4)
Dimethoate	Phosphorodithioic acid, O,O-dimethyl S-[2(methylamino)-2-oxoethyl] ester	10 (4.54)
3,3'-Dimethoxybenzidine	(1,1'-Biphenyl)-4,4'-diamine,3,3'-dimethoxy-	1 (0.454)
Dimethylamine *	Methanamine, N-methyl-	1000 (454)
Dimethylaminoazobenzene	Benzenamine, N,N-dimethyl-4-phenylazo-	1 (0.454)
7,12-Dimethylbenz[a]anthracene	1,2-Benzanthracene, 7,12-dimethyl-	1 (0.454)
3,3'-Dimethylbenzidine	(1,1'-Biphenyl)-4,4'-diamine,3,3'-dimethyl-	1 (0.454)
alpha,alpha-Dimethylbenzylhydroperoxide	Hydroperoxide, 1-methyl-1-phenylethyl-	10 (4.54)
3,3-Dimethyl-1-(methylthio)-2-butanone, O-[(methylamino)carbonyl] oxime	Thiofanox	100 (45.4)
Dimethylcarbamoyl chloride	Carbamoyl chloride, dimethyl-	1 (0.454)
Dimethylhydrazine, unsymmetrical @	1,1-Dimethylhydrazine	1 (0.454)
	Hydrazine, 1,1-dimethyl-	
1,1-Dimethylhydrazine	Dimethylhydrazine, unsymmetrical @	1 (0.454)
	Hydrazine, 1,1-dimethyl-	
1,2-Dimethylhydrazine	Hydrazine, 1,2-dimethyl-	1 (0.454)
O,O-Dimethyl O-p-nitrophenyl phosphorothioate	Methyl parathion *	100 (45.4)
Dimethylnitrosamine	N-Nitrosodimethylamine	1 (0.454)
alpha,alpha-Dimethylphenethylamine	Ethanamine, 1,1-dimethyl-2-phenyl-	5000 (2270)
2,4-Dimethylphenol	Phenol, 2,4-dimethyl-	100 (45.4)
Dimethyl phthalate	1,2-Benzenedicarboxylic acid, dimethyl ester	5000 (2270)
Dimethyl sulfate *	Sulfuric acid, dimethyl ester	1 (0.454)
Dinitrobenzene * (mixed)		100 (45.4)
m-Dinitrobenzene		
o-Dinitrobenzene		
p-Dinitrobenzene		
4,6-Dinitro-o-cresol and salts	Phenol, 2,4-dinitro-6-methyl-, and salts	10 (4.54)
4,6-Dinitro-o-cyclohexylphenol	Phenol, 2-cyclohexyl-4,6-dinitro-	100 (45.4)
Dinitrophenol		10 (4.54)
2,5-Dinitrophenol		
2,6-Dinitrophenol		
2,4-Dinitrophenol	Phenol, 2,4-dinitro-	10 (4.54)
Dinitrotoluene		1000 (454)
3,4-Dinitrotoluene		
2,4-Dinitrotoluene	Benzene, 1-methyl-2,4-dinitro-	1000 (454)
2,6-Dinitrotoluene	Benzene, 1-methyl-2,6-dinitro-	1000 (454)
Dinoseb	Phenol, 2,4-dinitro-6-(1-methylpropyl)-	1000 (454)
Di-n-octyl phthalate	1,2-Benzenedicarboxylic acid, di-n-octyl ester	5000 (2270)
1,4-Dioxane	1,4-Diethylene dioxide	1 (0.454)
1,2-Diphenylhydrazine	Hydrazine, 1,2-diphenyl-	1 (0.454)
Diphosphoramide, octamethyl-	Octamethylpyrophosphoramide	100(45.4)
Dipropylamine	1-Propanamine, N-propyl-	5000 (2270)
Di-n-propylnitrosamine	N-Nitroso-n-propylamine	1 (0.454)
Diquat		1000 (454)
Disulfoton *	O,O-Diethyl S-[2-(ethylthio)ethyl]phosphorodithioate	1 (0.454)
2,4-Dithiobiuret	Thioimidodicarbonic diamide	100 (45.4)
Dithiopyrophosphonic acid, tetraethyl ester	Tetraethyldithiopyrophosphate	100 (45.4)
Diuron		100 (45.4)
Dodecylbenzenesulfonic acid *		1000 (454)
Endosulfan *	5-Norbornene-2,3-dimethanol,1,4,5,6,7,7-hexachloro,cyclic sulfite	1 (0.454)
alpha - Endosulfan		1 (0.454)
beta - Endosulfan		1 (0.454)
Endosulfan sulfate		1 (0.454)
Endothall	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	1000 (454)
Endrin *	1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo,endo-1,4:5,8-dimethanonaphthalene.	1 (0.454)
Endrin aldehyde		1 (0.454)
Epichlorohydrin *	1-Chloro-2,3-epoxypropane	1000 (454)
	Oxirane, 2-(chloromethyl)-	
Epinephrine	1,2-Benzenediol,4-[1-hydroxy-2-(methylamino)ethyl]	1000 (454)
Ethanal	Acetaldehyde *	1000 (454)
Ethanamine, 1,1-dimethyl-2-phenyl-	alpha,alpha-Dimethylphenethylamine	5000 (2270)
Ethanamine, N-ethyl-N-nitroso-	N-Nitrosodiethylamine	1 (0.454)
Ethane, 1,2-dibromo-	Ethylene dibromide *	1000 (454)
Ethane, 1,1-dichloro-	Ethylidene dichloride	1000 (454)
	1,1-Dichloroethane	
Ethane, 1,2-dichloro-	Ethylene dichloride *	5000 (2270)
	1,2-Dichloroethane	
Ethane, 1,1,1,2,2,2-hexachloro-	Hexachloroethane *	1 (0.454)
Ethane, 1,1'-[methylenebis(oxy)]bis(2-chloro-	Bis(2-chloroethoxy)methane	1000 (454)
Ethane, 1,1'-oxybis-	Ethyl ether *	100 (45.4)
Ethane, 1,1'-oxybis(2-chloro-	Bis (2-chloroethyl) ether	1 (0.454)
	Dichloroethyl ether	
Ethane, pentachloro-	Pentachloroethane	1 (0.454)
Ethane, 1,1,1,2-tetrachloro-	1,1,1,2-Tetrachloroethane	1 (0.454)
Ethane, 1,1,2,2-tetrachloro-	1,1,2,2-Tetrachloroethane	1 (0.454)
Ethane, 1,1,2-trichloro-	1,1,2-Trichloroethane	1 (0.454)
Ethane, 1,1,1-trichloro-2,2-bis(p-methoxyphenyl)-	Methoxychlor	1 (0.454)
1,2-Ethanediylbiscarbamodithioic acid	Ethylenebis(dithiocarbamic acid)	5000 (2270)
Ethanenitrile	Acetonitrile *	5000 (2270)
Ethanethioamide	Thioacetamide	1 (0.454)
Ethanol, 2,2'-(nitrosoimino)bis-	N-Nitrosodiethanolamine	1 (0.454)
Ethanone, 1-phenyl-	Acetophenone	5000 (2270)
Ethanoyl chloride	Acetyl chloride *	5000 (2270)
Ethenamine, N-methyl-N-nitroso-	N-Nitrosomethylvinylamine	1 (0.454)
Ethene, chloro-	Vinyl chloride *	1 (0.454)
Ethene, 2-chloroethoxy-	2-Chloroethyl vinyl ether	1000 (454)
Ethene, 1,1-dichloro-	Vinylidene chloride *	5000 (2270)
	1,1-Dichloroethylene	

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity(RQ) Pounds(Kilograms)
Ethane, 1,1,2,2-tetrachloro-	Perchloroethylene	1 (0.454)
	Tetrachloroethene	
	Tetrachloroethylene	
Ethene, trans-1,2-dichloro-	1,2-trans-Dichloroethylene	1000 (454)
Ethion *		10 (4.54)
2-Ethoxyethanol	Ethylene glycol monoethyl ether *	1 (0.454)
Ethyl acetate	Acetic acid, ethyl ester	5000 (2270)
Ethyl acrylate *	2-Propenoic acid, ethyl ester	1000 (454)
Ethylbenzene *		1000 (454)
Ethyl carbamate (Urethan)	Carbamic acid, ethyl ester	1 (0.454)
Ethyl chloride @	Chloroethane	100 (45.4)
Ethyl cyanide	Propanenitrile	10 (4.54)
Ethyl 4,4'-dichlorobenzilate	Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-, ethyl ester	1 (0.454)
Ethylene dibromide *	Ethane, 1,2-dibromo-	1000 (454)
Ethylene dichloride *	1,2-Dichloroethane	5000 (2270)
	Ethane, 1,2-dichloro-	
Ethylene glycol monoethyl ether *	2-Ethoxyethanol	1 (0.454)
Ethylene oxide *	Oxirane	1 (0.454)
Ethylenebis(dithiocarbamic acid)	1,2-Ethanediylbiscarbamodithioicacid	5000 (2270)
Ethylenediamine *		5000 (2270)
Ethylenediamine tetraacetic acid (EDTA)		5000 (2270)
Ethylenethiourea	2-Imidazolidinethione	1 (0.454)
Ethylenimine	Aziridine	1 (0.454)
Ethyl ether *	Ethane, 1,1'-oxybis-	100 (45.4)
Ethylidene dichloride	Ethane, 1,1-dichloro-	1000 (454)
	1,1-Dichloroethane	
Ethyl methacrylate	2-Propenoic acid, 2-methyl-, ethyl ester	1000 (454)
Ethyl methanesulfonate	Methanesulfonic acid, ethyl ester	1 (0.454)
Ethyl methyl ketone @	2-Butanone	5000 (2270)
	Methyl ethyl ketone *	
Famphur	Phosphorothioic acid, O,O-dimethyl O-[p-[(dimethylamino)-sulfonyl] phenyl] ester	1000 (454)
Ferric ammonium citrate		1000 (454)
Ferric ammonium oxalate		1000 (454)
Ferric chloride		1000 (454)
Ferric dextran	Iron dextran	5000 (2270)
Ferric fluoride		100 (45.4)
Ferric nitrate *		1000 (454)
Ferric sulfate		1000 (454)
Ferrous ammonium sulfate		1000 (454)
Ferrous chloride *		100 (45.4)
Ferrous sulfate		1000 (454)
Fluoranthene	Benzo[j,k]fluorene	100 (45.4)
Fluorene		5000 (2270)
Fluorine *		10 (4.54)
Fluoroacetamide	Acetamide, 2-fluoro-	100 (45.4)
Fluoroacetic acid, sodium salt	Acetic acid, fluoro-, sodium salt	10 (4.54)
Formaldehyde *	Methylene oxide	1000 (454)
Formic acid *	Methanoic acid	5000 (2270)
Fulminic acid, mercury(II)salt	Mercury fulminate	10 (4.54)
Fumaric acid		5000 (2270)
Furan *	Furfuran	100 (45.4)
Furan, tetrahydro-	Tetrahydrofuran *	1000 (454)
2-Furancarboxaldehyde	Furfural *	5000 (2270)
2,5-Furandione	Maleic anhydride *	5000 (2270)
Furfural *	2-Furancarboxaldehyde	5000 (2270)
Furfuran	Furan *	100 (45.4)
D-Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-	Streptozotocin	1 (0.454)
Glycidylaldehyde	1-Propanal, 2,3-epoxy-	1 (0.454)
Guanidine, N-nitroso-N-methyl-N'-nitro-	N-Methyl-N'-nitro-N-nitrosoguanidine	1 (0.454)
Guthion *	Azinphos methyl @	1 (0.454)
Heptachlor	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-	1 (0.454)
Heptachlor epoxide		1 (0.454)
Hexachlorobenzene	Benzene, hexachloro-	1 (0.454)
Hexachlorobutadiene *	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	1(0.454)
Hexachlorocyclohexane (gamma isomer)	gamma - BHC	1 (0.454)
	Lindane *	
Hexachlorocyclopentadiene *	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	1 (0.454)
1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo,endo-1,4:5,8-dimethanonaphthalene.	Endrin *	1 (0.454)
1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo,exo-1,4:5,8-dimethanonaphthalene.	Dieldrin *	1 (0.454)
Hexachloroethane *	Ethane, 1,1,1,2,2,2-hexachloro-	1 (0.454)
Hexachlorohexahydro-endo,endo-dimethanonaphthalene	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4,5,8-endo,endo-dimethanonaphthalene.	1 (0.454)
1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4,5,8-endo,endo-dimethanonaphthalene.	Hexachlorohexahydro-endo,endo-dimethanonaphthalene	1 (0.454)
1,2,3,4,10-10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4:5,8-endo,exo-dimethanonaphthalene.	Aldrin *	1 (0.454)
Hexachlorophene	2,2'-Methylenebis(3,4,6-trichlorophenol)	100(45.4)
Hexachloropropene	1-Propene, 1,1,2,3,3,3-hexachloro-	1000 (454)
Hexaethyl tetraphosphate *	Tetraphosphonic acid, hexaethyl ester	100 (45.4)
Hydrazine *	Diamine	1 (0.454)
Hydrazine, 1,2-diethyl-	N,N'-Diethylhydrazine	1 (0.454)
Hydrazine, 1,1-dimethyl-	1,1-Dimethylhydrazine	1 (0.454)
	Dimethylhydrazine, unsymmetrical @	
Hydrazine, 1,2-dimethyl-	1,2-Dimethylhydrazine	1 (0.454)
Hydrazine, 1,2-diphenyl-	1,2-Diphenylhydrazine	1 (0.454)
Hydrazine, methyl-	Methyl hydrazine *	10 (4.54)
Hydrazinecarbothioamide	Thiosemicarbazide	100 (45.4)
Hydrochloric acid *		5000 (2270)

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity(RQ) Pounds(Kilograms)
Hydrocyanic acid *	Hydrogen cyanide	10 (4.54)
Hydrofluoric acid *	Hydrogen fluoride *	100 (45.4)
Hydrogen cyanide	Hydrocyanic acid *	10 (4.54)
Hydrogen fluoride *	Hydrofluoric acid *	100 (45.4)
Hydrogen phosphide	Phosphine *	100 (45.4)
Hydrogen sulfide *	Hydrosulfuric acid	100 (45.4)
	Sulfur hydride	
Hydroperoxide, 1-methyl-1-phenylethyl-	alpha,alpha-Dimethylbenzylhydroperoxide	10 (4.54)
Hydrosulfuric acid	Hydrogen sulfide *	100 (45.4)
	Sulfur hydride	
Hydroxydimethylarsine oxide	Cacodylic acid	1 (0.454)
2-Imidazolidinethione	Ethylenethiourea	1 (0.454)
Indeno(1,2,3-cd)pyrene	1,10-(1,2-Phenylene)pyrene	1 (0.454)
Iron dextran	Ferric dextran	5000 (2270)
Isobutyl alcohol	1-Propanol, 2-methyl-	5000 (2270)
Isocyanic acid, methyl ester	Methyl isocyanate *	1 (0.454)
Isophorone		5000 (2270)
Isoprene *		100 (45.4)
Isopropanolamine dodecylbenzene sulfonate		1000 (454)
Isosafrole	Benzene, 1,2-methylenedioxy-4-propenyl-	1 (0.454)
3(2H)-Isoxazolone, 5-(aminomethyl)-	5-(Aminomethyl)-3-isoxazolol	1000 (454)
Kelthane		10 (4.54)
Kepone	Decachlorooctahydro-1,3,4-metheno-2H-cyclobuta[c,d]-pentalen-2-one	1 (0.454)
Lasiocarpine		1 (0.454)
Lead ¢		1 (0.454)
Lead acetate	Acetic acid, lead salt	5000 (2270)
Lead arsenate *		5000 (2270)
Lead chloride *		100 (45.4)
Lead fluoborate *		100 (45.4)
Lead fluoride *		100 (45.4)
Lead iodide		100 (45.4)
Lead nitrate *		100 (45.4)
Lead phosphate	Phosphoric acid, lead salt	1 (0.454)
Lead stearate		5000 (2270)
Lead subacetate		1 (0.454)
Lead sulfate *		100 (45.4)
Lead sulfide		5000 (2270)
Lead thiocyanate		100 (45.4)
Lindane *	gamma - BHC	1 (0.454)
	Hexachlorocyclohexane (gamma isomer)	
Lithium chromate		1000 (454)
Malathion *		100 (45.4)
Maleic acid *		5000 (2270)
Maleic anhydride *	2,5-Furandione	5000 (2270)
Maleic hydrazide	1,2-Dihydro-3,6-pyridazinedione	5000 (2270)
Malononitrile	Propanedinitrile	1000 (454)
Melphalan	Alanine, 3-[p-bis(2-chloroethyl)amino]phenyl-, L-	1 (0.454)
Mercaptodimethur		10 (4.54)
Mercuric cyanide *		1 (0.454)
Mercuric nitrate *		10 (4.54)
Mercuric sulfate *		10 (4.54)
Mercuric thiocyanate		10 (4.54)
Mercurous nitrate *		10 (4.54)
Mercury *		1 (0.454)
Mercury fulminate	Fulminic acid, mercury(II)salt	10 (4.54)
Mercury, (acetato-O)phenyl-	Phenylmercuric acetate	100 (45.4)
Methacrylonitrile	2-Propenenitrile, 2-methyl-	1000 (454)
Methanamine, N-methyl-	Dimethylamine *	1000 (454)
Methane, bromo-	Methyl bromide *	1000 (454)
Methane, chloro-	Chloromethane	1 (0.454)
	Methyl chloride *	
Methane, chloromethoxy-	Chloromethyl methyl ether	1 (0.454)
	Methylchloromethyl ether @	
Methane, dibromo-	Methylene bromide	1000 (454)
Methane, dichloro-	Methylene chloride *	1000 (454)
Methane, dichlorodifluoro-	Dichlorodifluoromethane *	5000 (2270)
Methane, iodo-	Methyl iodide	1 (0.454)
Methane, oxybis(chloro-	Bis(chloromethyl) ether	1 (0.454)
Methane, tetrachloro-	Carbon tetrachloride *	5000 (2270)
Methane, tetranitro-	Tetranitromethane *	10 (4.54)
Methane, tribromo-	Bromoform	100 (45.4)
Methane, trichloro-	Chloroform *	5000 (2270)
Methane, trichlorofluoro-	Trichloromonofluoromethane	5000 (2270)
Methanesulfenyl chloride, trichloro-	Perchloromethyl mercaptan @	100 (45.4)
	Trichloromethanesulfenyl chloride	
Methanesulfonic acid, ethyl ester	Ethyl methanesulfonate	1 (0.454)
Methanethiol	Methyl mercaptan *	100 (45.4)
	Thiomethanol	
4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-	Heptachlor	1 (0.454)
Methanoic acid	Formic acid *	5000 (2270)
4,7-Methanoindan, 1,2,4,5,6,7,8,8-octachloro-3a,4,7,7a-tetrahydro-	Chlordane *	1 (0.454)
	Chlordane, technical *	
Methanol *	Methyl alcohol *	5000 (2270)
Methapyrilene	Pyridine, 2-[(2-(dimethylamino)ethyl)-2-thenylamino]-	5000 (2270)
Methomyl	Acetimidic acid, N-[(methylcarbamoyl)oxy]thio-, methyl ester	100 (45.4)
Methoxychlor	Ethane, 1,1,1-trichloro-2,2-bis(p-methoxyphenyl)-	1 (0.454)
Methyl alcohol *	Methanol *	5000 (2270)
Methylamine @	Monomethylamine	100 (45.4)
2-Methylaziridine	1,2-Propylenimine	1 (0.454)
Methyl bromide *	Methane, bromo-	1000 (454)

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity(RQ) Pounds(Kilograms)
1-Methylbutadiene	1,3-Pentadiene	100 (45.4)
Methyl chloride *	Chloromethane	1 (0.454)
	Methane, chloro-	
Methyl chlorocarbonate *	Carbonochloridic acid, methyl ester	1000 (454)
	Methyl chloroformate @	
Methyl chloroform *	1,1,1-Trichloroethane *	1000 (454)
Methyl chloroformate @	Carbonochloridic acid, methyl ester	1000 (454)
	Methyl chlorocarbonate *	
Methylchloromethyl ether @	Chloromethyl methyl ether	1 (0.454)
	Methane, chloromethoxy-	
3-Methylcholanthrene	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	1 (0.454)
4,4'-Methylenebis(2-chloroaniline)	Benzenamine, 4,4'-methylenebis(2-chloro-	1 (0.454)
2,2'-Methylenebis(3,4,6-trichlorophenol)	Hexachlorophene	100(45.4)
Methylene bromide	Methane, dibromo-	1000 (454)
Methylene chloride *	Methane, dichloro-	1000 (454)
Methylene oxide	Formaldehyde *	1000 (454)
Methyl ethyl ketone *	2-Butanone	5000 (2270)
	Ethyl methyl ketone @	
Methyl ethyl ketone peroxide *	2-Butanone peroxide	10 (4.54)
Methyl hydrazine *	Hydrazine, methyl-	10 (4.54)
Methyl iodide	Methane, iodo-	1 (0.454)
Methyl isobutyl ketone	4-Methyl-2-pentanone	5000 (2270)
Methyl isocyanate *	Isocyanic acid, methyl ester	1 (0.454)
2-Methylactonitrile	Acetone cyanohydrin *	10 (4.54)
	Propanenitrile, 2-hydroxy-2-methyl-	
Methyl mercaptan *	Methanethiol	100 (45.4)
	Thiomethanol	
Methyl methacrylate *	2-Propenoic acid, 2-methyl-, methyl ester	1000 (454)
N-Methyl-N'-nitro-N-nitrosoguanidine	Guanidine, N-nitroso-N-methyl-N'-nitro-	1 (0.454)
Methyl parathion *	O,O-Dimethyl O-p-nitrophenyl phosphorothioate	100 (45.4)
4-Methyl-2-pentanone	Methyl isobutyl ketone	5000 (2270)
Methylthiouracil	4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	1 (0.454)
Mevinphos *		10 (4.54)
Mexacarbate *		1000 (454)
Mitomycin C	Azirino(2',3':3,4)pyrrolo(1,2-a)indole-4,7-dione,6-amino-8-[((aminocarbonyl)oxy) methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-.	1 (0.454)
Monoethylamine *		100 (45.4)
Monomethylamine	Methylamine @	100 (45.4)
Naled		10 (4.54)
5,12-Naphthacenedione, (8S-cis)-8-acetyl-10-[3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl) oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-.	Daunomycin	1 (0.454)
Naphthalene *		100 (45.4)
Naphthalene, 2-chloro-	beta-Chloronaphthalene	5000 (2270)
	2-Chloronaphthalene	
1,4-Naphthalenedione	1,4-Naphthoquinone	5000 (2270)
2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-dimethyl-(1,1'-biphenyl)-4,4'-diyl)-bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt.	Trypan blue	1 (0.454)
Naphthenic acid		100 (45.4)
1,4-Naphthoquinone	1,4-Naphthalenedione	5000 (2270)
alpha-Naphthylamine	1-Naphthylamine	1 (0.454)
beta-Naphthylamine	2-Naphthylamine	1 (0.454)
1-Naphthylamine	alpha-Naphthylamine	1 (0.454)
2-Naphthylamine	beta-Naphthylamine	1 (0.454)
2-Naphthylamine, N,N-bis(2-chloroethyl)-	Chlornaphazine	1 (0.454)
alpha-Naphthylthiourea	Thiourea, 1-naphthalenyl-	100 (45.4)
Nickel ¢		1 (0.454)
Nickel ammonium sulfate		5000 (2270)
Nickel carbonyl *	Nickel tetracarbonyl	1 (0.454)
Nickel chloride		5000 (2270)
Nickel cyanide *	Nickel(II) cyanide	1 (0.454)
Nickel(II) cyanide	Nickel cyanide *	1 (0.454)
Nickel hydroxide		1000 (454)
Nickel nitrate *		5000 (2270)
Nickel sulfate		5000 (2270)
Nickel tetracarbonyl	Nickel carbonyl *	1 (0.454)
Nicotine * and salts *	Pyridine, (S)-3-(1-methyl-2-pyrrolidinyl)-, and salts	100 (45.4)
Nitric acid *		1000 (454)
Nitric oxide *	Nitrogen(II) oxide	10 (4.54)
p-Nitroaniline *	Benzenamine, 4-nitro-	5000 (2270)
Nitrobenzene *	Benzene, nitro-	1000 (454)
Nitrogen dioxide *	Nitrogen(IV) oxide	10 (4.54)
Nitrogen(II) oxide	Nitric oxide *	10 (4.54)
Nitrogen(IV) oxide	Nitrogen dioxide *	10 (4.54)
Nitroglycerine *	1,2,3-Propanetriol, trinitrate-	10 (4.54)
Nitrophenol (mixed)		100 (45.4)
m-	2-Nitrophenol	
o-	4-Nitrophenol	
p-		
	Phenol, 4-nitro-	
o-Nitrophenol	2-Nitrophenol	100 (45.4)
p-Nitrophenol	Phenol, 4-nitro-	100 (45.4)
	4-Nitrophenol	
2-Nitrophenol	o-Nitrophenol	100 (45.4)
4-Nitrophenol	p-Nitrophenol	100 (45.4)
	Phenol, 4-nitro-	
2-Nitropropane	Propane, 2-nitro-	1 (0.454)
N-Nitrosodi-n-butylamine	1-Butanamine, N-butyl-N-nitroso-	1 (0.454)
N-Nitrosodiethanolamine	Ethanol, 2,2'-(nitrosoimino)bis-	1 (0.454)
N-Nitrosodiethylamine	Ethanamine, N-ethyl-N-nitroso-	1 (0.454)
N-Nitrosodimethylamine	Dimethylnitrosamine	1 (0.454)

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity (RQ) Pounds (Kilograms)
N-Nitrosodiphenylamine		100 (45.4)
N-Nitrosodi-n-propylamine	Di-n-propylnitrosamine	1 (0.454)
N-Nitroso-N-ethylurea	Carbamide, N-ethyl-N-nitroso-	1 (0.454)
N-Nitroso-N-methylurea	Carbamide, N-methyl-N-nitroso-	1 (0.454)
N-Nitroso-N-methylurethane	Carbamic acid, methylnitroso-, ethyl ester	1 (0.454)
N-Nitrosomethylvinylamine	Ethenamine, N-methyl-N-nitroso-	1 (0.454)
N-Nitrosopiperidine	Pyridine, hexahydro-N-nitroso-	1 (0.454)
N-Nitrosopyrrolidine	Pyrrole, tetrahydro-N-nitroso-	1 (0.454)
Nitrotoluene		1000 (454)
m-Nitrotoluene		
o-Nitrotoluene		
p-Nitrotoluene		
5-Nitro-o-toluidine	Benzenamine, 2-methyl-5-nitro-	1 (0.454)
5-Norbornene-2,3-dimethanol, 1,4,5,6,7,7-hexachloro,cyclic sulfite	Endosulfan *	1 (0.454)
Octamethylpyrophosphoramide	Diphosphoramide, octamethyl-	100(45.4)
Osmium oxide	Osmium tetroxide	1000 (454)
Osmium tetroxide	Osmium oxide	1000 (454)
7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	Endothall	1000 (454)
1,2-Oxathiolane, 2,2-dioxide	1,3-Propane sultone	1 (0.454)
2H-1,3,2-Oxazaphosphorine,2-[bis(2-chloroethyl) amino] tetrahydro-2-oxide	Cyclophosphamide	1 (0.454)
Oxirane	Ethylene oxide *	1 (0.454)
Oxirane, 2-(chloromethyl)-	Epichlorohydrin *	1000 (454)
	1-Chloro-2,3-epoxypropane	
Paraformaldehyde *		1000 (454)
Paraldehyde *	1,3,5-Trioxane, 2,4,6-trimethyl-	1000 (454)
Parathion *	Phosphorothioic acid, O,O-diethyl O-(p-nitrophenyl)ester	1 (0.454)
Pentachlorobenzene	Benzene, pentachloro-	10 (4.54)
Pentachloroethane	Ethane, pentachloro-	1 (0.454)
Pentachloronitrobenzene	Benzene, pentachloronitro-	1 (0.454)
Pentachlorophenol	Phenol, pentachloro-	10 (4.54)
1,3-Pentadiene	1-Methylbutadiene	100 (45.4)
Perchloroethylene *	Ethene, 1,1,2,2-tetrachloro	1 (0.454)
	Tetrachloroethene	
	Tetrachloroethylene *	
Perchloromethyl mercaptan @	Methanesulfenyl chloride, trichloro-	100 (45.4)
	Trichloromethanesulfenyl chloride	
Phenacetin	Acetamide, N-(4-ethoxyphenyl)-	1 (0.454)
Phenanthrene		5000 (2270)
Phenol *	Benzene, hydroxy-	1000 (454)
Phenol, 2-chloro-	o-Chlorophenol	100 (45.4)
	2-Chlorophenol	
Phenol, 4-chloro-3-methyl-	p-Chloro-m-cresol	5000 (2270)
	4-Chloro-m-cresol	
Phenol, 2-cyclohexyl-4,6-dinitro-	4,6-Dinitro-o-cyclohexylphenol	100 (45.4)
Phenol, 2,4-dichloro-	2,4-Dichlorophenol	100 (45.4)
Phenol, 2,6-dichloro-	2,6-Dichlorophenol	100 (45.4)
Phenol, 2,4-dimethyl-	2,4-Dimethylphenol	100 (45.4)
Phenol, 2,4-dinitro-	2,4-Dinitrophenol	10 (4.54)
Phenol, 2,4-dinitro-6-(1-methylpropyl)-	Dinoseb	1000 (454)
Phenol, 2,4-dinitro-6-methyl-, and salts	4,6-Dinitro-o-cresol and salts	10 (4.54)
Phenol, 4-nitro-	p-Nitrophenol *	100 (45.4)
	4-Nitrophenol *	
Phenol, pentachloro-	Pentachlorophenol	10 (4.54)
Phenol, 2,3,4,6-tetrachloro-	2,3,4,6-Tetrachlorophenol	10 (4.54)
Phenol, 2,4,5-trichloro-	2,4,5-Trichlorophenol	10 (4.54)
Phenol, 2,4,6-trichloro-	2,4,6-Trichlorophenol	10 (4.54)
Phenol, 2,4,6-trinitro-, ammonium salt	Ammonium picrate *	10 (4.54)
Phenyl dichloroarsine *	Dichlorophenylarsine	1 (0.454)
1,10-(1,2-Phenylene)pyrene	Indeno(1,2,3-cd)pyrene	1 (0.454)
Phenyl mercaptan @	Benzenethiol	100 (45.4)
	Thiophenol *	
Phenylmercuric acetate	Mercury, (acetato-O)phenyl-	100 (45.4)
N-Phenylthiourea	Thiourea, phenyl-	100 (45.4)
Phorate	Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methylester	10 (4.54)
Phosgene *	Carbonyl chloride	10 (4.54)
Phosphine *	Hydrogen phosphide	100 (45.4)
Phosphoric acid *		5000 (2270)
Phosphoric acid, diethyl p-nitrophenyl ester	Diethyl-p-nitrophenyl phosphate	100 (45.4)
Phosphoric acid, lead salt	Lead phosphate	1 (0.454)
Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester	Phorate	10 (4.54)
Phosphorodithioic acid, O,O-diethyl S-methyl ester	O,O-Diethyl S-methyl dithiophosphate	5000 (2270)
Phosphorodithioic acid, O,O-dimethyl S-[2 (methylamino)-2-oxoethyl] ester	Dimethoate	10 (4.54)
Phosphorofluoridic acid, bis(1-methylethyl) ester	Diisopropyl fluorophosphate	100 (45.4)
Phosphorothioic acid, O,O-diethyl O-(p-nitrophenyl) ester	Parathion *	1 (0.454)
Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	O,O-Diethyl O-pyrazinyl phosphorothioate	100 (45.4)
Phosphorothioic acid, O,O-dimethyl O-[p-[(dimethylamino)-sulfonyl] phenyl] ester	Famphur	1000 (454)
Phosphorus *		1 (0.454)
Phosphorus oxychloride *		1000 (454)
Phosphorus pentasulfide *	Phosphorus sulfide	100 (45.4)
	Sulfur phosphide	
Phosphorus sulfide	Phosphorus pentasulfide *	100 (45.4)
	Sulfur phosphide	
Phosphorus trichloride *		1000 (454)
Phthalic anhydride	1,2-Benzenedicarboxylic acid anhydride	5000 (2270)
2-Picoline	Pyridine, 2-methyl-	5000 (2270)
Plumbane, tetraethyl-	Tetraethyl lead *	10 (4.54)

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity(RQ) Pounds(Kilograms)
POLYCHLORINATED BIPHENYLS (PCBs)	Aroclor 1016	10 (4.54)
	Aroclor 1221	
	Aroclor 1232	
	Aroclor 1242	
	Aroclor 1248	
	Aroclor 1254	
	Aroclor 1260	
Potassium arsenate *		1000 (454)
Potassium arsenite *		1000 (454)
Potassium bichromate	Potassium dichromate @	1000 (454)
Potassium chromate		1000 (454)
Potassium cyanide *		10 (4.54)
Potassium dichromate @	Potassium bichromate	1000 (454)
Potassium hydroxide *		1000 (454)
Potassium permanganate *		100 (45.4)
Potassium silver cyanide		1 (0.454)
Pronamide	3,5-Dichloro-N-(1,1-dimethyl-2-propynyl)benzamide	5000 (2270)
1-Propanal, 2,3-epoxy-	Glycidylaldehyde	1 (0.454)
Propanal, 2-methyl-2-(methylthio)-,O-[(methylamino)carbonyl]oxime	Aldicarb	1 (0.454)
1-Propanamine	n-Propylamine *	5000 (2270)
1-Propanamine, N-propyl-	Dipropylamine	5000 (2270)
Propane, 1,2-dibromo-3-chloro-	1,2-Dibromo-3-chloropropane	1(0.454)
Propane, 2-nitro-	2-Nitropropane	1 (0.454)
Propane, 2,2'-oxybis(2-chloro-	Bis(2-chloroisopropyl) ether	1000 (454)
1,3-Propane sultone	1,2-Oxathiolane, 2,2-dioxide	1 (0.454)
Propanedinitrile	Malononitrile	1000 (454)
Propanenitrile	Ethyl cyanide	10 (4.54)
Propanenitrile, 3-chloro-	3-Chloropropionitrile	1000 (454)
Propanenitrile, 2-hydroxy-2-methyl-	Acetone cyanohydrin *	10 (4.54)
	2-Methyllactonitrile	
1,2,3-Propanetriol, trinitrate-	Nitroglycerine *	10 (4.54)
1-Propanol, 2,3-dibromo-, phosphate (3:1)	Tris(2,3-dibromopropyl)phosphate	1 (0.454)
1-Propanol, 2-methyl-	Isobutyl alcohol	5000 (2270)
2-Propanone	Acetone *	5000 (2270)
2-Propanone, 1-bromo-	Bromoacetone *	1000 (454)
Propargite		10 (4.54)
Propargyl alcohol *	2-Propyn-1-ol	1000 (454)
2-Propenal	Acrolein *	1 (0.454)
2-Propenamide	Acrylamide	5000 (2270)
Propene, 1,3-dichloro-	1,3-Dichloropropene	100 (45.4)
1-Propene, 1,1,2,3,3,3-hexachloro-	Hexachloropropene	1000 (454)
2-Propenenitrile	Acrylonitrile *	100 (45.4)
2-Propenenitrile, 2-methyl-	Methacrylonitrile	1000 (454)
2-Propenoic acid	Acrylic acid *	5000 (2270)
2-Propenoic acid, ethyl ester	Ethyl acrylate *	1000 (454)
2-Propenoic acid, 2-methyl-, ethyl ester	Ethyl methacrylate	1000 (454)
2-Propenoic acid, 2-methyl-, methyl ester	Methyl methacrylate *	1000 (454)
2-Propen-1-ol	Allyl alcohol *	100 (45.4)
Propionic acid *		5000 (2270)
Propionic acid, 2-(2,4,5-trichlorophenoxy)-	Silvex	100 (45.4)
	2,4,5-TP @	
	2,4,5-TP acid	
Propionic anhydride		5000 (2270)
n-Propylamine *	1-Propanamine	5000 (2270)
Propylene dichloride *	1,2-Dichloropropane	1000 (454)
Propylene oxide *		100 (45.4)
1,2-Propylenimine *	2-Methylaziridine	1 (0.454)
2-Propyn-1-ol	Propargyl alcohol *	1000 (454)
Pyrene		5000 (2270)
Pyrethrins		1 (0.454)
4-Pyridinamine	4-Aminopyridine	1000 (454)
Pyridine *		1000 (454)
Pyridine, 2-[(2-(dimethylamino)ethyl)-2- thienylamino]-	Methapyrilene	5000 (2270)
Pyridine, hexahydro-N-nitroso-	N-Nitrosopiperidine	1 (0.454)
Pyridine, 2-methyl-	2-Picoline	5000 (2270)
Pyridine, (S)-3-(1-methyl-2-pyrrolidinyl)-, and salts	Nicotine * and salts *	100 (45.4)
4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	Methylthiouracil	1 (0.454)
Pyrophosphonic acid, tetraethyl ester	Tetraethyl pyrophosphate *	10 (4.54)
Pyrrole, tetrahydro-N-nitroso-	N-Nitrosopyrrolidine	1 (0.454)
Quinoline		5000 (2270)
RADIONUCLIDES		1 (0.454)
Reserpine	Yohimban-16-carboxylic acid,11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy]-, methyl ester.	5000 (2270)
Resorcinol	1,3-Benzenediol	5000 (2270)
Saccharin and salts	1,2-Benzisothiazolin-3-one,1,1-dioxide, and salts	1 (0.454)
Safrole	Benzene, 1,2-methylenedioxy-4-allyl-	1 (0.454)
Selenious acid		10 (4.54)
Selenium c		100 (45.4)
Selenium dioxide	Selenium oxide *	10 (4.54)
Selenium disulfide	Sulfur selenide	1 (0.454)
Selenium oxide *	Selenium dioxide	10 (4.54)
Selenoureas	Carbamimidoselenoic acid	1000 (454)
L-Serine, diazoacetate (ester)	Azaserine	1 (0.454)
Silver c		1000 (454)
Silver cyanide *		1 (0.454)
Silver nitrate *		1 (0.454)
Silvex	Propionic acid, 2-(2,4,5-trichlorophenoxy)-	100 (45.4)
	2,4,5-TP @	
	2,4,5-TP acid	
Sodium *		10 (4.54)

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity(RQ) Pounds(Kilograms)
Sodium arsenate *		1000 (454)
Sodium arsenite *		1000 (454)
Sodium azide *		1000 (454)
Sodium bichromate	Sodium dichromate @	1000 (454)
Sodium bifluoride *		100 (45.4)
Sodium bisulfite *		5000 (2270)
Sodium chromate		1000 (454)
Sodium cyanide *		10 (4.54)
Sodium dichromate @	Sodium bichromate	1000 (454)
Sodium dodecylbenzene sulfonate		1000 (454)
Sodium fluoride *		1000 (454)
Sodium hydrosulfide *		5000 (2270)
Sodium hydroxide *		1000 (454)
Sodium hypochlorite *		100 (45.4)
Sodium methylate *		1000 (454)
Sodium nitrite *		100 (45.4)
Sodium phosphate, dibasic		5000 (2270)
Sodium phosphate, tribasic		5000 (2270)
Sodium selenite *		100 (45.4)
4,4'-Stilbenediol, alpha,alpha'-diethyl-	Diethylstilbestrol	1 (0.454)
Streptozotocin	D-Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-	1 (0.454)
Strontium chromate		1000 (454)
Strontium sulfide		100 (45.4)
Strychnidin-10-one, and salts	Strychnine * and salts *	10 (4.54)
Strychnidin-10-one, 2,3-dimethoxy-	Brucine	100 (45.4)
Strychnine * and salts *	Strychnidin-10-one, and salts	10 (4.54)
Styrene		1000 (454)
Sulfur hydride	Hydrogen sulfide *	100 (45.4)
	Hydrosulfuric acid	
Sulfur monochloride		1000 (454)
Sulfur phosphide	Phosphorus pentasulfide *	100 (45.4)
	Phosphorus sulfide	
Sulfur selenide	Selenium disulfide	1 (0.454)
Sulfuric acid		1000 (454)
Sulfuric acid, dimethyl ester	Dimethyl sulfate *	1 (0.454)
Sulfuric acid, thallium(I) salt	Thallium(I) sulfate *	100 (45.4)
2,4,5-T *	2,4,5-T acid	1000 (454)
	2,4,5-Trichlorophenoxyacetic acid *	
2,4,5-T acid	2,4,5-T *	1000 (454)
	2,4,5-Trichlorophenoxyacetic acid *	
2,4,5-T amines		5000 (2270)
2,4,5-T esters		1000 (454)
2,4,5-T salts		1000 (454)
TDE *	DDD	1(0.454)
	Dichlorodiphenyl dichloroethane	
	4,4'-DDD	
1,2,4,5-Tetrachlorobenzene	Benzene, 1,2,4,5-tetrachloro-	5000 (2270)
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)		1 (0.454)
1,1,1,2-Tetrachloroethane	Ethane, 1,1,1,2-tetrachloro-	1 (0.454)
1,1,2,2-Tetrachloroethane	Ethane, 1,1,2,2-tetrachloro-	1 (0.454)
Tetrachloroethene	Ethene, 1,1,2,2-tetrachloro-	1 (0.454)
	Perchloroethylene *	
	Tetrachloroethylene *	
Tetrachloroethylene *	Ethene, 1,1,2,2-tetrachloro-	1 (0.454)
	Perchloroethylene *	
	Tetrachloroethene	
2,3,4,6-Tetrachlorophenol	Phenol, 2,3,4,6-tetrachloro-	10 (4.54)
Tetraethyl lead *	Plumbane, tetraethyl-	10 (4.54)
Tetraethyl pyrophosphate *	Pyrophosphoric acid, tetraethyl ester	10 (4.54)
Tetraethyldithiopyrophosphate	Dithiopyrophosphoric acid, tetraethyl ester	100 (45.4)
Tetrahydrofuran *	Furan, tetrahydro-	1000 (454)
Tetranitromethane *	Methane, tetranitro-	10 (4.54)
Tetraphosphoric acid, hexaethyl ester	Hexaethyl tetraphosphate *	100 (45.4)
Thallic oxide	Thallium(III) oxide	100 (45.4)
Thallium e		1000 (454)
Thallium(I) acetate	Acetic acid, thallium(I) salt	100 (45.4)
Thallium(I) carbonate	Carbonic acid, dithallium (I) salt	100(45.4)
Thallium(I) chloride		100 (45.4)
Thallium(I) nitrate		100 (45.4)
Thallium(III) oxide	Thallic oxide	100 (45.4)
Thallium(I) selenide		1000 (454)
Thallium(I) sulfate *	Sulfuric acid, thallium(I) salt	100 (45.4)
Thioacetamide	Ethanethioamide	1 (0.454)
Thiofanox	3,3-Dimethyl-1-(methylthio)-2-butanone,O-[(methylamino)carbonyl] oxime	100 (45.4)
Thiomidodicarbonic diamide	2,4-Dithiobiuret	100 (45.4)
Thiomethanol	Methanethiol	100 (45.4)
	Methyl mercaptan *	
Thiophenol *	Benzenethiol	100 (45.4)
	Phenyl mercaptan @	
Thiosemicarbazide	Hydrazinecarbothioamide	100 (45.4)
Thiourea	Carbamide, thio-	1 (0.454)
Thiourea, (2-chlorophenyl)-	1-(o-Chlorophenyl)thiourea	100 (45.4)
Thiourea, 1-naphthalenyl-	alpha-Naphthylthiourea	100 (45.4)
Thiourea, phenyl-	N-Phenylthiourea	100 (45.4)
Thiram	Bis(dimethylthiocarbamoyl) disulfide	10 (4.54)
Toluene *	Benzene, methyl-	1000 (454)
Toluenediamine *	Diaminotoluene	1 (0.454)
Toluene diisocyanate *	Benzene, 2,4-diisocyanatomethyl-	100 (45.4)
o-Toluidine hydrochloride	Benzenamine, 2-methyl-, hydrochloride	1 (0.454)
o-Toluidine	2-Amino-1-methyl benzene	1 (0.454)

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity(RQ) Pounds(Kilograms)
p-Toluidine	4-Amino-1-methyl benzene	1 (0.454)
Toxaphene *	Camphene, octachloro-	1 (0.454)
2,4,5-TP @	Propionic acid, 2-(2,4,5-trichlorophenoxy)-	100 (45.4)
	Silvex	
	2,4,5-TP acid	
2,4,5-TP acid esters		100 (45.4)
2,4,5-TP acid	Propionic acid, 2-(2,4,5-trichlorophenoxy)-	100 (45.4)
	Silvex	
	2,4,5-TP @	
1H-1,2,4-Triazol-3-amine	Amitrole	1 (0.454)
Trichlorfon		100 (45.4)
1,2,4-Trichlorobenzene		100 (45.4)
1,1,1-Trichloroethane *	Methyl chloroform *	1000 (454)
1,1,2-Trichloroethane	Ethane, 1,1,2-trichloro-	1 (0.454)
Trichloroethene	Trichloroethylene *	1000 (454)
Trichloroethylene *	Trichloroethene	1000 (454)
Trichloromethanesulfenyl chloride	Methanesulfenyl chloride, trichloro-	100 (45.4)
	Perchloromethyl mercaptan @	
Trichloromonofluoromethane	Methane, trichlorofluoro-	5000 (2270)
Trichlorophenol *		10 (4.54)
2,3,4-Trichlorophenol		
2,3,5-Trichlorophenol		
2,3,6-Trichlorophenol		
2,4,5-Trichlorophenol	Phenol, 2,4,5-trichloro-	
2,4,6-Trichlorophenol	Phenol, 2,4,6-trichloro-	
3,4,5-Trichlorophenol		
2,4,5-Trichlorophenol	Phenol, 2,4,5-trichloro-	10 (4.54)
2,4,6-Trichlorophenol	Phenol, 2,4,6-trichloro-	10 (4.54)
2,4,5-Trichlorophenoxyacetic acid *	2,4,5-T *	1000 (454)
	2,4,5-T acid	
Triethanolamine dodecylbenzene sulfonate		1000 (454)
Triethylamine		5000 (2270)
Trimethylamine *		100 (45.4)
sym-Trinitrobenzene *	Benzene, 1,3,5-trinitro-	10 (4.54)
1,3,5-Trioxane, 2,4,6-trimethyl-	Paraldehyde	1000 (454)
Tris(2,3-dibromopropyl) phosphate	1-Propanol, 2,3-dibromo-, phosphate (3:1)	1 (0.454)
Trypan blue	2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-dimethyl-(1,1'-biphenyl)-4,4'-diyl)-bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt.	1 (0.454)
Unlisted Hazardous Wastes Characteristic of Corrosivity D002		100(45.4)
Unlisted Hazardous Wastes Characteristic of EP Toxicity		
Arsenic D004		1 (0.454)
Barium D005		1000 (454)
Cadmium D006		1 (0.454)
Chromium D007		1 (0.454)
Lead D008		1 (0.454)
Mercury D009		1 (0.454)
Selenium D010		10 (4.54)
Silver D011		1 (0.454)
Endrin D012		1 (0.454)
Lindane D013		1 (0.454)
Methoxychlor D014		1 (0.454)
Toxaphene D015		1 (0.454)
2,4-D D016		100 (45.4)
2,4,5-TP D017		100 (45.4)
Unlisted Hazardous Wastes Characteristic of Ignitability D001		100 (45.4)
Unlisted Hazardous Wastes Characteristic of Reactivity D003		100 (45.4)
Uracil, 5-[bis(2-chloroethyl)amino]-	Uracil mustard	1 (0.454)
Uracil mustard	Uracil, 5-[bis(2-chloroethyl)amino]-	1 (0.454)
Uranyl acetate *		100 (45.4)
Uranyl nitrate *		100 (45.4)
Vanadic acid, ammonium salt	Ammonium vanadate	1000 (454)
Vanadium(V) oxide	Vanadium pentoxide	1000 (454)
Vanadium pentoxide	Vanadium(V) oxide	1000 (454)
Vanadyl sulfate		1000 (454)
Vinyl acetate *		5000 (2270)
Vinyl chloride *	Ethene, chloro-	1 (0.454)
Vinylidene chloride *	Ethene, 1,1-dichloro-	5000 (2270)
	1,1-Dichloroethylene	
Warfarin	3-(alpha-Acetonylbenzyl)-4-hydroxycoumarin and salts	100 (45.4)
Xylene * (mixed)	Benzene, dimethyl-	1000 (454)
m-	m-	
o-	o-	
p-	p-	
Xylenol *		1000 (454)
Yohimban-16-carboxylic acid,11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy]-, methyl ester.	Reserpine	5000 (2270)
Zinc *		1000 (454)
Zinc acetate		1000 (454)
Zinc ammonium chloride		1000 (454)
Zinc borate		1000 (454)
Zinc bromide		1000 (454)
Zinc carbonate		1000 (454)
Zinc chloride		1000 (454)
Zinc cyanide *		10 (4.54)
Zinc fluoride		1000 (454)
Zinc formate		1000 (454)
Zinc hydrosulfite *		1000 (454)
Zinc nitrate *		1000 (454)
Zinc phenolsulfonate		5000 (2270)
Zinc phosphide *		100 (45.4)

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity(RQ) Pounds(Kilograms)
Zinc silicofluoride		5000 (2270)
Zinc sulfate		1000 (454)
Zirconium nitrate *		5000 (2270)
Zirconium potassium fluoride		1000 (454)
Zirconium sulfate *		5000 (2270)
Zirconium tetrachloride *		5000 (2270)
F001		1 (0.454)
The following spent halogenated solvents used in degreasing and sludges from the recovery of these solvents in degreasing operations:.		
(a) Tetrachloroethylene		1 (0.454)
(b) Trichloroethylene		1000 (454)
(c) Methylene chloride		1000 (454)
(d) 1,1,1-Trichloroethane		1000 (454)
(e) Carbon tetrachloride		5000 (2270)
(f) Chlorinated fluorocarbons		5000 (2270)
F002		1 (0.454)
The following spent halogenated solvents and the still bottoms from the recovery of these solvents:.		
(a) Tetrachloroethylene		1 (0.454)
(b) Methylene chloride		1000 (454)
(c) Trichloroethylene		1000 (454)
(d) 1,1,1-Trichloroethane		1000 (454)
(e) Chlorobenzene		100 (45.4)
(f) 1,1,2-Trichloro-1,2,2-trifluoroethane		5000 (2270)
(g) o-Dichlorobenzene		100 (45.4)
(h) Trichlorofluoromethane		5000 (2270)
F003		100 (45.4)
The following spent non-halogenated solvents and solvents:		
(a) Xylene		1000 (454)
(b) Acetone		5000 (2270)
(c) Ethyl acetate		5000 (2270)
(d) Ethylbenzene		1000 (454)
(e) Ethyl ether		100 (45.4)
(f) Methyl isobutyl ketone		5000 (2270)
(g) n-Butyl alcohol		5000 (2270)
(h) Cyclohexanone		5000 (2270)
(i) Methanol		5000 (2270)
F004		1000 (454)
The following spent non-halogenated solvents and the stillbottoms from the recovery of these solvents:.		
(a) Cresols/Cresylic acid		1000 (454)
(b) Nitrobenzene		1000 (454)
F005		100 (45.4)
The following spent non-halogenated solvents and the stillbottoms from the recovery of these solvents:.		
(a) Toluene		1000 (454)
(b) Methyl ethyl ketone		5000 (2270)
(c) Carbon disulfide		100 (45.4)
(d) Isobutanol		5000 (2270)
(e) Pyridine		1000 (454)
F006		1 (0.454)
Wastewater treatment sludges from electroplating operations except from the following processes: (1) Sulfuric acid anodizing of aluminum,(2) tin plating on carbon steel, (3) zinc plating (segregated basis) on carbonsteel, (4) aluminum or zinc-aluminum plating on carbon steel, (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel, and (6) chemical etching and milling of aluminum.		
F007		10 (4.54)
Spent cyanide plating bath solutions from electroplating operations		
F008		10 (4.54)
Plating bath sludges from the bottom of plating baths fromelectroplating operations where cyanides are used in the process (except for precious metals electroplating plating bath sludges).		
F009		10 (4.54)
Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process (except for precious metals electroplating spent stripping and cleaning bath solutions).		
F010		10 (4.54)
Quenching bath sludge from oil baths from metal heat treating operations where cyanides are used in the process (except for precious metals heat-treating quenching bath sludges).		
F011		10 (4.54)
Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations (except for precious metals heat treating spent cyanide solutions from salt bath pot cleaning).		
F012		10 (4.54)
Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process (except for precious metals heat treating quenching wastewater treatment sludges).		
F019		1 (0.454)
Wastewater treatment sludges from the chemical conversion coating of aluminum		
F020		1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol.).		

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity(RQ) Pounds(kilograms)
F021		1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives..		
F022		1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions..		
F023		1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexachlorophene from highly purified 2,4,5-trichlorophenol.).		
F024		1 (0.454)
Wastes, including but not limited to distillation residues, heavy ends, tars, and reactor cleanout wastes, from the production of chlorinated aliphatic hydrocarbons, having carbon content from one to five, utilizing free radical catalyzed processes. (This listing does not include light ends, spent filters and filter aids, spent dessicant(sic), wastewater, wastewater treatment sludges, spent catalysts, and wastes listed in 40 CFR 261.32.).		
F026		1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions..		
F027		1 (0.454)
Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derivedfrom these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-trichlorophenol as the sole component.).		
F028		1 (0.454)
Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027..		
K001		1 (0.454)
Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol.		
K002		1 (0.484)
Wastewater treatment sludge from the production of chrome yellow and orange pigments.		
K003		1 (0.454)
Wastewater treatment sludge from the production of molybdate orange pigments		
K004		1 (0.454)
Wastewater treatment sludge from the production of zinc yellow pigments		
K005		1 (0.454)
Wastewater treatment sludge from the production of chrome green pigments		
K006		1 (0.454)
Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated).		
K007		1 (0.454)
Wastewater treatment sludge from the production of iron blue pigments		
K008		1 (0.454)
Oven residue from the production of chrome oxide green pigments		
K009		1 (0.454)
Distillation bottoms from the production of acetaldehyde from ethylene		
K010		1 (0.454)
Distillation side cuts from the production of acetaldehydefrom ethylene		
K011		1 (0.454)
Bottom stream from the wastewater stripper in the production of acrylonitrile		
K013		1 (0.454)
Bottom stream from the acetonitrile column in the production of acrylonitrile		
K014		5000 (2270)
Bottoms from the acetonitrile purification column in the production of acrylonitrile		
K015		1 (0.454)
Still bottoms from the distillation of benzyl chloride		
K016		1 (0.454)
Heavy ends or distillation residues from the production of carbon tetrachloride		
K017		1 (0.454)
Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin.		
K018		1 (0.454)
Heavy ends from the fractionation column in ethyl chloride production		
K019		1 (0.454)
Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production.		
K020		1 (0.454)
Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production.		
K021		1 (0.454)
Aqueous spent antimony catalyst waste from fluoromethanes production		
K022		1 (0.454)
Distillation bottom tars from the production of phenol/acetone from cumene		
K023		5000 (2270)
Distillation light ends from the production of phthalic anhydride from naphthalene		
K024		5000 (2270)
Distillation bottoms from the production of phthalic anhydride from naphthalene		

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity(RQ) Pounds(Kilograms)
K025		1 (0.454)
Distillation bottoms from the production of nitrobenzene by the nitration of benzene		
K026		1000 (454)
Stripping still tails from the production of methyl ethyl pyridines		
K027		1 (0.454)
Centrifuge and distillation residues from toluene diisocyanate production		
K028		1 (0.454)
Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane.		
K029		1 (0.454)
Waste from the product steam stripper in the production of 1,1,1-trichloroethane		
K030		1 (0.454)
Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene.		
K031		1 (0.454)
By-product salts generated in the production of MSMA and cacodylic acid		
K032		1 (0.454)
Wastewater treatment sludge from the production of chlordane		
K033		1 (0.454)
Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane.		
K034		1 (0.454)
Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane.		
K035		1 (0.454)
Wastewater treatment sludges generated in the production of creosote		
K036		1 (0.454)
Still bottoms from toluene reclamation distillation in the production of disulfoton		
K037		1 (0.454)
Wastewater treatment sludges from the production of disulfoton		
K038		1 (0.454)
Wastewater from the washing and stripping of phorate production		
K039		10 (4.54)
Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate.		
K040		1 (0.454)
Wastewater treatment sludge from the production of phorate		
K041		1 (0.454)
Wastewater treatment sludge from the production of toxaphene		
K042		1 (0.454)
Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T.		
K043		1 (0.454)
2,6-dichlorophenol waste from the production of 2,4-D		
K044		10 (4.54)
Wastewater treatment sludges from the manufacturing and processing of explosives		
K045		10 (4.54)
Spent carbon from the treatment of wastewater containing explosives		
K046		100 (45.4)
Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds.		
K047		10 (4.54)
Pink/red water from TNT operations		
K048		1 (0.454)
Dissolved air flotation (DAF) float from the petroleum refining industry		
K049		1 (0.454)
Slop oil emulsion solids from the petroleum refining industry		
K050		1 (0.454)
Heat exchanger bundle cleaning sludge from the petroleum refining industry		
K051		1 (0.454)
API separator sludge from the petroleum refining industry		
K052		10 (4.54)
Tank bottoms (leaded) from the petroleum refining industry		
K060		1 (0.454)
Ammonia still lime sludge from coking operations		
K061		1 (0.454)
Emission control dust/sludge from the primary production of steel in electric furnaces.		
K062		1 (0.454)
Spent pickle liquor from steel finishing operations		
K069		1 (0.454)
Emission control dust/sludge from secondary lead smelting		
K071		1(0.454)
Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used.		
K073		1 (0.454)
Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production.		
K083		100 (45.4)
Distillation bottoms from aniline extraction		
K084		1 (0.454)
Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.		
K085		1 (0.454)
Distillation or fractionation column bottoms from the production of chlorobenzenes		
K086		1 (0.454)
Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead.		

LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous Substance	Synonyms	Reportable Quantity(RQ) Pounds(Kilograms)
K087		100 (45.4)
Decanter tank tar sludge from coking operations		
K093		5000 (2270)
Distillation light ends from the production of phthalic anhydride from ortho-xylene		
K094		5000 (2270)
Distillation bottoms from the production of phthalic anhydride from ortho-xylene		
K095		1 (0.454)
Distillation bottoms from the production of 1,1,1-trichloroethane		
K096		1 (0.454)
Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane.		
K097		1 (0.454)
Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane.		
K098		1 (0.454)
Untreated process wastewater from the production of toxaphene		
K099		1 (0.454)
Untreated wastewater from the production of 2,4-D		
K100		1 (0.454)
Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting.		
K101		1 (0.454)
Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.		
K102		1 (0.454)
Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.		
K103		100 (45.4)
Process residues from aniline extraction from the production of aniline		
K104		1 (0.454)
Combined wastewater streams generated from nitrobenzene/aniline chlorobenzenes		
K105		1 (0.454)
Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes.		
K106		1 (0.454)
Wastewater treatment sludge from the mercury cell process in chlorine production		
K111		1 (0.454)
Product washwaters from the production of dinitrotoluene via nitration of toluene.		
K112		1 (0.454)
Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene..		
K113		1 (0.454)
Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene..		
K114		1 (0.454)
Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene..		
K115		1 (0.454)
Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene..		
K116		1 (0.454)
Organic condensate from the solvent recovery column in theproduction of toluene diisocyanate via phosgenation of toluenediamine..		
K117		1 (0.454)
Wastewater from the reaction vent gas scrubber in the production of ethylene bromide via bromination of ethene..		
K118		1 (0.454)
Spent absorbent solids from purification of ethylene dibromide in the production of ethylene dibromide..		
K136		1 (0.454)
Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene..		

Footnotes:
¢ - the RQ for these hazardous substances is limited to those pieces of the metal having a diameter smaller than 100 micrometers (0.004 inches)
¢¢ - the RQ for asbestos is limited to friable forms only
* - indicates that this material appears by name in the Hazardous Materials Table
@ - indicates that the name was added by RSPA because (1) the name is a synonym for a specific hazardous substance and (2) the name appears in the Hazardous Materials Table as a proper shipping name.

COLORADO SCHOOL OF MINES

JOB DESCRIPTION

ENVIRONMENTAL HEALTH MANAGER

GENERAL:

This is a technical, professional position which provides a variety of industrial hygiene services in support of teaching and research activities at the Colorado School of Mines. The position requires well developed technical skills, managerial ability, interpersonal skills, ability to communicate, and ability to exercise independent judgement in situations which involve risk. The position also requires good physical health, and the capability to utilize cumbersome personal protective equipment and to handle heavy containers of waste material. In addition, the position requires leadership and organizational skills, sound understanding of math and the basic sciences and excellent writing ability.

MAJOR TASKS:

1. Direct a complex institutional hazardous waste management program. Train and supervise part-time assistants in accomplishing program functions including: collect hazardous waste from campus laboratories; sort and segregate waste according to hazard class; transport waste to a general storage location and ensure safe storage; perform routine inspections of waste storage facilities; maintain waste collection records; pack waste for shipment; coordinate transport and disposal of waste.

2. Serve as a member of the campus Chemical Spill Response Team.

3. Implement and manage institutional programs dedicated to regulatory compliance and control of asbestos, lead, mercury, PCBs and ozone-depleting chemicals.

4. Develop employee training programs and provide training presentations.

5. Act as a point of contact and source of information for administrators, faculty members, students and classified staff members in matters pertaining to hazardous waste, environmental compliance, industrial hygiene and related environmental health issues.

6. Administer the School's environmental permits including those associated with sanitary sewer discharges, air emissions and stormwater discharges. Perform environmental monitoring associated with these discharges. Submit periodic compliance reports as required by regulatory agencies.

7. Perform a wide variety of industrial hygiene tasks including: design and implement sampling and analysis plans related to assessment of personnel exposures to regulated materials; evaluate hazardous material storage and handling procedures and equipment; evaluate the effectiveness of engineering controls such as laboratory ventilation systems; consult with researchers concerning the safe design of experiments and lab apparatus.

8. Prepare technical reports, guidance documents, and institutional policies. Assist in the investigation and documentation of issues related to compliance with health, safety and environmental regulation.

9. Develop, implement and manage an institutional medical surveillance program and a respiratory protection program.

MINIMUM QUALIFICATIONS:

Required Minimum Training/Education: B.S. Degree in a field of Natural Science or Engineering.

Required Experience: At least five years of professional experience in a field of environmental or occupational health and safety.

Required Physical Capabilities: The position will be occupied by a non-smoker who is medically qualified and physically able to wear personal protective equipment including respirators and level "A" protective gear.

Other Requirements:

- The Environmental Health Manager must be able and willing to work with a wide variety of potentially hazardous materials including radioactive material, toxic and reactive chemicals, and biohazards.

- The Environmental Health Manager must be able to communicate effectively orally and in writing.

Other Desirable Qualifications:

- Advanced Work Experience
- Advanced Education
- Professional Certification as an Industrial Hygienist, Certified Hazardous Material Manager, Professional Engineer, Health Physicist, Certified Safety Professional, etc....
- Knowledge of Computer Operations
- Knowledge of the Structure and Content of Environmental, Public Health and Occupational Health and Safety Regulation
- Knowledge of the Organization and Authority of Governmental Regulatory Authorities

COLORADO SCHOOL OF MINES
JOB DESCRIPTION

WASTE MANAGEMENT ASSISTANT

General: This is a part-time position suitable for students with a background in the natural sciences. The position works under the supervision of the Environmental Health Manager. Work involves the pickup, transportation, sorting, consolidation and packing of regulated waste.

Major Tasks:

1. Under the direction of the Environmental Health Manager accomplish manual labor tasks associated with the management of regulated waste on the CSM campus.

2. Utilize personal protective equipment including boots, gloves, protective suits and respiratory protection devices.

3. Perform equipment cleaning, operational checks and inventory tasks.

4. Enter hazardous waste management data in a computer.

Qualifications:

1. Must be able to pass physical exam.

2. Satisfactorily complete 40-hour OSHA Training Course and periodic refresher training.

3. Willing and able to utilize cumbersome personal protective equipment.

4. Valid driver's license.

5. Computer data entry skill.

6. Educational background in the natural sciences.

11/19/98-Bob/Reports/Rept100F

JOB DESCRIPTION

CHEMICAL HYGIENE MANAGER

General:

This is a technical professional position which calls for a wide range of skills including knowledge of chemical handling practices, knowledge of principles of toxicology, use of computers, bookkeeping, program development, maintenance of chemical stockroom supplies and presentation of technical training to faculty members, graduate students, and classified staff employees. The Chemical Hygiene Manager reports to the CSM Director of Environmental Health and Safety. The Chemical Hygiene Manager maintains a central chemical storage and distribution facility. The Manager develops/maintains a computer database to track the types, ownership, quantity, location and history of chemical use on the campus. The Manager maintains a Chemical Hygiene Program which conforms to the OSHA standards and which incorporates all chemical usage on the campus. Distribution of Material Safety Data Sheets (MSDS) and maintenance of chemical inventories are elements of this program.

Major Tasks:

1) Maintain a chemical storage and distribution facility to serve all chemical users on the campus. Maintain adequate stocks of frequently used chemicals. Ensure safe storage of several classes of chemicals.

2) Initiate procurement of chemicals for all users on campus. Process requisitions from chemical users on campus. Place orders with vendors. Maintain appropriate records.

3) Receive shipments of all chemicals and radioactive materials used on campus. Inspect received materials for leaks, shortage, damage.

4) Distribute chemicals to authorized users on campus. Distribute MSDSs as needed.

5) Maintain a computerized chemical inventory control and bar code tracking system for the entire campus. Perform inventories of chemical containers.

6) Maintain appropriate paperwork and records for the billing of chemical purchases. Prepare reports as required.

7) Provide technical training on chemical handling and toxicology to campus personnel.

rev date

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8) Develop, maintain and distribute a model Chemical Hygiene Plan for campus laboratories. Coordinate the implementation and maintenance of the Chemical Hygiene Plan among all campus departments and among individual chemical users.

9) Serve as a member of the Chemical Spill Response Team.

Qualifications:

- Training/Education: Bachelor's degree with a major in industrial hygiene, chemistry, environmental science or a related field.

- Experience: At least two years of professional experience in a related field. Five years of experience is preferred.

- Physical Capabilities: Must be non-smoker who is medically qualified and physically able to wear personal protective equipment including respirators and level "A" protective gear. Must possess visual acuity, manual dexterity and physical ability necessary to safely handle various containers of hazardous materials.

- Other Requirements: Must be...
  - Able and willing to work with a wide variety of potentially hazardous materials including those that are radioactive, biohazardous, carcinogenic, explosive, corrosive and/or toxic.
  - Able to communicate effectively orally and in writing
  - PC computer literate
  - Skilled in interpersonal relations

- Other Desirable Qualifications:
  - Advanced work experience
  - Advanced education
  - Professional Certification such as Certified Industrial Hygienist, Certified Hazardous Materials Manager, Professional Engineer, Health Physicist, Certified Safety Professional, etc.
  - Other training such as First Aid and CPR certification, 40 hour OSHA HAZWOPER and 8 hour refresher courses, OSHA Incident Command training
  - Knowledge of Environmental, Public Health, Occupational Health and Safety Regulations

Environmental Health and Safety
Colorado School of Mines
Golden, CO 80401-1887
303/273-3316

COLORADO SCHOOL OF MINES
GOLDEN, COLORADO 80401-1887

March 26, 1998

Ms. Mira Neumiller
Biennial Report Coordinator
Hazardous Materials and Waste Management Division
Colorado Department of Public Health and Environment
4300 Cherry Creek Dr S
Denver, CO 80222

Re: Biennial Report for 1997

Dear Ms. Neumiller:

Attached is the 1997 Biennial Report for the Colorado School of Mines. There is a pen & ink change to the county name on the first page of the IC form. Reference the two attached e-mail communications for the reason.

Sincerely,

Wendell Rahorst
Hazardous Materials Manager

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Subject: **BRSDisk program**
Date: Wed, 11 Mar 1998 11:51:00 -0700
From: "Wendell Rahorst, CIH" <wrahorst@mines.edu>
To: mira.neumiller@state.co.us

Ms. Neumiller,

The BRSDisk program does not have a listing for Jefferson County, CO. It sees an entry for Jefferson County on the IC form as a fatal error and will not compile the report. Is there a work around for this?

Wendell Rahorst
wrahorst@mines.edu

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Subject: **BRSDisk program -Reply**
Date: Thu, 12 Mar 1998 08:13:29 -0700
From: MIRA NEUMILLER <mjneumil@smtpgate.dphe.state.co.us>
To: wrahorst@mines.edu

Please enter another county and change it on your hard copy. Also call my attention to it on the site transmittal form or cover letter. I will change it back to Jefferson County after it's loaded into another system that does accept Jefferson County. Sorry for the glitch.

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Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM IC

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
IDENTIFICATION AND CERTIFICATION

Sec. I Site/Company name and location address information.

A.EPA ID number: COD982597320 B.County: ~~DENVER~~ JEFFERSON

C.Site/Company name: COLORADO SCHOOL OF MINES

E.Address: 1500 ILLINOIS STREET

F.City: GOLDEN G.State: CO H.ZIP CODE: 80401 - 1887

Sec. II Mailing address of this site: A.Same as location? [_]

B.Address: 1500 ILLINOIS STREET

C.City: GOLDEN D.State: CO E.ZIP CODE: 80401 - 1887

Sec. III Name title and phone number of the person who should be contacted if questions arise regarding this report.

	Last Name	First Name	M.I.
A.Contact Name:	Rahorst	Wendell	
B.Contact Title:	HazMatMgr	C.Phone: 303 / 273 - 3998	ext: NA

Sec. IV "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are signifigant penalties under Section 3008 of the Resource Conservation and Recovery Act for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Last Name	First Name	M.I.	
A.Name: Rahorst	Wendell		B.Title: HazMatMgr

C. SIGNATURE

Wendell Rahorst

D. DATE OF SIGNATURE
19 98 0326
03 / 26 19 98
MO. DAY YR.

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EPA ID Number: COD982597320

Sec. V GENERATOR STATUS:

A. RCRA Generator status.

1. LQG
2. SQG
3. CESQG **1**
4. Non Generator

B. Reason for not generating

1. Never Generated
2. Out of business
3. Only Excluded/delisted
4. Only Non-hazardous
5. Periodic/occasional
6. Waste Min.
7. Other

Sec. VI ON-SITE MANAGEMENT STATUS

A.RCRA Permitted storage	B.RCRA Permitted TDR	C.RCRA Exempt TDR
1	1	1

Sec. VII WASTE MINIMIZATION ACTIVITY EXPANDED OR BEGUN IN 1996 or 1997

A.Source reduction.	B.Recycling	C. Reduction/Recycling Opportunity investigation
–	–	–

Comments:

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DATA SUBMISSION FOR: Colorado School of Mines - Golden 02-19-1998 DATE: 03-26-1998

COD982597320

Form IC LOCATION Information

Generator Name Alt ID

ADDRESS

City County State ZIP

COLORADO SCHOOL OF MINES
1500 ILLINOIS STREET
GOLDEN DENVER CO 80401 1887

COD982597320

Form IC MAILING, CERTIFICATION, & STATUS Information

Mailing address
City State ZIP
Certification By Date Gen. Stat.
Contact Phone Ext.
Stor TDR Ex.TDR Source Recycle Opportunity

1500 ILLINOIS STREET
GOLDEN CO 80401 1887
Rahorst Wendell HazMatMgr 19 98 0326 1
Rahorst Wendell HazMatMgr 303 273 3998 NA
1 1 1 _ _ _

COD982597320

Form GM Waste Generated Information

Page	Waste Form	UOM	Density LB/SG	ORG SYS	ON-Site OFF_	P O M	R a d	SIC Source TRI	Qty Gen 1996	Qty Gen 1997
0001	B103	3	01.20	2 1	M N	Y	1	2 8221 A94	000000000.00	000003978.00
0002	B204	3	00.90	2 1	M N	Y	1	2 8221 A94	000000000.00	000001840.00
0003	B001	3	01.00	2 1	M N	Y	1	2 8221 A94	000000000.00	000000007.00
0004	B003	3	07.50	2 1	M N	Y	1	2 8221 A94	000000000.00	000000005.00
0005	B002	3	01.20	1 1	M N	Y	1	2 8221 A94	000000000.00	000000012.00
0006	B009	3	01.00	2 1	M N	Y	1	2 8221 A94	000000000.00	000000078.00
0007	B002	3	00.80	2 1	M N	Y	1	2 8221 A94	000000000.00	000000260.00
0008	B113	3	09.50	1 1	M N	Y	1	2 8221 A94	000000000.00	000001000.00
0009	B001	3	01.00	2 1	M N	Y	1	2 8221 A94	000000000.00	000000013.00
0010	B319	3	00.80	2 1	M N	Y	1	2 8221 A94	000000000.00	000000488.00
0011	B003	3	01.00	2 1	M N	Y	1	2 8221 A94	000000000.00	000000014.00
0012	B001	3	00.92	2 1	M N	Y	1	2 8221 A94	000000000.00	000000009.00

300

0013	B001	3	02.30	2	1	M	N	Y	1	2	8221	A94	000000000.00	000000007.00
0014	B001	3	02.50	2	1	M	N	Y	1	2	8221	A94	000000000.00	000000018.00
0015	B001	3	02.30	2	1	M	N	Y	1	2	8221	A94	000000000.00	000000012.00
0016	B001	2	02.60	2	1	M	N	Y	1	2	8221	A94	000000000.00	000000002.00
0017	B001	3	02.39	2	1	M	N	Y	1	2	8221	A94	000000000.00	000000002.00
0018	B001	3	02.50	2	1	M	N	Y	1	2	8221	A94	000000000.00	000000009.00
0019	B104	3	01.00	2	1	M	Y	N	1	2	8221	A94	000000000.00	000003791.00
0020	B206	3	00.90	2	1	M	N	Y	1	2	8221	A54	000000000.00	000004083.00

COD982597320
Form GM

Page	Waste Codes								
0001	D002	D004	D005	D007	D008	D009	D010	D006	D011
0002	D001	D004	D005	D006	D007	D008	D009	D010	D011
0003	D001								
0004	D008								
0005	D003								
0006	D003								
0007	D004	D006	D007	D008	D011				
0008	D006	D011							
0009	U134								
0010	D009								
0011	D001								
0012	D001	D003							
0013	D001	D003							
0014	D001	D007							
0015	D001								
0016	D003								
0017	D003								
0018	D002								
0019	D002								
0020	D006	D007							

COD982597320
Form GM Off-Site Shipments

Page	System Code	EPA ID Shipped to	Qty Shipped 1995	Availability code
0001	M041	NED981723513	000003978.00	1
0002	M041	NED981723513	000001840.00	1
0003	M075	ILD000608471	000000007.00	1
0004	M111	ILD000608471	000000005.00	1
0005	M075	ILD000608471	000000009.00	1
0005	M043	ARD069748192	000000003.00	1
0006	M072	ILD000608471	000000078.00	1
0007	M043	ARD069748192	000000260.00	1
0008	M141	KSD007246846	000001000.00	1
0009	M074	ILD000608471	000000013.00	1
0010	M019	FLD984262782	000000488.00	1
0011	M041	ARD069748192	000000014.00	1
0012	M043	ARD069748192	000000009.00	1

0013	M043	ARD069748192	000000007.00 1
0014	M043	ARD069748192	000000018.00 1
0015	M043	ARD069748192	000000012.00 1
0016	M043	ARD069748192	000000002.00 1
0017	M043	ARD069748192	000000002.00 1
0018	M043	ARD069748192	000000009.00 1
0020	M061	COD982581993	000004083.00 1

COD982597320
Form GM On-Site Treatment

Page	System Code	Qty Treated 1995
0019	M121	000003791.00

COD982597320
Form GM Waste description

Page	Description of Waste Stream
0001	Waste corrosive liquids, acidic, inorganic with metals
0001	generated by laboratory processes.
0002	Laboratory waste flammable, organic solvents and metals
0003	Laboratory waste, hydrogen peroxide
0004	Laboratory waste, solid lead sulfide
0005	Alkali metals in oil
0006	wastespent cyanide solutions
0007	Soil and paper products contaminated with silver and cadmium
0008	Photo chemical waste containing Silver and Cadmium
0009	Waste Hydoflouric acid
0010	Waste mercury containing articiles
0011	Waste spent picric acid
0012	Waste Lithium Aluminum Hydride
0013	Flammable solid- amorphous phosphorus
0014	Oxidizing Solids-Calcium Nitrate and Chromium nitrate
0015	Oxidizing Solids- Sodium Nitrate and Potassium Nitrate
0016	Toxic Solid- Sodium Sulfite
0017	Phosphorus Pentoxide
0018	Boron Oxide
0019	This is a laboratory waste of spent mineral acids that conta
0019	ins no regulated metals and is neutralizied to a pH of betwe
0019	en 6-8.
0020	Waste oil produced by oil changes on equipment

COD982597320
Form GM Comments

Page	Comments for Waste Stream
0006	Lab Pack of spent waste cyanide solutions
0008	Waste was treated at permitted wastewater treatment facility
0010	Waste mercury contained inmanfactured articles

COD982597320
Form OI

Off-Site EPA ID	Page	Handler Type G	T	TDSR	Name of Transporter or Facility
Address					
City					State ZIP
ARD069748192	00001		X		Ensco, Inc
309 American Circle					
El Dorado					AR 71730 0000

302

FLD984262782 00002 X MERCURY TECHNOLOGIES INTERNATIONAL
4317-L-FORTUNE PLACE
WEST MELBOURNE FL 32904 0000

D000608471 00003 X Clean Harbors Services, Inc.
11800 S. Stony Island Ave.
Chicago IL 60617

KSD007246846 00004 X Hydrocarbon Recyclers
2549 North New York
Wichita KS 67219

NED981723513 00005 X Clean Harbors Env. Services
5 miles south of Kimball
Kimball NE 69145

MAD039322250 00006 X Clean Harbors Env. Services

0000

OKD981605363 00007 X Environmental Transportation Services

0000

UTD981552425 00008 X SLT Express

0000

DER000000968 00009 X Specialized Dedicated Fleets

0000

DBD981110166 00010 X Matlack Inc

0000

NED986382133 00011 X Smith Systems Transportation

0000

COD000716621 00012 X Safety-Kleen Corp

0000

OKD018115469 00013 X Safety-Kleen Corp

0000

FLD984262782 00014 X Mercury Technologies
4317-1 Fortune Pl
West Melbourne FL 32904 0000

TXD988023305 00015 X Laidlaw Environmental Services

0000

D982565947 00016 X Rollins Chempak Inc

0000

OKD981588791 00017 X Triad Transport Inc.

0000

D982581993 00018 X X Mesa Oil, Inc.
7239 Bradburn Blvd
Denver CO 80030 0000

304

.ERROR LISTING FOR Colorado School of Mines - Golden 02-19-1998 RUN ON 03-26-1998

. GM ERROR SET FOR H9825973.G12

page# message
00013 WARN: Possible duplicate GM page: 00003
00018 WARN: Possible duplicate GM page: 00012
00010 WARN: G507 FLD984262782 DID NOT REPORT HAVING M019 TREATMENT SYS. IN 1995
00020 WARN: G507 COD982581993 DID NOT REPORT HAVING M061 TREATMENT SYS. IN 1995
00019 WARN: G608 TREATMENT SYSTEM: M121 WASTE MAY BE EXEMPT
OR EXCLUDED FROM REPORTING IF IT IS A TOTALLY ENCLOSED
TREATMENT SYSTEM OR A CLOSED LOOP RECYCLING SYSTEM.

. IC ERROR SET FOR H9825973.S12

. OI ERROR SET FOR H9825973.O12

. REPORT TOTALS FOR Colorado School of Mines - Golden 02-19-1998 IN TONS

PREV YEAR TOTAL GENERATED	=	0
TOTAL GENERATED (GM)	=	17.1886
TOTAL RECEIVED (WR)	=	0
TOTAL SHIPPED (GM)	=	13.0185
TOTAL TREATED (GM)	=	4.1701
TOTAL UI, POTW, & NPDES	=	0
TOTAL RCRA GENERATION	=	17.1886

. RCRA WASTE TONS GENERATED ON-SITE BY WASTE FORM (TYPE)

FORM CODE		TONS GENERATED
B001	Lab packs of old chemicals only	.0847
B002	Lab packs of debris only	.2992
B003	Mixed lab packs	.0209
B009	Other lab packs (Specify in Comments)	.0858
B103	Spent acid with metals	4.3758
B104	Spent acid without metals	4.1701
B113	Other aqueous waste with high dissolved so	1.1
B204	Halogenated/nonhalogenated solvent mixture	2.024
B206	Waste oil	4.4913
B319	Other waste inorganic solids (Specify in C	.5368

. RCRA WASTE TONS GENERATED ON-SITE BY WASTE SOURCE

SOURCE CODE		TONS GENERATED
A54	Oil changes	4.4913
A94	Laboratory wastes	12.6973

. RCRA TONS TREATED AND RCRA EFFLUENTS BY ON-SITE TREATMENT SYSTEM
TONS TREATED FROM GM OR WR - EFFLUENTS ON FORM GM WITH ORG = 5

SYSTEM		TREATED	EFFLUENT
M121	Neutralization only	4.1701	0

. RCRA WASTE TONS SHIPPED TO OFFSITE TREATMENT SYSTEMS

SYSTEM		TONS SHIPPED
M019	Metals recovery - type unknown	.5368
M041	Incineration - liquids	6.4152
M043	Incineration - solids	2.352
M061	Fuel blending	4.4913
M072	Cyanide destruction followed by chemi	.0858
M074	Chemical oxidation followed by chemic	.0143
M075	Chemical oxidation only	.0176
M111	Stabilization/Chemical fixation using	.0055
M141	Transfer facility storage, waste was	1.1

D[illegible] SUBMISSION FOR: Colorado School of Mines - Golden 02-19-1998 DATE: 03-26-1998
COD982597320
Form IC LOCATION Information

Generator Name Alt ID
ADDRESS
City County State ZIP

COLORADO SCHOOL OF MINES
1500 ILLINOIS STREET
GOLDEN DENVER CO 80401 1887

COD982597320
Form IC MAILING, CERTIFICATION, & STATUS Information

Mailing address
City State ZIP
Certification By Date Gen. Stat.
Contact Phone Ext.
Stor TDR Ex.TDR Source Recycle Opportunity

1500 ILLINOIS STREET
GOLDEN CO 80401 1887
Rahorst Wendell HazMatMgr 19 98 0326 1
Rahorst Wendell HazMatMgr 303 273 3998 NA
[illegible] 1 1 _ _ _

COD982597320
Form GM Waste Generated Information

Page	Waste Form	UOM	Density LB/SG	ORG SYS	ON-Site OFF_	P O M	R a d	SIC	Source TRI	Qty Gen 1996	Qty Gen 1997
0001	B103	3	01.20	2 1 M	N Y	1	2	8221	A94	000000000.00	000003978.00
0002	B204	3	00.90	2 1 M	N Y	1	2	8221	A94	000000000.00	000001840.00
0003	B001	3	01.00	2 1 M	N Y	1	2	8221	A94	000000000.00	000000007.00
0004	B003	3	07.50	2 1 M	N Y	1	2	8221	A94	000000000.00	000000005.00
0005	B002	3	01.20	1 1 M	N Y	1	2	8221	A94	000000000.00	000000012.00
0006	B009	3	01.00	2 1 M	N Y	1	2	8221	A94	000000000.00	000000078.00
0007	B002	3	00.80	2 1 M	N Y	1	2	8221	A94	000000000.00	000000260.00
0008	B113	3	09.50	1 1 M	N Y	1	2	8221	A94	000000000.00	000001000.00
[illegible]9	B001	3	01.00	2 1 M	N Y	1	2	8221	A94	000000000.00	000000013.00
0010	B319	3	00.80	2 1 M	N Y	1	2	8221	A94	000000000.00	000000488.00
0011	B003	3	01.00	2 1 M	N Y	1	2	8221	A94	000000000.00	000000014.00
0012	B001	3	00.92	2 1 M	N Y	1	2	8221	A94	000000000.00	000000009.00

0013	B001	3	02.30	2	1	M	N	Y	1	2	8221	A94	000000000.00	000000007.00
0014	B001	3	02.50	2	1	M	N	Y	1	2	8221	A94	000000000.00	000000018.00
0015	B001	3	02.30	2	1	M	N	Y	1	2	8221	A94	000000000.00	000000012.00
0016	B001	2	02.60	2	1	M	N	Y	1	2	8221	A94	000000000.00	000000002.00
0017	B001	3	02.39	2	1	M	N	Y	1	2	8221	A94	000000000.00	000000002.00
0018	B001	3	02.50	2	1	M	N	Y	1	2	8221	A94	000000000.00	000000009.00
0019	B104	3	01.00	2	1	M	Y	N	1	2	8221	A94	000000000.00	000003791.00
0020	B206	3	00.90	2	1	M	N	Y	1	2	8221	A54	000000000.00	000004083.00

COD982597320
Form GM

Page	Waste Codes								
0001	D002	D004	D005	D007	D008	D009	D010	D006	D011
0002	D001	D004	D005	D006	D007	D008	D009	D010	D011
0003	D001								
0004	D008								
0005	D003								
0006	D003								
0007	D004	D006	D007	D008	D011				
0008	D006	D011							
0009	U134								
0010	D009								
0011	D001								
0012	D001	D003							
0013	D001	D003							
0014	D001	D007							
0015	D001								
0016	D003								
0017	D003								
0018	D002								
0019	D002								
0020	D006	D007							

COD982597320
Form GM Off-Site Shipments

Page	System Code	EPA ID Shipped to	Qty Shipped 1995	Availability code
0001	M041	NED981723513	000003978.00	1
0002	M041	NED981723513	000001840.00	1
0003	M075	ILD000608471	000000007.00	1
0004	M111	ILD000608471	000000005.00	1
0005	M075	ILD000608471	000000009.00	1
0005	M043	ARD069748192	000000003.00	1
0006	M072	ILD000608471	000000078.00	1
0007	M043	ARD069748192	000000260.00	1
0008	M141	KSD007246846	000001000.00	1
0009	M074	ILD000608471	000000013.00	1
0010	M019	FLD984262782	000000488.00	1
0011	M041	ARD069748192	000000014.00	1
0012	M043	ARD069748192	000000009.00	1

[illegible]	M043	ARD069748192	000000007.00	1
0014	M043	ARD069748192	000000018.00	1
0015	M043	ARD069748192	000000012.00	1
0016	M043	ARD069748192	000000002.00	1
0017	M043	ARD069748192	000000002.00	1
0018	M043	ARD069748192	000000009.00	1
0020	M061	COD982581993	000004083.00	1

COD982597320
Form GM On-Site Treatment

Page	System Code	Qty Treated 1995
0019	M121	000003791.00

COD982597320
Form GM Waste description

Page	Description of Waste Stream
0001	Waste corrosive liquids, acidic, inorganic with metals
0001	generated by laboratory processes.
0002	Laboratory waste flammable, organic solvents and metals
0003	Laboratory waste, hydrogen peroxide
0004	Laboratory waste, solid lead sulfide
0005	Alkali metals in oil
0006	wastespent cyanide solutions
0007	Soil and paper products contaminated with silver and cadmium
0008	Photo chemical waste containing Silver and Cadmium
[illegible]9	Waste Hydoflouric acid
[illegible]0	Waste mercury containing articiles
0011	Waste spent picric acid
0012	Waste Lithium Aluminum Hydride
0013	Flammable solid- amorphous phosphorus
0014	Oxidizing Solids-Calcium Nitrate and Chromium nitrate
0015	Oxidizing Solids- Sodium Nitrate and Potassium Nitrate
0016	Toxic Solid- Sodium Sulfite
0017	Phosphorus Pentoxide
0018	Boron Oxide
0019	This is a laboratory waste of spent mineral acids that conta
0019	ins no regulated metals and is neutralizied to a pH of betwe
0019	en 6-8.
0020	Waste oil produced by oil changes on equipment

COD982597320
Form GM Comments

Page	Comments for Waste Stream
0006	Lab Pack of spent waste cyanide solutions
0008	Waste was treated at permitted wastewater treatment facility
0010	Waste mercury contained inmanfactured articles

COD982597320
Form OI

Off-Site EPA ID	Page	Handler Type G	T	TDSR	Name of Transporter or Facility
[illegible]Address					
[illegible]City					State ZIP
ARD069748192	00001		X		Ensco, Inc
309 American Circle					
El Dorado					AR 71730 0000

309

F[illegible]84262782 00002 X MERCURY TECHNOLOGIES INTERNATIONAL
4317-L-FORTUNE PLACE
WEST MELBOURNE FL 32904 0000

ILD000608471 00003 X Clean Harbors Services, Inc.
11800 S. Stony Island Ave.
Chicago IL 60617

KSD007246846 00004 X Hydrocarbon Recyclers
2549 North New York
Wichita KS 67219

NED981723513 00005 X Clean Harbors Env. Services
5 miles south of Kimball
Kimball NE 69145

MAD039322250 00006 X Clean Harbors Env. Services
0000

OKD981605363 00007 X Environmental Transportation Services
0000

UTD981552425 00008 X SLT Express
0000

DER000000968 00009 X Specialized Dedicated Fleets
0000

DBD981110166 00010 X Matlack Inc
0000

NED986382133 00011 X Smith Systems Transportation
0000

COD000716621 00012 X Safety-Kleen Corp
0000

OKD018115469 00013 X Safety-Kleen Corp
0000

FLD984262782 00014 X Mercury Technologies
4317-1 Fortune Pl
West Melbourne FL 32904 0000

TXD988023305 00015 X Laidlaw Environmental Services
0000

DED982565947 00016 X Rollins Chempak Inc
0000

C[illegible]81588791 00017 X Triad Transport Inc.

0000

COD982581993 00018 X X Mesa Oil, Inc.
7239 Bradburn Blvd
Denver CO 80030 0000

311

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM IC

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
IDENTIFICATION AND CERTIFICATION

Sec. I Site/Company name and location address information.

A.EPA ID number: COD982597320 B.County: DENVER

C.Site/Company name: COLORADO SCHOOL OF MINES

E.Address: 1500 ILLINOIS STREET

F.City: GOLDEN G.State: CO H.ZIP CODE: 80401 - 1887

Sec. II Mailing address of this site: A.Same as location? [_]

B.Address: 1500 ILLINOIS STREET

C.City: GOLDEN D.State: CO E.ZIP CODE: 80401 - 1887

Sec. III Name title and phone number of the person who should be contacted if questions arise regarding this report.

	Last Name	First Name	M.I.
A.Contact Name:	Rahorst	Wendell	
B.Contact Title:	HazMatMgr	C.Phone: 303 / 273 - 3998	ext: NA

Sec. IV "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are signifigant penalties under Section 3008 of the Resource Conservation and Recovery Act for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Last Name	First Name	M.I.	
A.Name: Rahorst	Wendell		B.Title: HazMatMgr

C. SIGNATURE

D. DATE OF SIGNATURE
19 98 0326
03 / 26 / 19 98
MO. DAY YR.

312

EPA ID Number: COD982597320

Sec. V GENERATOR STATUS:

A. RCRA Generator status.
1. LQG
2. SQG
3. CESQG
4. Non Generator

1

B. Reason for not generating

1. Never Generated
2. Out of business
3. Only Excluded/delisted
4. Only Non-hazardous
5. Periodic/occasional
6. Waste Min.
7. Other

Sec. VI ON-SITE MANAGEMENT STATUS

A.RCRA Permitted storage	B.RCRA Permitted TDR	C.RCRA Exempt TDR
1	1	1

Sec. VII WASTE MINIMIZATION ACTIVITY EXPANDED OR BEGUN IN 1996 or 1997

A.Source reduction.	B.Recycling	C. Reduction/Recycling Opportunity investigation
–	–	–

Comments:

313

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Waste corrosive liquids, acidic, inorganic with metals generated by laboratory processes.

B. EPA hazardous waste codes:
D002 D004 D005 D010
D007 D008 D009 D006 D011

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 103	2

Sec. II

Quantity Generated
A. in 1996: 000000000.00
B. in 1997: 000003978.00

C. Unit Of Measure: 3
Density: 01.20
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	NED981723513	M 041	1	000003978.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

314

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Laboratory waste flammable, organic solvents and metals

B. EPA hazardous waste codes:
D001 D004 D005 D009
D006 D007 D008 D010 D011

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 204	2

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000001840.00

C. Unit Of Measure: 3
Density: 00.90
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	NED981723513	M 041	1	000001840.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

315

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Laboratory waste, hydrogen peroxide

B. EPA hazardous waste codes:
D001

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 001	2

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000000007.00

C. Unit Of Measure: 3
Density: 01.00
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	ILD000608471	M 075	1	000000007.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

316

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Laboratory waste, solid lead sulfide

B. EPA hazardous waste codes:
D008

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 003	2

Sec. II

Quantity Generated
A. in 1996: 000000000.00
B. in 1997: 000000005.00

C. Unit Of Measure: 3
Density: 07.50
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	ILD000608471	M 111	1	000000005.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

317

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Alkali metals in oil

B. EPA hazardous waste codes:
D003

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 002	2

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000000012.00

C. Unit Of Measure: 3
Density: 01.20
LB/GAL(1)sg(2) : 1

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	ILD000608471	M 075	1	000000009.00
Site 2	ARD069748192	M 043	1	000000003.00
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

318

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
wastespent cyanide solutions

B. EPA hazardous waste codes:
D003

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 009	2

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000000078.00

C. Unit Of Measure: 3
Density: 01.00
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	ILD000608471	M 072	1	000000078.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments: Lab Pack of spent waste cyanide solutions

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Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Soil and paper products contaminated with silver and cadmiu

B. EPA hazardous waste codes:
D004 D006 D007
D008 D011

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 002	2

Sec. II

Quantity Generated
A. in 1996: 000000000.00
B. in 1997: 000000260.00

C. Unit Of Measure: 3
Density: 00.80
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	ARD069748192	M 043	1	000000260.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

320

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Photo chemical waste containing Silver and Cadmium

B. EPA hazardous waste codes:
D006 D011

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 113	2

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000001000.00

C. Unit Of Measure: 3
Density: 09.50
LB/GAL(1)sg(2) : 1

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	KSD007246846	M 141	1	000001000.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments: Waste was treated at permitted wastewater treatment facility

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Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Waste Hydoflouric acid

B. EPA hazardous waste codes:
U134

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 001	2

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000000013.00

C. Unit Of Measure: 3
Density: 01.00
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	ILD000608471	M 074	1	000000013.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

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Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Waste mercury containing articiles

B. EPA hazardous waste codes:
D009

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 319	2

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000000488.00

C. Unit Of Measure: 3
Density: 00.80
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	FLD984262782	M 019	1	000000488.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments: Waste mercury contained inmanfactured articles

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Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Waste spent picric acid

B. EPA hazardous waste codes:
D001

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 003	2

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000000014.00

C. Unit Of Measure: 3
Density: 01.00
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1		On-site System 2	
System Type: M	Quantity T/D/R in 1997:	System Type: M	Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	ARD069748192	M 041	1	000000014.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

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Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Flammable solid- amorphous phosphorus

B. EPA hazardous waste codes:
D001 D003

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code: 1	F. Source Code: A 94	G. Point of Measurement: 1	H. Form code:	I. RCRA/Rad Mix: 2
8221	Sys Type: M			B 001	

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000000007.00

C. Unit Of Measure: 3
Density: 02.30
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	ARD069748192	M 043	1	000000007.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

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Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Waste Lithium Aluminum Hydride

B. EPA hazardous waste codes:
D001 D003

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 001	2

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000000009.00

C. Unit Of Measure: 3
Density: 00.92
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	ARD069748192	M 043	1	000000009.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

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Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Oxidizing Solids-Calcium Nitrate and Chromium nitrate

B. EPA hazardous waste codes:
D001 D007

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 001	2

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000000018.00

C. Unit Of Measure: 3
Density: 02.50
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	ARD069748192	M 043	1	000000018.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

327

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Oxidizing Solids- Sodium Nitrate and Potassium Nitrate

B. EPA hazardous waste codes:
D001

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code: 1	F. Source Code: A 94	G. Point of Measurement: 1	H. Form code:	I. RCRA/Rad Mix: 2
8221	Sys Type: M			B 001	

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000000012.00

C. Unit Of Measure: 3
Density: 02.30
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	ARD069748192	M 043	1	000000012.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

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Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Toxic Solid- Sodium Sulfite

B. EPA hazardous waste codes:
D003

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 001	2

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000000002.00

C. Unit Of Measure: 2
Density: 02.60
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	ARD069748192	M 043	1	000000002.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

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Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Phosphorus Pentoxide

B. EPA hazardous waste codes:
D003

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 001	2

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000000002.00

C. Unit Of Measure: 3
Density: 02.39
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	ARD069748192	M 043	1	000000002.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

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Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Boron Oxide

B. EPA hazardous waste codes:
D002

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 001	2

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000000009.00

C. Unit Of Measure: 3
Density: 02.50
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	ARD069748192	M 043	1	000000009.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

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Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
This is a laboratory waste of spent mineral acids that cont ins no regulated metals and is neutralizied to a pH of betw en 6-8.

B. EPA hazardous waste codes:
D002

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 94	1	B 104	2

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000003791.00

C. Unit Of Measure: 3
Density: 01.00
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [Y]

On-site System 1
System Type: M 121
Quantity T/D/R in 1997: 000003791.00

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [N]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1		M		
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

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Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM GM

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
WASTE GENERATION AND MANAGEMENT

Sec. I

A. Waste Description:
Waste oil produced by oil changes on equipment

B. EPA hazardous waste codes:
D006 D007

C. State hazardous waste codes:

D. SIC Code:	E. Origin Code:	F. Source Code:	G. Point of Measurement:	H. Form code:	I. RCRA/Rad Mix:
8221	1 Sys Type: M	A 54	1	B 206	2

Sec. II

Quantity Generated

A. in 1996:	B. in 1997:
000000000.00	000004083.00

C. Unit Of Measure: 3
Density: 00.90
LB/GAL(1)sg(2) : 2

D. On-site Treatment/Disposal/Recycle of this waste? [N]

On-site System 1
System Type: M
Quantity T/D/R in 1997:

On-site System 2
System Type: M
Quantity T/D/R in 1997:

Sec. III

Was any of this waste shipped off-site in 1997? [Y]

	B. EPA ID No. shipped to	C. System Type	D. Availability Code	E. Qty shipped in 1997
Site 1	COD982581993	M 061	1	000004083.00
Site 2		M		
Site 3		M		
Site 4		M		
Site 5		M		
Site 6		M		
Site 7		M		
Site 8		M		

Did new activities in 1997 result in minimization of this Waste? [N]

Comments:

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.te Name: Colorado School
of Mines - Gold
EPA ID Number: COD982597320

FORM OI

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
OFF-SITE IDENTIFICATION

A. EPA ID No. of Off-site Installation or transporter:
ILD000608471

B. Name of Off-site Installation or transporter:
Clean Harbors Services, Inc.

C.Handler Type:

Generator
Transporter
X TSDR

D. Address of Off-site Installation:
Street: 11800 S. Stony Island Ave.
City: Chicago
State: IL Zip: 60617 -

Comments:

Site Name: Colorado School
of Mines - Gold
EPA ID Number: COD982597320

FORM OI

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
OFF-SITE IDENTIFICATION

A. EPA ID No. of Off-site Installation or transporter:
KSD007246846

B. Name of Off-site Installation or transporter:
Hydrocarbon Recyclers

C.Handler Type:

Generator
Transporter
X TSDR

D. Address of Off-site Installation:
Street: 2549 North New York
City: Wichita
State: KS Zip: 67219 -

Comments:

Site Name: Colorado School
of Mines - Gold
EPA ID Number: COD982597320

FORM OI

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
OFF-SITE IDENTIFICATION

A. EPA ID No. of Off-site Installation or transporter:
NED981723513

B. Name of Off-site Installation or transporter:
Clean Harbors Env. Services

C.Handler Type:

Generator

D. Address of Off-site Installation:
Street: 5 miles south of Kimball

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	Transporter	City:	Kimball		
X	TSDR	State:	NE	Zip:	69145 -

Comments:

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM OI

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
OFF-SITE IDENTIFICATION

A. EPA ID No. of Off-site Installation or transporter:
MAD039322250

B. Name of Off-site Installation or transporter:
Clean Harbors Env. Services

C.Handler Type:

Generator
X Transporter
TSDR

D. Address of Off-site Installation:
Street:
City:
State: Zip: - 0000

Comments:

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM OI

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
OFF-SITE IDENTIFICATION

A. EPA ID No. of Off-site Installation or transporter:
OKD981605363

B. Name of Off-site Installation or transporter:
Environmental Transportation Services

C.Handler Type:

Generator
X Transporter
TSDR

D. Address of Off-site Installation:
Street:
City:
State: Zip: - 0000

Comments:

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM OI

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OFF-SITE IDENTIFICATION

A. EPA ID No. of Off-site Installation or transporter:
UTD981552425

B. Name of Off-site Installation or transporter:
SLT Express

C.Handler Type:

Generator

D. Address of Off-site Installation:
Street:

336

X	Transporter TSDR	City: State:	Zip:	- 0000

Comments:

337

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

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U.S. ENVIRONMENTAL PROTECTION AGENCY
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OFF-SITE IDENTIFICATION

A. EPA ID No. of Off-site Installation or transporter:
DER000000968

B. Name of Off-site Installation or transporter:
Specialized Dedicated Fleets

C.Handler Type:

Generator
X Transporter
TSDR

D. Address of Off-site Installation:
Street:
City:
State: Zip: - 0000

Comments:

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

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OFF-SITE IDENTIFICATION

A. EPA ID No. of Off-site Installation or transporter:
DBD981110166

B. Name of Off-site Installation or transporter:
Matlack Inc

C.Handler Type:

Generator
X Transporter
TSDR

D. Address of Off-site Installation:
Street:
City:
State: Zip: - 0000

Comments:

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM OI

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
OFF-SITE IDENTIFICATION

A. EPA ID No. of Off-site Installation or transporter:
NED986382133

B. Name of Off-site Installation or transporter:
Smith Systems Transportation

C.Handler Type:

Generator

D. Address of Off-site Installation:
Street:

338

X	Transporter TSDR	City: State:	Zip:	- 0000

Comments:

339

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

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OFF-SITE IDENTIFICATION

A. EPA ID No. of Off-site Installation or transporter: COD000716621

B. Name of Off-site Installation or transporter: Safety-Kleen Corp

C.Handler Type:
Generator
X Transporter
TSDR

D. Address of Off-site Installation:
Street:
City:
State: Zip: - 0000

Comments:

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM OI

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OFF-SITE IDENTIFICATION

A. EPA ID No. of Off-site Installation or transporter: OKD018115469

B. Name of Off-site Installation or transporter: Safety-Kleen Corp

C.Handler Type:
Generator
X Transporter
TSDR

D. Address of Off-site Installation:
Street:
City:
State: Zip: - 0000

Comments:

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM OI

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
OFF-SITE IDENTIFICATION

A. EPA ID No. of Off-site Installation or transporter: FLD984262782

B. Name of Off-site Installation or transporter: Mercury Technologies

C.Handler Type:
Generator

D. Address of Off-site Installation:
Street: 4317-1 Fortune Pl

340

	Transporter	City:	West Melbourne		
X	TSDR	State:	FL	Zip:	32904 - 0000

Comments:

341

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

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OFF-SITE IDENTIFICATION

A. EPA ID No. of Off-site Installation or transporter: TXD988023305

B. Name of Off-site Installation or transporter: Laidlaw Environmental Services

C. Handler Type:
Generator
X Transporter
TSDR

D. Address of Off-site Installation:
Street:
City:
State: Zip: - 0000

Comments:

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM OI

U.S. ENVIRONMENTAL PROTECTION AGENCY
1997 Hazardous Waste Report
OFF-SITE IDENTIFICATION

A. EPA ID No. of Off-site Installation or transporter: DED982565947

B. Name of Off-site Installation or transporter: Rollins Chempak Inc

C. Handler Type:
Generator
X Transporter
TSDR

D. Address of Off-site Installation:
Street:
City:
State: Zip: - 0000

Comments:

Site Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

FORM OI

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OFF-SITE IDENTIFICATION

A. EPA ID No. of Off-site Installation or transporter: OKD981588791

B. Name of Off-site Installation or transporter: Triad Transport Inc.

C. Handler Type:
Generator

D. Address of Off-site Installation:
Street:

342

X	Transporter TSDR	City: State:	Zip:	- 0000

Comments:

343

te Name: Colorado School of Mines - Gold
EPA ID Number: COD982597320

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U.S. ENVIRONMENTAL PROTECTION AGENCY
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OFF-SITE IDENTIFICATION

A. EPA ID No. of Off-site Installation or transporter:
COD982581993

B. Name of Off-site Installation or transporter:
Mesa Oil, Inc.

C. Handler Type:

	Generator
X	Transporter
X	TSDR

D. Address of Off-site Installation:
Street: 7239 Bradburn Blvd
City: Denver
State: CO Zip: 80030 - 0000

Comments:

344

Colorado School of Mines
HAZARDOUS MATERIALS MANAGEMENT FACILITY

SAFETY ORIENTATION

1. Location of Emergency Exits. The main entry on the northeast corner of the Hazardous Materials Management Facility (HMMF) is the primary entry/exit for the facility. An additional exit is located on the south center fence of the facility.

2. Required Personal Protective Equipment. Safety glasses are required at all times within the facility. Protective gloves are required for handling of containers. Protective suits and respiratory protection are required for waste consolidation activities.

3. Location of Emergency Shower/Eyewash Station. The emergency shower and eyewash station are both located within the corrosive materials compartment. The compartment must be unlocked prior to work in any compartment to allow easy access to the shower and eyewash.

4. Radioactive Materials Compartment. Participation in a radiation dosimetry program is required for entry into the radioactive materials compartment. Locations within the compartment may exceed a dose rate of 2 millirem per hour, the limit for uncontrolled public access. Entry into the compartment without a dosimeter is prohibited.

5. Radiation/Pregnancy Warning. Some areas outside the radioactive materials compartment may exceed a dosage rate of 0.2 millirem per hour. Pregnant individuals and persons under the age of 18 may wish to avoid entry into areas with dose rates above 0.2 millirem per hour.

6. Entry Optional. The toxicity of chemical and radiation exposure is considered a function of dose. Exposures below recognized toxicity limits may have no identifiable harmful effect. However, some individuals believe any exposure, even to a few molecules of a substance, to be harmful. Those individuals may wish to avoid entering the HMMF, as low-level exposures are possible.

7. Emergency Contact Information. In case of fire and/or medical emergencies, call 9-911. In case of spills, contact the EHS Department at extension 3316, the Spill Response Team listed on the spill contact poster, or Public Safety at 3333.