

CANCELLED

ALASKA DEPARTMENT OF LABOR
DIVISION OF LABOR STANDARDS AND SAFETY

DOSH Program Directive #85-2

February 4, 1985

To: All OSH Personnel

Subject: Technical Assistance and Enforcement Guidelines for Hazardous Waste Site Activities.

1. Purpose: This program directive provides direction to OSH staff who may be called upon to provide technical assistance or conduct enforcement activities at toxic and hazardous waste sites. Some of these sites may be covered under Environmental Protection Agency's (EPA) "Superfund" program. "Superfund" is the common name for the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (sometimes also called CERCLA), the law passed to provide for removal or remedial actions at hazardous waste sites which pose a threat to the public.
2. Directives Affected: None
3. Background:
 - A. EPA is the lead Superfund agency. Federal OSHA and EPA have agreed that OSHA has the lead role in providing for the safety and health of workers at hazardous waste sites. In Alaska, the state's Occupational Safety and Health Section (OSH) of the Alaska Department of Labor has jurisdiction over such hazardous waste sites.
 - B. EPA's Superfund program designates 400 priority sites for cleanup. At this time no site in Alaska has been so designated.
 - C. However, in addition to Superfund sites, there are thousands of toxic waste facilities in the United States and some of these facilities are in Alaska. OSH, therefore, may be required to inspect these sites. Although the same inspection mechanism now in place will be used to inspect such sites, it is important to ensure that only trained and properly equipped personnel inspect these sites. Normally non-Superfund sites will not receive technical assistance visits.
 - D. OSH actions will, at all times, be closely coordinated with EPA, since EPA is the lead agency for cleanup activities. Because of the hazards involved at each of the sites (not only to cleanup workers but also to the public), OSH recognizes the need for expeditiousness in the cleanup process.

OSH activities should not unnecessarily hinder removal or remedial actions, while at the same time they should ensure that worker safety and health are not compromised.

4. Technical Assistance Activities: These activities relate primarily to Superfund sites. OSH will cooperate with OSHA and EPA if a Superfund site is designated in Alaska.
 - A. Technical Assistance Team: OSHA Regional Office technical staff and members of the OSHA Health Response Team (HRT) may be asked to work with Alaska OSH to provide on-site and off-site health and safety advice and consultation to employers and contractors who are performing or supervising cleanup activities at Superfund sites.
 - B. Response Sequence: Federal OSHA reaction to Superfund activities will follow the sequence listed below:
 - (i) Whenever EPA (or another lead agency such as the Coast Guard) requests OSHA's safety and health assistance, the EPA Regional Administrator or the EPA Regional Superfund coordinator, through the Hazardous Response Support Division, notifies OSHA's Director of Field Operations in writing about the site activities, giving all relevant information, including:
 - (a) Site name.
 - (b) Site address.
 - (c) Site activity startup date.
 - (d) Name of the lead agency On-Scene Coordinator (OSC) and telephone number.
 - (e) Name of contractor(s), if any, and telephone number.
 - (ii) The OSHA Director of Field Operations notifies the Director of Technical Support, and alerts the Region affected. The Regional Administrator contracts State OSH. Alaska OSH takes appropriate action.
 - (iii) If the Chief of I.H. determines that OSHA assistance is required, he shall ask the Commissioner to request the OSHA Regional Administrator to provide the services of the HRT.
 - (iv) The extent of on-site technical assistance will be determined by the Chief, I.H. on a case-by-case basis.
 - (v) The Chief I.H. will assign OSH Alaska staff to a team to provide technical assistance. This team should

include industrial hygienists and/or safety compliance officers who have been trained in toxic and hazardous waste sites procedures and safety. The Chief may also ask the Department's Medical Director to be on the team. The Chief will always be a member of the team.

- (vi) Site evaluation reports are written by the team. If time permits, the Alaska OSH team will discuss the report with contractors on the site and with EPA personnel or other lead agency personnel in charge.
 - (a) It should be pointed out to the contractor(s) that compliance with Alaska OSH standards and the general duty clause is required by terms of the contract with EPA. This also should be noted prominently in the report itself.
 - (b) Copies of the report will be given to the contractor, the lead agency On-Scene Coordinator, EPA in instances where EPA is not the lead agency, and to the OSHA Regional Administrator.
 - (vii) In the case of accidents, worker complaints, or referrals other than requests for technical assistance from the lead agency OSC, the State OSH may be called in to perform normal compliance activities. The enforcement guidelines in paragraph 5 of this directive must be followed.
5. Enforcement Activities. The Alaska DOL inspection mechanism now in place shall be followed when handling complaints or accident reports at either Superfund sites or other hazardous waste sites, except that only trained personnel are to be sent to these sites. (See 6 of this directive.)
- A. On-Site Coordination. The enforcement team shall coordinate activities with EPA, Corps of Engineers, or other lead agency representatives, if present.
 - 2. Applicable Standards. Depending on the activities occurring at the site, general industry and/or construction standards may be applicable.
 - a. Examples of Health Standards. Since engineering controls at the site may not be feasible, programs for the following must be specifically evaluated for their effectiveness:
 - (1) Respirators; including use of respirators during emergency evacuation (01.0403 GSC).

- (2) Protective clothing and equipment; including decontamination procedures (e.g., 04.0401 GSC, 01.0402 GSC and 1910.1003(c)(5)).
 - (3) Hygiene facilities and practices; including emergency showers, change areas, showers (if necessary), and a program for ensuring that eating, drinking and smoking are done only in safe and clean areas (e.g., 04.0304(i) Lead Code).
- b. General Duty Clause. The general duty clause provision AS 18.60.075(a)(4), shall be used where there is no standard that applies to the particular hazard involved. Procedure in Chapter IV of the Alaska Compliance Manual shall be followed when considering general duty clause citations.
6. Training Requirements. Because hazardous waste sites may be significantly different from and more volatile than most industrial sites, compliance officers will be required to complete at least a one-week training course before undertaking any on-site inspection activity.
- A. Until other training courses can be assessed, it is necessary, at this time, for the required training to include at least EPA's "Hazardous Materials Incident Response Operations" course (#165.5) which is held at EPA's facility in Edison, New Jersey.
 - B. The Chief I.H. is scheduled to take the above course in January 1985 and at least one field I.H. will receive this training during the first quarter FY 1986. The I.H. consultant will also receive training in FY 1986. Training of other I.Hs on the staff will depend on available monies. The State will, however, have at least two I.Hs who have the necessary training to conduct inspections or provide on-site technical assistance at toxic and hazardous waste sites.
 - C. The Chief I.H. through the Deputy Director will inform the Regional Administrator of State personnel who are trained for hazardous waste response activities.
7. Personal Protective Equipment and Inspection Procedures. Appendix A of this directive contain guidelines to be used by trained I.H. field inspectors to conduct inspections or on-site technical assistance visits of toxic and hazardous waste sites. The Chief I.H. shall provide an extensive orientation of these guidelines to the I.H. before an inspection is conducted.

8. IMIS Procedures: Enter the work "SUPERFUND" on the Inspection Classification Line, 25a (National Emphasis Program), of the AK OSH-1. Note: This procedure is only to be used for EPA designated Superfund sites.



Robert J. Bacolas, Director

Reviewed and Approved



Jim Robison, Commissioner

Technical Assistance
and
Enforcement Guidelines
for

The preparation, protection, and inspection of job sites with unusual,
unexpected, or unknown physical and chemical hazards.

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I. FORWARD

Alaska, Department of Labor employees by nature of their occupation may come in contact with toxic, hazardous, carcinogenic, teratogenic, mutagenic, or biologically hazardous chemicals or organisms. In addition, some job sites offer unusual, unexpected, or unknown physical hazards. These potential or actual threats must be met through education, training, understanding, and constraint to insure the best possible measure of safety.

II. SCOPE

Where hazardous materials or chemicals are expected, unexpected, or in the work environments that Alaska Department of Labor personnel must encounter in their job; the potential for unwarranted exposure or injury exists.

Regardless of engineering controls, attention to safety and health practices, knowledge and understanding; the unexpected, unusual incidents, spills, and human error do in fact occur in the real world of everyday operations.

Safety and health investigations in toxic waste dump environments may expose unprotected individuals to the effects of various toxic chemicals. Protecting an individual from such exposures is a difficult problem since no one type of personnel protective equipment (PPE) will provide an adequate level of protection in all environments encountered. The predominant physical, chemical, and toxic properties of the chemicals found in such environments dictates the type and degree of protection required. In addition, the work function and the probability of exposure to the substances involved must be considered when specifying protective equipment.

Personal protective equipment is then called upon to provide that extra measure of operational safety and health. No protective equipment is without some disadvantage or expected to provide absolute protection under all conditions. Therefore, the selection regular training and use, care, cleaning, and maintenance must be based on the anticipated hazards, their degree of threat, and the potential for exposure or injury.

Personal protective equipment requirements are a necessary part of any contact with potential chemical or physical hazards encountered in the workplace.

This plan is intended to set forth guidance, information, and policy for the selection, use and care of personal protective equipment user training, and monitoring and inspection procedures used in the course of investigating toxic waste dump sites.

III. PROHIBITIONS

The following prohibitions apply to all Alaska Department of Labor personnel:

1. Alaska Department of Labor employees may not use unapproved respiratory or other personal protective devices.
2. AK DOL employees may not engage in operations where specific specialized training is required, such as hazardous waste site inspection training.
3. AK DOL employees are prohibited from giving approval or tactic suggestions for the use of any unapproved respiratory device, or other personal protective devices to other employees or employees at a workplace.
4. AK DOL employees are prohibited from entering situations that may present a high risk potential without the proper personal protective devices.

IV. AUTHORITY

A. General

Since personal protective equipment is an adjunct to prevent or minimize injury of personnel while in performance of their duties, the lines of authority, decision making about their requirement, type, and use must be clear. Field personnel may be directed to enter known potentially hazardous situations such as hazardous waste sites where unknown hazards may be encountered. Therefore, review and decision making at the proper level of authority is imperative.

B. Authority to Make Decisions

The authority, responsibility, and accountability for making decisions to enter known or potentially hazardous locations requiring special training or equipment rests with the Chief Industrial Hygienist.

Arbitrary decisions by the safety specialist or industrial hygienist are not allowed for such conditions. The Chief Industrial Hygienist must be informed immediately when such unusual conditions are anticipated or encountered in the course of regular duties in progress.

C. Inviolable Rules

AK DOL personnel are required to immediately report potential life-threatening situations, gross contamination, or injury while conducting operations where personal protective equipment is required or worn.

Failures of personal protective equipment under hazardous conditions must be reported as soon as possible. Any medical condition known prior to entry into hazardous situations that may reduce physical performance or during conduct of operations must be reported to the supervisor as soon as possible.

Unwarranted or accidental exposure or injury during conduct of operations in a hazardous atmosphere or location must be reported to the supervisor as soon as possible.

D. Line of Authority

AK DOL personnel anticipating the use of personal protective equipment in hazardous atmospheres, locations or conditions are required to inform the Chief Industrial Hygienist. The Chief Industrial Hygienist has a responsibility to assess the situation and, if necessary, advise the next level of supervision and seek technical advice.

The Chief IH may not permit prohibited practices such as SCUBA diving, entry into lack-of-oxygen situations, conditions immediately hazardous, hazardous to life, or exposure to potentially explosive conditions.

E. Aborting Operations

If during the course of inspections, investigations, or emergency situations, incidents or conditions are encountered that in the judgement of the CSHO/IH potentially dangerous concentrations of toxic or hazardous materials exist, they should immediately exit the location.

Typical conditions that warrant immediate exit of the location are:

1. Lack of oxygen (Below 19.5%).
2. Potentially explosive concentrations of vapors.
3. Concentrations of toxic or hazardous materials that exceed the selection criteria and protection factors of the respirator (ANSI Z88.2-1980).
4. The presence of the CSHO/IH may endanger another other by being in the way.
5. The CSHO/IH is directed from the area by fire, police, or safety professionals for their own safety.
6. Imminent rupture or release of toxic or hazardous materials from containers even though the proper respirator is worn.
7. Elevated concentrations (3 times the TLV) of poisonous gases, e.g., H₂S, HCN, NO₂, CO, CLZ, NH₃, COCL₂).
8. Sudden or apparent illness of the CSHO/IH.
9. Apparent physical hazards such as unstable structures.

In such situations the CSHO/IH shall record the incident and immediately notify their supervisor.

F. The Deputy Director is responsible for the overall administration of this program but may delegate the functional execution to the Chief, Industrial Hygienist.

Formal training courses in respiratory protection for respiratory program coordinators are desirable.

Because of the responsibility toward occupational health protection of AK DOL employees and potential liability of the agency, the development of a control program is required.

V. TRAINING

A. Training of Personnel

As with any other investigation procedure, special monitoring, or PPE that is required to provide encapsulation of the worker to prevent exposure or contamination requires knowledge, understanding, and training.

AK DOL personnel who are expected to meet such contingencies should be pre-trained in an office setting at least.

If time does not permit or a team must be hastily assembled, pre-entry briefings and training must be conducted. It will accomplish:

- Definition of the objective and tasks.
- Develop procedure.
- Familiarize workers with equipment.
- Pre-test equipment for state of readiness.
- Allay fears.
- Establish lines of authority.

Entry into hazardous waste sites by AK DOL personnel should be limited to those with formal EPA training or authorized OSHA Institute sponsored training.

B. Testing and Training for Use of PPE

Employees will need to learn the proper procedures for dressing in order that the protective qualities of the equipment may be maximized. Likewise, undressing should be conducted following guidelines established in the decontamination procedures. The intent is to pass through stages of contamination reduction, removing contaminated clothing and

equipment in decreasing order of the degree of contamination and need for protection during decontamination; e.g., use of the respirator until potential contamination in the breathing zone is at acceptable levels.

VI. USE OF PERSONAL PROTECTIVE EQUIPMENT

A. Duties of the Safety Specialist and Industrial Hygienist

Supervisors act as an agent of the agency and therefore have the role and responsibility of the "Employer" named in Alaska standards. Actions required by employers are therefore required of supervisors of DOL employees.

Employee's responsibility named in standards apply to DOL employees. Employees must act as good examples in the conduct of their duties. Each employee shall use the required respirators or other personal protective equipment provided, or indicate the need of special PPE for unusual conditions.

Personal protection equipment imperfections, malfunctions, or inadequacies should be reported in writing to the immediate supervisor.

Any medical or physiological conditions that may preclude wearing of a respirator or personal protective equipment should be reported to the supervisor as soon as possible after the condition is known.

Determine the potential exposure pattern prior to a visit or inspection and carry proper personal protective equipment.

B. Individual Responsibilities

Each employee shall use the required respirators or other personal protective equipment provided, or indicate the need of special PPE for unusual conditions.

Personal protection equipment imperfections, malfunctions, or inadequacies should be reported in writing to the immediate supervisor.

Any medical or physiological conditions that may preclude wearing of a respirator or personal protective equipment should be reported to the supervisor as soon as possible after the condition is known.

Determine the potential exposure pattern prior to a visit or inspection and carry proper personal protective equipment.

The employee is responsible for the selection of personal protective equipment for the hazard to include:

- ° Respirator protection factors, skin protection, foot and eye wear.
- ° Type of respirator and other personal protective equipment for the hazard or hazards.
- ° Limitations of cartridges, canisters, bottles, or permeation factor for protective clothing.
- ° Maintain a respirator quantitative fit test card for full face demand or SCBA devices, or as required by specific standards, e.g., Pb, Asbestos. SCBA users must be qualified by training.
- ° Conduct periodic qualitative fit tests.

- Avoid entering situations that are immediately dangerous to life such as oxygen deficiency or tanks containing toxic gases or vapors.
- Complete special training for SCBA respirators or any other personal protective equipment which requires special training.

C. Self Determination of Needs

Based on expected exposure to hazardous chemicals or conditions, the safety specialist or industrial hygienist shall determine the needs for entry and procure the PPE through the supervisor or designated representatives.

Conditions such as high heat stress, medical limitations, or the need for special equipment should be realized and reported to the supervisor for resolution. Preplanning can preclude loss of productive time and obviate unwarranted exposure.

D. Policy

Each safety specialist/industrial hygienist is required to learn the policies set forth for procurement and use of PPE required in the course of their duties.

E. Procedure

DOL employees are required to follow procedures established in this program as well as those established by the supervisor, team leader, or other appropriate control agency such as the EPA, U.S. Coast Guard, Fire departments, or military establishments that may have overriding authority or requirements for safety and health protection.

F. Reporting Requirements

DOL employees are required to report unusual circumstances, failures, or near accidents, to supervisors so that preventive measures may be developed for the future, if required. Excessive or unwarranted exposures should be reported immediately to the supervisor in case medical surveillance is in the best interest of DOL and the employee. If possible, note the type of contaminant, concentration, duration of exposure, the type of PPE in use, and others exposed.

DOL employees should record exposures and report them to the supervisor and may record them in their own records to satisfy the requirements of Alaska standards:

- ° 8 AAC 61.270 - Access to Employee Medical Records
- ° 15.010 - Hazard Communication

G. Life, Limb and Property Decision

1. Emergency Exposure Catastrophes, major accidents, or natural disasters may require unusual and prompt action by DOL personnel. Under such conditions employees may deviate from procedures, but may not use unapproved respiratory devices, or engage in prohibited practices like entry into confined spaces without all proper precautions or requirements for protection.

2. Known Overexposures

Any DOL employees who find themselves in a situation of overexposure where respiratory protection is mandatory, or dictated by the concentration, must exit themselves or immediately don the correct respiratory device.

There are no known situations where continued overexposure to toxic or hazardous materials is warranted.

If for some reason an inspection or directed operation is aborted, the immediate supervisor should be notified as soon as possible.

Such known overexposures should be estimated and recorded for inclusion in the individual medical file.

H. Unusual Hazards

DOL personnel are required to use approved respiratory or other personal protective equipment specified in the standards for specific hazards that may be present during conduct of their duties. Some examples are lead, arsenic, carcinogens, asbestos, electrical or elevated heights.

Restricted areas requiring PPE designated by employers may not be entered without knowledge of the employer, express permission for entry, and use of approved protective devices/clothing.

I. Recognition of Hazards

1. Physical Hazards

The PPE selected for the potential or known physical hazards of the workplace is most often determined by:

- Determine the type of industry by class and establish the known physical hazards from documents, experience, experienced personnel, industry representatives, Federal and State standards, or historical case files.

- Understanding that there are no set requirements for physical hazards in industry, but that they must be determined on a case basis to develop PPE needs.
 - Determination of the customary safety devices used by the trade for that industry such as safety shoes, hard hats, safety belts, special clothing or eye wear.
 - Industry requirements specified in safety programs.
 - Anticipating the common physical hazards from slipping, tripping, elevated surfaces, lack of visibility and weather conditions. Proper head, ear, eye, and foot protection is readily available. The supervisor may further specify wearing of special devices like flotation jackets.

A recommended equipment check list that may be used by the Chief Industrial Hygienist assignment of PPE and detection devices is included in this procedure.

J. Respiratory Hazards

1. Policy and Procedure

The following documents in general govern the necessity, selection, and use of respiratory protection by DOL personnel in Alaska.

They are:

- GSC 01.0401
- Other applicable standards that specify respirators, as condition of use; e.g., lead, arsenic, carcinogens, asbestos, ammonia, etc.
- Alaska Industrial Hygien Technical Manual Chapters X, XI, and XII.

- ° NIOSH Manual of Certified Equipment - 1982. DOL personnel including all field personnel that use personal protective clothing and approved respiratory devices shall become acquainted with the above policy and guidance documents.

2. Approved Respirators

Only approved respirators listed in the NIOSH Manual of Certified Equipment 1982 or special DOL directories shall be used. All others, or modifications of approved respirators, are prohibited for use.

Responsibilities and requirements are set forth in Chapter XII of the Alaska Industrial Hygiene Technical Manual which encompasses applicable State standards, and practices outlined in ANSI standard Z88.1-1980.

3. Selection of Respirators for the Hazard

As with protective clothing, respirators must be selected on the basis of known or anticipated chemicals and concentrations.

The Alaska Industrial Hygien Technical Manual contains information about the selection of respiratory protection; however, the selection of the proper respirator(s) should be guided by this summary criteria.

The nature of the hazard assessment must include:

- ° Type of hazard (chemical, physical, reactive, explosive).
- ° Physical properties of the contaminant
- ° Chemical properties of the contaminant
- ° Toxic Effects
- ° Estimate of exposure

- Allowable exposure
- Potential for concentrations immediately hazardous to life
- Nature of the hazardous operation or process
- Location of the hazardous area and access routes
- Expected exposure pattern and length of time of exposure
- Human physical requirements (heat load, vigorous physical effort, elevated access, enclosed spaces)
- Respirator fit and protection factor importance.

The following table provides a decision process that may be helpful to categorize the types of respiratory equipment required based on an assessment of hazards. However, hose masks with and without blowers are not recommended since new state-of-the-art respirator equipment is available.

Other considerations such as mandatory personal protective clothing and respirator type for unknown hazards such as chemical dump sites must be considered.

4. Use and Prohibitions of SCBA, SSA, or SCUBA Respiratory Protection
DOL policy strictly forbids engagement in operations where SCBA is required by hazard or directive unless specific pre-training and respiratory fit tests have been completed.

DOL personnel are prohibited from underwater diving under any circumstance using SCUBA devices, or surface supplied air (SSA).

Entry into an IDLH atmospheres, highly toxic or carcinogenic chemical exposures, or reaction vessels or tanks shall not be conducted without the express permission of the supervisor.

Entry into atmosphere requiring SCBA is prohibited without the use of a buddy system, constant communication, and an emergency rescue plan.

Abortions of inspections, investigations, or incident evaluations should be immediate when lack of oxygen, explosive, IDLH, sudden high concentrations of toxic materials are encountered. The incident must be reported to the supervisor as soon as practical.

5. Medical Limitations

8 AAC 61.270, Access to Employee Medical Record, and 15.0101, Hazard Communication, allow employees a role in their own health management that applies to hazards in the conduct of employment.

Alaska Industrial Hygiene Technical Manual Chapter XI provides medical examination and records for those exposed to toxic or hazardous situations.

The wearing of personal protective clothing and respiratory protection adds a considerable fact to physical energy output required. In addition, factors such as high ambient temperature and heavy physical demands will also add to the physiological heat load and physical stress.

DOL personnel who are ill or have chronic heart or lung disfunctions should avoid the high stress load of personal protective equipment and respirators.

Temporary illness such as influenza, severe colds, infections, or recurring asthma should be reported to the supervisor if that DOL

Note: The hose mask is not recommended if other forms of respiratory protection are available.

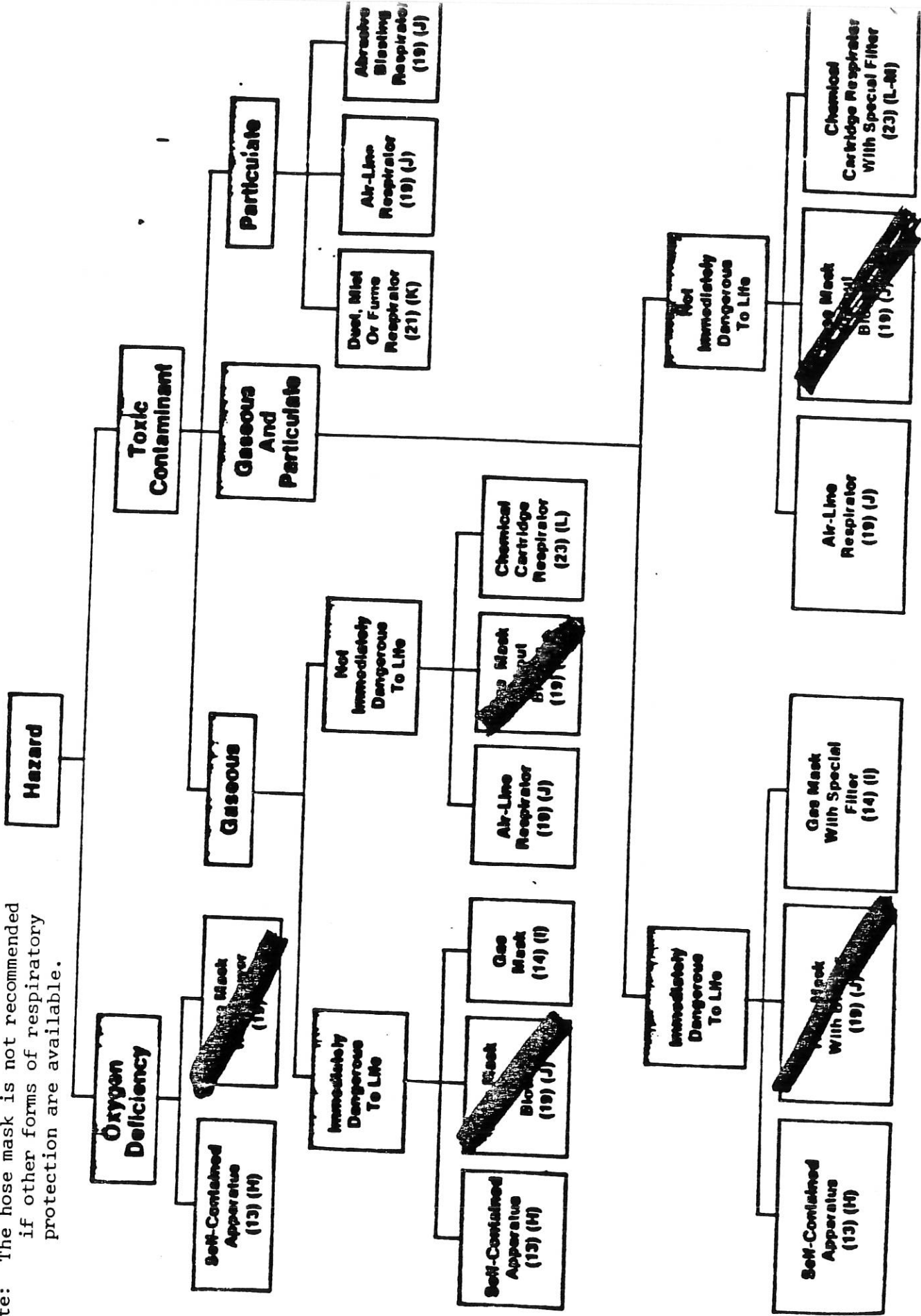


Figure 33—Outline for selecting respiratory protective devices. (Based on Bureau of Mines Information Circular 7792. Numbers in parentheses refer to Bureau of Mines Schedules; letters in parentheses refer to Summary of NIOSH/MSCMA on Respiratory Protection.)

employee is scheduled to wear PPE for extended periods. High physiological heat load or physical stress during periods of temporary illness is ill-advised.

Limitations should be listed on the fit test records.

Any DOL personnel wearing PPE and/or respirators that sense flushing, light headedness, vertigo, immediate profuse sweating, should seek immediate relief. These symptoms are common prior to heat prostration. Contact the supervisor as soon as practical.

Work conditions of high ambient temperatures or high physical output while wearing protective clothing and respirators require intermittent rest reduce to reduce stress load.

Working alone under conditions of high physiological stress in PPE is ill-advised.

6. Failure of Equipment

DOL personnel wearing PPE or respirators where failure of equipment would result in unwarranted exposure, risk to health, or gross contamination must follow these procedures if failures occur.

- ° Immediately exit the area to a safe location.
- ° Remain at the location and call for competent help. It is important not to contaminate surrounding or personal effects if contamination has occurred.
- ° Define the problem and identify the failure. Notify the supervisor.
- ° Correct minor problems or failures such as broken straps, valves, leaking canisters, or replace torn personal protective clothing.

- If major failures of the respiratory equipment or protective clothing have occurred or gross contamination of the body has occurred, do not re-enter the situation until the supervisor or an authorized site coordinator or teamleader has authorized the return.
 - Report major failures to the Chief Industrial Hygienist for technical review, advice, or resolution.
- DOL personnel must use their best judgement and training if a PPE failure occurs. They must:

- Stop
- Exit the area
- Get competent help
- Correct the minor failures
- Report the incident if a major failure occurs.

There is no stigma to stopping if there is doubt about the integrity and protection of personal protective clothing or respirators during conduct of activity.

7. Use of Company Protective Clothing and Respirators

If entry into an establishment requires special protective clothing by the employer, it may be worn unless:

- If in the judgment of the safety specialist or industrial hygienist is inadequate for the potential hazard.
- The respiratory equipment is not on the NIOSH approved equipment list.
- The company or establishment requires specialized training for the types of protective clothing or respirators to be worn.

8. Accidental Overexposure or Gross Contamination

If during the course of investigation, inspections, or incident evaluation, DOL personnel receive accidental overexposure to highly toxic materials such as organo phosphorous pesticides, nitrogen dioxide, hydrogen sulfide, hydrogen cyanide, sulfur dioxide, chlorine, or ammonia; they must seek immediate medical help.

Many of the highly toxic materials elicit delayed responses. Early medical management is paramount.

Physical stress should be avoided prior to observation and/or treatment.

Gross contamination of highly toxic materials, if inhalation has not occurred, should be removed with warm soap and water as soon as possible. Avoid spreading the contamination by limiting movement and calling for competent help. Do not leave the area until decontamination has been completed or controlled to include articles and control of clothing. Attempt to document any gross contamination.

9. Care and Cleaning of Protective Clothing and Respirators

Protective clothing and respirators develop two types of contamination through use. They are human sweat and skin oils on the inside, and contamination from the hazardous environment on the outside.

Therefore, care and cleaning is conducted in phases:

Phase I

- Inspection.
- Functional Checks.
- Pretraining and testing of equipment before use.
- Protection from soil, damage, or contamination.

Phase II

- Decontamination dependent on the degree and type of chemical.
- Control of contaminated solutions.

Phase III

- Inspection, reassembly, and testing.
- Protection or packaging ready for next use.

Prestaging, layout, and inspection for completeness is stressed prior to storage for next use.

VII. SKIN CONTAMINATION/DECONTAMINATION

A. Selection of Protective Clothing

Since many toxic or hazardous materials may be readily absorbed through the skin, an appropriate level of personal protective equipment must be selected. It may vary according to the:

- Toxicity.
- Physical form.
- Reactivity
- Concentration
- Skin absorption threat.
- Chemical damage to the skin (acid, caustic, phenols, etc.).

Secondly, the control of contamination on the clothing is necessary to prevent the spread of that contamination and is an integral part of the control and decontamination process.

The selection of the PPE must be made based on climatic conditions, seasons, and environmental conditions of the site.

Personnel responding to hazardous substance incidents may become contaminated in a number of ways, including:

- ° Contacting vapors, gases, mists, or particulates in the air.
- ° Being splashed by materials while sampling or opening containers.
- ° Walking through puddles of liquids or on contaminated soil.
- ° Using contaminated instruments or equipment.

Protective clothing and respirators help prevent the wearer from becoming contaminated or inhaling contaminants, while good work practices help reduce contamination on protective clothing, instruments, and equipment.

Even with these safeguards, contamination may occur. Harmful materials can be transferred into clean areas, exposing unprotected personnel. Or in removing contaminated clothing, personnel may contact contaminants on the clothing and/or inhale them. To prevent such occurrences, methods to reduce contamination and decontamination procedures must be developed and implemented before anyone enters a site and must continue (modified when necessary) throughout site operations.

Decontamination consists of physically removing contaminants and/or changing their chemical nature to innocuous substances. How extensive decontamination must be depends on a number of factors, the most important being the type of contaminants involved. The more harmful the contaminant the more extensive and thorough decontamination must be. Less harmful contaminants may require less decontamination. Combining decontamination, the correct method of donning personnel protective equipment, and the use of site work zones minimizes cross-contamination from protective clothing to wearer, equipment to personnel, and one area to another. Only general guidance can be given on methods and techniques for decontamination. The exact procedure to use must be determined after evaluating a number of factors specific to the incident.

Personal protective equipment for unknown chemical environment where skin or respiratory exposure is as follows:

The protective equipment described is a composite system consisting of layers of protection from the skin outward with a completely disposable outer layer.

The normal work clothes, to be worn under the outermost suit, will consist of a one-piece Nomex jump suit and ANSI-approved safety-toed chemical work boots. Nomex was selected because it provides protection from the fire and/or explosion hazards which may be present at many of the sites. The primary exterior barrier is a Saran/polyethylene coated Tyvek suit with hood and booties attached. The booties are necessary to prevent contamination of the chemical

work boots. Since the Saran/Tyvek booties have little abrasion/puncture resistance, light or heavy-weight overboots, depending on terrain, must be worn to protect the integrity of the suit and inner boot.

Since all protective outerwear will be subject to chemical permeation or migration over time, the Saran/Tyvek suit is intended to serve as splash protection only. Should the suit be contaminated with unknown chemicals, the CSHO should move immediately through decontamination procedures and discard the outer suit. The suit need not be discarded for routine changing of SCBA air bottles.

The hands will be protected by a multibarrier glove system as well. Inner cotton gloves will be worn to absorb perspiration from the hand. Over the cotton glove will be worn the inner chemical glove which will protect the SCHO during the decontamination phase as contaminated outer layers are discarded. The primary exterior layer is a fourteen inch long, 22 mil nitrile glove.

When exiting the site, all outerwear should be discarded and placed in appropriate containers for proper care or disposal.

The possibility of knowingly contaminating or puncturing the suit does exist. Therefore, it is recommended that the interior protective clothes be washed after each day's activity. If more than one day's activity in the field is anticipated, duplicate sets of interior work clothes must be provided.

2. Equipment Recommendations

The personal protective equipment listed below may provide adequate protection to DOL personnel at hazardous waste sites.

This ensemble may be worn with either a self-contained breathing apparatus or a gas mask. In addition, it meets the requirements of the Environmental Protection Agency's (EPA) protection "Level B" and "Level C" operations. The protection levels established by EPA can be briefly defined as 1) Level A Vapor-Tight Encapsulating Suit/Self-Contained breathing apparatus, 2) Level B - Splash Suite/SCBA, 3) Level C - Splash Suit/Gas Mask, and 4) Level D - Coveralls/Hard Hat/Steel-Toed Safety Boots/Emergency Escape SCBA Device.

1. The items listed are recommended. The Chief may allow purchase of such equipment. All requisition policies and procedures will be followed. Exception: Cotton underwear is considered personal item(s) and will not be purchased by the State.

1. Article: 100% Cotton Underwear
(lightweight/thermal)
Number: CSHO Discretion
Source: Local Purchase
Manufacturer(s): CSHO Discretion
Rationale: Cotton is a material of choice when flammable environments may be encountered.
2. Article: Nomex Coveralls
Number: 2/CSHO on site
Source: Local purchase

Rationale: These coveralls should be constructed of a woven Nomex weighing 5 to 6 oz. per square yard. This grade of material will offer the wearer good protection if exposed to a fire. The coveralls are available as an "off the shelf" item as well as on a custom order basis. The costs are comparable. However, KEVLAR inner liners are available for the custom made coveralls which provide added fire protection as well as cold weather protection to the wearer.

3. Article: Hard Hat/Face Shield/Goggles/Safety Glasses

Number: 1/CSHO on site

Source: Local purchase

Manufacturer(s): CSHO discretion (Meets applicable ANSI requirements)

Rationale: DOL/EPA required for site entry

4. Article: Safety Toe Footwear

Number: 1 pair/CSHO on site

Source: Local purchase

Rationale: Inner work boots should be made of rubber or PVC. However, if an object penetrates the outer protective boot and the sole and contaminates the inner boot, then that inner boot must be discarded if decontamination cannot be assured. For example,

there is no way of satisfactorily decontaminating PCB contaminated leather boots.

5. Article: Inner Cotton Glove
Number: CSHO discretion
Source: Local purchase
Rationale: In order to absorb perspiration from the hands, a very inexpensive medium weight white cotton lisle glove is recommended.

6. Article: Lightweight Inner Chemical Glove
Number: 6 pairs/CSHO on site
Source: Local purchase
Rationale: A high dexterity neoprene/latex glove is recommended to comply with the requirements of EPA's B and C protection levels.

7. Article: Chemical Resistant Outer Gloves
Number: 6 pairs/CSHO on site
Source: Local purchase
Rationale: This glove provides another level of protection and is required for EPA protection level B and C operations. The glove recommended is a 14 inch, 22 mil Nitrile glove.

8. Article: Saranex/Tyvek Health Response Suit

Source: Supplied by DOL upon request as needed

Rationale: The splash suit is composed of DOW Saranex (2mil) which is laminated to Dupont 1422 Tyvek but an extruded polyethylene layer which serves as a bonding agent. This procedure creates a three layer laminate. Note: Other specifications are: (a) A large sack suit with drawstring nec, elastic in the wrist of the sleeves, attached booties, and a hood attached to the front of the suit; (b) A zipper in the back of the suit allows easy donning of the suit as well as replacing of SCBA air tanks; (c) A suit large enough to accommodate a SCBA; (d) And with an elastic opening large enough to accommodate the SCBA facepiece, enough room for a hard hat, and it must drape down over the neck and the top of the SCBA; and (e) All seams are lay-over seams for tear resistance and for forming a liquid seal. The suit has been referred to by the manufacturer as the Health Response suit.

9. Article: Heavyweight Overboots
- Number: 3 pair/CSHO on site
- Source: Local Purchase
- Rationale: An overboot is required for EPA level B and C operations. The disposable overboots should

be used in areas where there is a substantial risk to the suit and inner boots from ground objects such as metal, glass, nails, or other sharp objects. These overboots, designed for single use only, are substantial foot wear and personnel may be tempted to reuse these boots. Supervisors must ensure that these overboots are disposed of after each use. PVC ten inch overboots are recommended. Each CSHO should select overboots at least three sizes larger than the size of their inner boot in order to accommodate the bootie attached to the splash suit.

10. Article: Lightweight Overbooties
Number: CSHO Discretion
Source: Local Purchase
Rationale: These could be used at site where ground conditions are fairly clean. The purpose of these booties is to help personnel avoid slips and falls as well as to protect the primary Sarnex/Tyvek layer. Various types of rubber and PVC booties are available.
11. Article: Self Contained Breathing Apparatus (SCBA). 30 minute-positive pressure demand type, with fiber wrapped aluminum cylinder.

- Source: When needed DOL. Each SCBA will be issued with one (1) spare cylinder.
12. Article: Emergency Escape Units - 5 minute
 Number: 2/Alaska DOL
 Source: Supplied by DOL
13. Article: Gas Mask - With Type "N" Canisters
 Number: As Required
 Source: Local Purchase
14. Article: Half-mask with Appropriate Cartridges
 Quantity: As Required
 Source: Local Purchase

C. Types of Personal Protective Clothing Acceptable

Except for the above directed requirements or EPA requirements for entry into hazardous dump sites controlled by them, there is no specific guidance for the types of protective clothing required. It is dictated by the six factors in the selection of protective clothing section.

There are 6 general considerations in preplanning for exposure to hazardous chemicals and purchase of equipment. The factors are:

- ° Control: Identification of the hazard and attendant control measures.
- ° Comfort: The equipment must afford reasonably comfortable attire.
- ° Cost: The first consideration is control, the cost follows.

- Communications: Training, acceptance, understanding and procedures.
- Care & Convenience: The equipment must be on hand, ready, and clean.

D. Street Clothes Contamination

Street clothes that become contaminated with highly toxic or hazardous materials must be secured until properly decontaminated prior to release, or reuse. An essential element of contamination control is to make no exceptions. Once the contaminated materials leave the area - all control is lost.

E. Control of Contamination

1. Initial Planning

The initial decontamination plan assumes all personnel and equipment leaving the Exclusion Zone (area of potential contamination) are grossly contaminated. A system is then set up to wash and rinse, at least once, all the personal protective equipment worn. This is done in combination with a sequential donning of equipment, starting at the first station with the most heavily contaminated item and progressing to the last station with the least contaminated article. Each piece of clothing or operation requires a separate station.

The spread of contaminants during the washing/donning procedure is further reduced by separating each decontamination station by a minimum of 3 feet. Ideally, contamination should decrease as a person moves from one station to another farther along in the line.

While planning site operations, methods should be developed to prevent the contamination of people and equipment. For example, using remote sampling techniques, not opening containers by hand, bagging monitoring instruments, using drum grapplers, watering down dusty areas, and not walking through areas of obvious contamination would reduce the probability of becoming contaminated and require a less elaborate decontamination procedure.

The initial decontamination plan is based on a worst-case situation (if no information is available about the incident). Specific conditions at the site are then evaluated, including:

- Type of contaminant.
- The amount of contamination .
- Levels of protection required.
- Type of protective clothing worn.

The initial system is modified, eliminating unnecessary stations or otherwise adapting it to site conditions. For instance, the initial plan might require a complete wash and rinse of chemical protective garments. If disposable garments are worn, the wash/rinse step could be omitted. Wearing disposable boot covers and gloves could eliminate washing and rinsing both gloves and disposable boots and reduce the number of stations needed.

2. Contamination Reduction Corridor

An area within the Contamination Reduction Zone is designated the Contamination Reduction Corridor (CRC). The CRC controls

access into and out of the Exclusion Zone and confines personnel decontamination activities to a limited area. The size of the corridor depends on the number of stations in the decontamination procedure, overall dimensions of work control zones, and amount of space available at the site. A corridor of 75 feet by 15 feet should be adequate for full decontamination. Whenever possible, it should be a straight path.

The CRC boundaries should be conspicuously marked, with entry and exit restricted. The far end is the hotline - the boundary between the Exclusion zone and the Contamination Reduction Zone. Personnel exiting the Exclusion Zone must go through the CRC. anyone in the CRC should be wearing the Level of Protection designated for the decontamination crew. Another corridor may be required for the entrance and exit of heavy equipment meeting decontamination. Within the CRC, distinct areas are set aside for decontamination of personnel, portable field equipment, removed clothing, etc. These areas should be marked and personnel restricted to those wearing the appropriate Level of Protection. All activities within the corridor are confined to decontamination.

Personal protective clothing, respirators, monitoring equipment, sampling supplies, etc. are all maintained outside of the CRC. Personnel don their protective equipment away from the CRC and enter the Exclusion Zone through a separate access control point at the hotline.

F. Extent of Decontamination Required

1. Modifications of Initial Plan

The original decontamination plan must be adapted to specific conditions found at incidents. These conditions may require more or less personnel decontamination than planned, depending on a number of factors.

a. Type of Contaminant

The extent of personnel decontamination depends on the effects the contaminants have on the body. Contaminants do not exhibit the same degree of toxicity (or other hazard). The more toxic a substance is, the more extensive or thorough decontamination must be. Whenever it is known or suspected that personnel can become contaminated with highly toxic or skin-destructive substances, a full decontamination procedure should be followed. If less hazardous materials are involved, the procedure can be downgraded.

b. Amount of Contamination

The amount of contamination on protective clothing is usually determined visually. If it is badly contaminated, a thorough decontamination is generally required. Gross material remaining on the protective clothing for any extended period of time may degrade or permeate it. This likelihood increases with higher air concentrations and greater amounts of liquid contamination. Gross contamination also increases the probability of personnel

contact. Swipe tests may help determine the type and quantity of surface contaminants.

c. Level of Protection

The Level of Protection and specific pieces of clothing worn determine on a preliminary basis the layout of the decontamination line. Each Level of Protection incorporates different problems in decontamination and donning of the equipment. For example, decontamination of the harness straps and backpack assembly of the self-contained breathing apparatus is difficult. A duty¹ rubber apron worn over the harness makes decontamination easier. Clothing variations and different Levels of Protection may require adding or deleting stations in the original decontamination procedure.

d. Work Function

The work of each person does determine the potential for contact with hazardous materials. In turn, this dictates the layout of the decontamination line. Observers, photographers operators of air samplers, or others in the Exclusion Zone performing tasks that will not bring them in contact with contaminants may not need, for example, to have their garments washed and rinsed. Others in the Exclusion Zone with a potential for direct contact with the hazardous material will require more thorough decontamination. Different decontamination lines could be set up for different job

functions, or certain stations in a line could be omitted for personnel performing certain tasks.

e. Location of Contamination

Contamination on the upper areas of protective clothing poses a greater risk to the worker because volatile compounds may generate a hazardous breathing concentration both for the worker and for the decontamination personnel. There is also an increased probability of contact with skin when donning the upper part of clothing.

f. Reason for Leaving Site

The reason for leaving the Exclusion Zone also determines the need and extent of decontamination. A worker leaving the Exclusion Zone to pick up or drop off tools or instruments and immediately returning may not require decontamination. A worker leaving to get a new air cylinder or change a respirator or canisters, however, may require some degree of decontamination. Individuals departing the CRC for a break, lunch, end of day, etc., must be thoroughly decontaminated.

2. Effectiveness of Decontamination

There is no method to immediately determine how effective decontamination is in removing contaminants. Discolorations, stains, corrosive effects, and substances adhering to objects may indicate contaminants have not been removed. However, observable effects only indicate surface contamination and

no permeation (absorption) into clothing. Also many contaminants are not easily observed.

A method for determining effectiveness of surface decontamination is swipe testing. Cloth or paper patches - swipes - are wiped over predetermined surfaces of the suspect object and analyzed in a laboratory. Both the inner and outer surfaces of protective clothing should be swipe tested. Positive indications of both sets of swipes would indicate surface contamination has not been removed and substances have penetrated or permeated through the garment. Swipe tests can also be done on skin or inside clothing. Permeation of protective garments requires laboratory analysis of a piece of the material. Both swipe and permeation testing provide after-the-fact information. Along with visual observations, results of these tests can help evaluate the effectiveness of decontamination.

3. Equipment

Decontamination equipment, materials, and supplies are generally selected based on availability. Other considerations are ease of equipment decontamination or disposability. Most equipment and supplies can be easily procured. For example, soft-bristle scrub brushes or long-handle brushes are used to remove contaminants. Water in buckets or garden sprayers are used for rinsing. Large galvanized wash tubs or stock tanks can hold wash and rinse solutions. Children's wading pools can also be used. Large plastic garbage cans or other similar containers lined with plastic bags store

contaminated clothing and equipment. Contaminated liquids can be stored temporarily in metal or plastic cans or drums. Other gear includes paper or cloth towels for drying protective clothing and equipment.

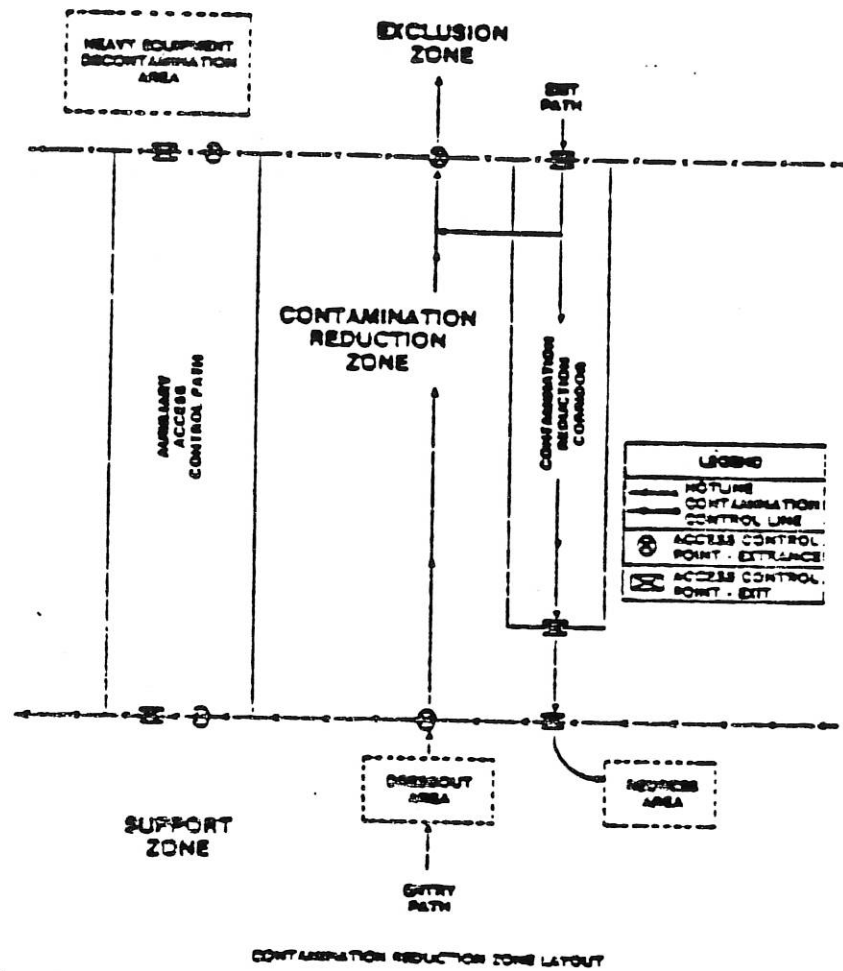
4. Decontamination Solution

Protective equipment, sampling tools, and other equipment are usually decontaminated by scrubbing with detergent-water using a soft-bristle brush followed by rinsing with copious amounts of water. While this process may not be fully effective in removing some contaminants (or in a few cases, contaminants may react with water), it is a relatively safe option compared with using a chemical decontaminating solution. This requires that the contaminant be identified. A decontamination chemical is then needed that will change the contaminant into a less harmful substance. Especially troublesome are unknown substances or mixtures from a variety of known or unknown substances. The appropriate decontamination solution must be selected in consultation with an experienced chemist.

5. Establishment of Procedures

Once decontamination procedures have been established, all personnel requiring decontamination must be given precise instructions (and practice, if necessary). Compliance must be frequently checked. The time it takes for decontamination must be determined. Persons wearing SCBA's must level the

contaminated work area in sufficient time to pass through the CRC and decontamination before all the air is consumed.



G. Medical Treatment

In case of injury or requirement for dire medical treatment, DOL personnel with skin contamination by highly toxic or hazardous chemicals should be treated thusly:

- ° Removed from the work site.
- ° Decontaminate or remove clothing if it does not interfere with life saving or medical treatment.
- ° Inform medical personnel of the nature and extent of contamination.
- ° Wrap the injured in a blanket or suitable material to limit the spread of contamination.

Physical injuries can range from a sprained ankle to a compound fracture, from a minor cut to massive bleeding. Depending on the seriousness of the injury, treatment may be given at the site by trained response personnel. For more serious injuries, additional assistance may be required at the site or the victim may have to be treated at a medical facility.

Life-saving care should be instituted immediately without considering decontamination. The outside garments can be removed (depending on the weather) if they do not cause delays, interfere with treatment, or aggravate the problem. Respiratory masks and backpack assemblies must always be removed. Fully encapsulating suits or chemical-resistant clothing can be cut away. If the outer contaminated garments cannot be safely removed, the individual should be wrapped in plastic, rubber, or blankets to help prevent contaminating the inside of ambulances and/or medical personnel. Outside garments are then removed at the

medical facility. No attempt should be made to wash or rinse the victim. One exception would be if it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life. For minor medical problems or injuries, the normal decontamination procedure should be followed.

Exposure to chemicals can be divided into two categories:

- Injuries from direct contact, such as acid burns or inhalation of toxic chemicals.
- Potential injury due to gross contamination on clothing or equipment.

For the contaminant inhaled, treatment can only be by qualified physicians. If the contaminant is on the skin or in the eyes, immediate measures must be taken to counteract the substance's effect. First aid treatment usually is flooding the affected area with water; however, for a few chemicals, water may cause more severe problems, such as phosphorus burns.

When protective clothing is grossly contaminated, contaminants may be transferred to treatment personnel or the wearer and cause injuries. Unless severe medical problems have occurred simultaneously with splashes, the protective clothing should be washed off as rapidly as possible and carefully removed.

H. Estimate of Exposure

Estimates of exposure and skin contamination should be made through sampling, degree of contamination of clothing and equipment, contamination

of clothing and equipment, contamination of workplace, wipe sampling of the skin (if appropriate), and bioassay of urine or blood. Attempt to document the length, concentration and type of exposure.

Such procedures are general recommendations when gross or unwarranted skin contamination has occurred. It is not necessary for routine decontamination at the end of a work period such as a hot soapy shower.

I. Reporting

All incidents of gross skin contamination and decontamination of highly toxic or hazardous chemicals shall be reported to the supervisor as soon as practical.

VIII. ACCIDENTAL INGESTION OF TOXIC OR HAZARDOUS MATERIALS

A. Accidental

Accidental ingestion of toxic and hazardous chemicals may occur when personnel are in highly contaminated areas by:

- Mannerism - like licking a moustache, lips, or brushing the mouth with the hands
- Chewing gum - this is known to increase ingestion from the lips.
- Contaminated food - the most likely method of food contamination is eating before adequate washing of the face and hands.

B. Preventive Control Measures

The best method of ingestion prevention is education, training, and developing a consciousness of work practices and personal habits.

No assumption should be made that the face and hands are clean when working in, near, or around where highly toxic or hazardous materials are present. The presumptive control measure of always washing the hands and face before eating will essentially prevent ingestion.

C. Physical contamination Control to Prevent Ingestion

The following are simplified rules that basically address historical causes of ingestion and cross contamination leading to ingestions:

- ° Failure to identify the hazard and thereby carrying the contamination into every phase of activity.
- ° Assumption that contamination control is in place.
- ° Wearing contaminated street clothing.
- ° Improper washing of hands or face.
- ° Mannerisms, such as licking lips or moustache.
- ° Not washing hands before and after using the toilet.
- ° Improper decontamination of parts of the body.
- ° Handling equipment that has escaped decontamination.
- ° Leaky respirator.
- ° The wrong respirator.
- ° Failure to wear a respirator due to improper assessment of the hazard.
- ° Accidental exposures or incidents unknown to the exposed.

D. Medical

Immediately upon realizing that ingestion of a highly toxic or hazardous material has occurred DOL personnel must:

- ° Report the incident to the supervisor immediately.

- The supervisor shall make arrangements for medical treatment, examination, and surveillance.
- Make estimates of the chemical(s) exposures.
- Serious ingestion that is manifested by illness must be reported as an occupational injury.

IX. WIPE SAMPLES

Wipe sampling is a versatile method of determining the presence of contamination and may be used to estimate the surface concentration.

Wipe samples may be useful for:

- Skin contamination estimates.
- Protective clothing contamination.
- Equipment contamination.

Wipe samples collected should be placed in sealed containers that have no outside surface contamination. The containers must be properly labeled as to contents and the hazard; e.g., carcinogen.

The contract laboratory, should be consulted to determine if (a) they are capable of analysis of the chemical species or mixture and (b) if there is a minimum lower level of detection for the method.

Advice may be solicited from the Chief, Industrial Hygienist.

The following general procedure and discussion is intended to outline the uses and limitations of wipe sampling.

One may wish to assess surface contamination and especially removable surface contamination, for a variety of reasons. Several of these reasons are listed below:

- ° Many toxic materials may gain entry into the body via ingestion and, in some instances, via penetration (absorption) through intact skin.
- ° Surfaces which may contact food or other materials which are ingested or placed in the mouth; e.g., chewing tobacco, gum, cigarettes, may be wipe sampled (including hands and fingers) to show contaminations.
- ° Contact of toxic materials with smoking materials may allow the materials, or a combustion product, to enter the body via the lungs; e.g., lead. Wipes of surfaces which may contact smoking materials (including hands and fingers) may be useful in evaluating this possible route of exposure.
- ° Skin irritants may be evaluated for potential contact by wiping surfaces, including exposed skin (fingers, hands).
- ° Effectiveness of personal protective gear; e.g., gloves, aprons, respirators, etc., may sometimes be evaluated by wipe sampling the inner surfaces of the protective gear (and protected skin).
- ° Effectiveness of decontamination of surfaces and protective gear; e.g., respirators, may sometimes be evaluated by wipe sampling.
- ° Evaluation of contamination caused by work practices can sometimes be accomplished by wipe sampling if accompanied by close observation of the operation being sampled.
- ° Accumulation of toxic materials may become re-suspended in air, and may contribute to airborne exposures; e.g., asbestos,

lead, beryllium. Bulk and wipe samples may aid in determining the possibility of this happening.

- Wipe sampling of surfaces which may contact skin is often useful for substances which absorb through intact skin. However, skin wipes may not be useful for those substances which absorb rapidly through the skin. Biological monitoring for these substances or other metabolites or biological markers is often the only means of assessing their absorption. Skin wipes are not recommended for these substances. It is suggested that wipes of protective gear inside surfaces or other skin contact surfaces be used instead.

One should be aware that there is a very strong possibility that swipe samples will give a false negative; that is, that surface contamination will not be removed by a swipe sample. (If one is looking for removable contamination, this may not present a problem.)

The Industrial Hygienist must use professional judgment on a case-by-case basis when evaluating the significance of positive wipe sampling results, considering the presence of health effects, and contribution of skin absorption (and/or gastrointestinal absorption) to the total dose, taking into consideration the ambient air concentrations, skin irritation, etc.

A. General Technique for Wipe Sampling

Consult the Chemical Information Table for appropriate filter media and solvent (dry wipes may be used, solvents are not always necessary but may enhance removal).

NOTE: Direct skin wipes should not be done when high skin absorption of a substance is expected. Under no conditions should any solvent other than distilled water be used on skin or personal protective gear which directly contacts the skin.

Two types of filters are generally recommended for taking wipe samples: Glass fiber filters (37 mm) are usually used for materials which are analyzed by HPLC,, and often for substances analyzed by GC.

Paper filters are generally used for metals, and may be used for anything not analyzed by HPLC.

For convenient useage, the Whatman smear tab (or its equivalent) is strongly recommended.

Pre-loading a group of vials with appropriate filters is a convenient method. (The Whatman smear tabs should be inserted with the tab end out.) Always wear clean plastic gloves when handling filters (disposable gloves are recommended).

At the work site, prepare a rough sketch of the area(s) or room(s) to be wipe sampled.

Put on a clean impervious disposable glove. Withdraw the filter from the vial. If a damp wipe sample is desired, moisten the filter with distilled water or other solvent as recommended in the Chemical Information table.

Caution: Skin or personal protective equipment must only be wiped DRY, or with distilled water, never with solvents. Remember also, skin wipes should not be done for materials with high skin absorption. It is recommended

that hands, not fingers be the only skin surfaces wiped. Permission of the employee should of course be sought.

Before any skin wipe is taken, explain why you want the sample. If the employee refuses, do not force the issue.

Wipe approximately 100 square centimeters (4 sq. in.) of the surface to be sampled.

Without allowing the filter to contact any other surface, fold the filter with the exposed side in, then fold it over again. Place the filter in a sample vial, cap the vial, number it, and place a corresponding number and the sample location on the sketch.

At least one blank filter treated in the same fashion, but without wiping, should be submitted for each sampled area.

Fresh gloves should be put on after any area appearing to be heavily contaminated has been sampled, or if gloves appear to have picked up any contamination.

Include note with the sketch giving any further description of the sample; e.g., "Fred Employee's respirator, inside: "Lunch table," etc.

Submit the samples to the contract laboratory with appropriate OSHA 91.

B. Additional Techniques for Wipe Sampling

1. Acids and Bases. When examining surfaces for contamination with strong acids on bases, moistened pH paper may be used.

Direct Reading: Instruments may sometimes be used for some types of surface contamination; e.g., mercury sniffer for mercury.

C. Special Techniques: for Field Analytical Evaluation of Wipe Samples for Carcinogenic Aromatic Amines:

1. Procedure

Surfaces. Wipe an area of approximately 100 cm² with a Whatman 42, 7 cm (2.8-inch) diameter filter paper moistened with 5 drops of methanol (placed in the center).

As in the case of routine wipe sampling, wear clean, disposable impervious gloves. This avoids contamination of the filter by the hand and the subsequent possibility for false positives, and prevents contact with the carcinogen.

2. Analysis

After wiping the sample area, apply 3 drops of fluorescamine (a visual reagent supplied by the contract laboratory upon request) to the contaminated area of the filter.

Place a drop of the reagent on an area of the filter which has not contacted the surface. This provides a blank adjacent to the test area.

After a reaction time of 6 minutes, irradiate the filter with a 366 nm U.V. light.

Compare the color development of the contacted area with the non contacted area and refer to standard comparison if, available.

If discoloration is observed on the filter, collect another sample using the same procedure, and send it to the contract laboratory confirmation of results.

X. HIGH HAZARD CONTINGENCY PLANS

Personal protective equipment and respiratory requirements often cannot be fully anticipated. Equipment to be considered must be assessed to properly protect DOL personnel where subject personnel will be called upon to assist, inspect, or evaluate the highly toxic chemicals and physical or environmental hazards.

A generalized contingency plan is offered that may be tailored to meet the combined threat from the chemical and physical hazards. The following factors must be considered prior to entry to avoid error, contamination, and unwarranted exposure.

- ° Overall strategic plan.
- ° Selection of a coordinator or team.
- ° Notification of the Chief Industrial Hygienist
- ° Climate.
- ° Wind conditions.
- ° First assessment of the chemicals, hazards, and physical restrictions based on available information.
- ° Review of similar incidents contained in files.
- ° Personal protective equipment for trained DOL personnel.
- ° Decontamination equipment necessary.

- ° Spill or contaminated equipment containers.
- ° Special tools and equipment.
- ° Air and wipe sampling equipment.
- ° Location of staging area if the incident, accident, or catastrophe warrants it.
- ° Communication equipment if adverse conditions warrant it.
- ° Briefing of DOL personnel on policy and procedure prior to entry.

Conditions may elevate the need for consideration of other elements of the contingency plan not mentioned here. Some conditions that may require closer control or action are:

- ° Imminent danger situations.
- ° Unanticipated chemical or physical agent exposure after entry that call for a change of plans and personal protective equipment.
- ° Hazardous dump sites.
- ° Requirements by Federal agencies that have jurisdiction all control; e.g., EPA, U.S. Coast Guard.

XI. NOISE

Ear protection against noise in the work environment is required where DOL personnel exposures exceed the allowable levels in Table 1-16, OH & EC 04.0104.

Additionally, the wearing of plastic hood respirator protection under NIOSH approval TC-19C causes a measurable noise exposure from the in-rushing air. DOL personnel who wear these devices shall wear ear protection.

XII. EYE PROTECTION

Safety glasses, chemical goggles, face shields, or any other device used for eye protection shall meet the provisions of GSC 01.0402, Eye and Face Protection, as well as the ANSI standard Z87.1-1968.

The wearing of contact lenses is prohibited where splashing of strong acids, alkali, and harsh chemicals, such as phenols, is likely to occur. Likewise, when high dust levels are present from environmental or industrial sources, the wearing of contact lenses is prohibited. The wearing of contact lenses with full face respiratory protection is prohibited.

Prescription glass worn by DOL personnel may not be substituted for safety glasses unless the prescription lenses meet the requirements of the ANSI standard Z87.1-1968.

The eye protection must be selected for the chemical and physical hazards as required for respiratory equipment and personnel protective clothing.

The prescribed method of cleaning of eye protection is with warm soapy water since many are high density plastic subject to damage by organic solvents or harsh chemicals.

XII. HEAT STRESS

Personal protective equipment is used to protect workers from a variety of hazards; namely,

- ° Excessive heat.
- ° Chemical hazards.
- ° Particulate contamination.

- Exposure to the elements (extreme cold, wind, rain, snow).
- Highly toxic materials.

Dependent on the degree of coverage of the body surface, all coverings contain certain body heat. Factors which contribute to heat stress and affect physiological mechanisms are:

- Impervious nature of the PPE.
- Amount of body covered.
- Work rate.
- State of health.
- Ambient temperature.
- Radiant heat load.

The human body uses evaporative sweat rate for torso cooling; therefore, if the heated water vapor cannot escape, the physiological heat load will rise. The body temperature will rise at a faster than normal rate. When work is conducted where high ambient temperatures exist, or high radiant heat absorption (furnace) may occur, and impermeable PPE must be worn, there is a real threat of heat prostration, heat stroke, or heart attack.

Employees with such physical limitations (reduced lung function) will experience a high physiological heat load under conditions of poor oxygen transfer during moderate or heavy activity while wearing respirators. The only exception is continuous flow air fed respirators or a powered air purifying respirator. The age and physical condition should receive some consideration in the evaluation.

Situations that demand the wearing of impervious clothing along with respiratory protection require careful consideration. Hot environments or direct sunlight heightens the physiological heat load quickly, thus adding to the respiratory burden caused by the respirator.

Generally, the employee whose body heat cannot be dissipated quickly will only be able to work 30 minutes under those conditions before involuntary reactions require exit with an attendant equal rest time. When rectal temperature exceeds 102°F for more than 30 minutes, the employee will exit involuntarily, find reasons to de-suit, or will collapse from heat prostration.

Supervisors are ill-advised to require longer periods of exposure unless airfed respiratory protection and air cooled impervious clothing are provided. This generalized information is well established and should not be ignored.

Individuals that offer information or a provisional diagnosis from a physician, that may suggest potential situations of risk during high physical stress and respiratory load threats, should never be ignored. Diseases like irregular heart beats, hypertension, valvular disease, congenital deformations or irregularities, blood dysplasias to include anemias, and high blood pressure may be accentuated by a high physiological work load caused by the respirator and/or reduced oxygen transfer in the lung.

The limitation range should be determined by a physician through physical examination.

The Alaska Industrial Hygiene Technical Manual provides the procedures and policy for medical scheduling, examination, and surveillance.

Those who refuse the program should provide proof of fitness before high physiological heat loads, heavy load of clothing or equipment in conjunction with respirators, or SCBA are allowed.

Plastic air fed hoods that exhaust air over the torso provide some measure of cooling and comfort and should be considered where the expected physiological heat load will be high.

Cooling vests and vortex tube coolers are commercially available where plastic air fed hoods cannot be worn and compressed airlines are available.

Otherwise a schedule of equal alternate work and rest periods must be developed to prevent the onset of heat stress, exhaustion, and possibly more serious consequences. In no case should a CSHO be exposed to heat stress conditions which exceed the recommendations given in TLVs for Chemical Substances and Physical Agents, 1983/84, American Conference of Governmental Industrial Hygienists.

XIV. WORK PRACTICES

DOL personnel who must knowingly encounter potentially hazardous chemicals and materials such as found in dump sites or during accidents or incidents should follow common work practices to minimize exposure.

Generally they are:

- ° Insure that the PPE is adequate protection prior to entry into the hazardous area.
- ° If contaminated, STOP, exit the area to the nearest boundary, and call for competent help. Do not leave and spread the contamination.

- ° Personnel should be assigned to work teams. Each team member should be trained to recognize potential hazards and be familiar with procedrues, engineering controls, and personal protective equipment.
- ° Onsite, team members should assume responsibility for alternating other team members when they observe practices or conditions which may create additional hazards or unnecessary exposures. In emergency situations, the team should evacuate as a group to insure that all team members are evacuated.

When necessary the "buddy system" can be augmented by providing a safety observer on the perimeter of the contaminated area.

The safety observer is reponsible for:

- ° Identifying problems.
- ° Coordinating with outside sources of help; e.g., ambulance services, medical facilites, fire department, and other response groups.

Advantages of the "buddy system":

- ° Increased awareness of safety, even when efforts are geared to task performance.
- ° The objectivity of an observer often enables them to recognize stress and habits which may cause accidents and excessive exposures.
- ° Workers are not isolated where they will be unobserved.
- ° Assistance can be provided more efficiently.
- ° Standard procedures should be established to avoid direct contact with hazardous materials and to assure safe handling of the materials.

Procedure should comply with:

- DOL regulations in GSC 01.0101-01.1320 and CC 05.010-05.260. General requirements and standards are established for storage, containment, handling of chemicals and containers, and maintenance of materials handling equipment.
- EPA regulations for hazardous material in 49 CFR 265.

Requirements are stipulated for types of containers, maintenance of storage areas, and maintenance of containers.

- Minimize direct contact with wastes.
- Limit the length of exposure of direct contact or within heavily contaminated areas to prevent significant permeation of wastes into personal protective clothing and equipment.
- Containers should be stored and staged to enable inspection of containers and storage areas, detection of leaks and degradation of containers, and implement corrective counter-measures.
- Procedures and practices should minimize rough handling of materials which can cause structural damage and release of materials or chemicals.
- Prevention of back injuries requires training of personnel in proper lifting and moving procedures to limit stress to muscles when working in awkward positions.
- Personnel should be trained in safety procedures for opening containers to allow release of excess pressure without excessive release of wastes being expelled under pressure, where sampling is required.

Detection of radiation levels of more than 1 mR/hr requires:

- More extensive monitoring to locate the source.
- Consultation with a health physicist.

Detection of levels exceeding 10 mR/hr requires:

- Evacuation of all personnel.
 - Consult health physicist for assistance in further monitoring methods.
- Confined areas are often IDLH situations. Requirements for entry and protection when working in tanks and other confined areas are set forth in:

Alaska Standards	04.0103(d) and (g)
	07.350(d)
	07.135(h)
	01.1002(e)(4)(A)
	01.0105(c)(4)
	08.216

Prior to entering any confined space, a preliminary assessment should provide:

- Confirmation of oxygen levels.
- Detection and measurement of flammable vapor hazards.
- Identification of contaminants.
- Concentrations of contaminants present.

This assessment should be used to determine:

- The risk to worker safety and health.
- If risks to workers outweigh the need to enter the area.

- ° If provision of ventilation is required to reduce risks to workers prior to entry.

When entry into a confined area is necessary, the following basic safety precautions should be followed:

1. Provide back-up observer, equipped to enter and rescue.
2. Communications for emergency notification and requests for assistance should be readily accessible to both entry workers and observers.
3. The worker entering the area should use a safety line to provide assistance in entry and exit and facilitate emergency removal.
4. If an emergency occurs, the observer must first initiate emergency response procedures to assist in removing the injured worker, next establish communication with other personnel to alert them to the situation and then obtain necessary medical treatment.
5. The observer must determine if entry into the enclosed area and removal of the injured workers can be accomplished without also succumbing to conditions and becoming a second victim.
6. Following procedures previously established, injured worker should be carried, pulled, or lifted out of the confined area and emergency first aid provided.
7. The worker should be prepared for transport to medical facilities for treatment and/or observation following appropriate emergency decontamination procedures to protect medical and offsite response personnel from exposures to contaminants.

- ° Entry and Fall Protection

To facilitate entry and exit in emergency situations and to prevent falls, safety belts and lifelines should be used when:

- ° Climbing.

- Working in elevated areas.
- Entering confined areas of high hazards areas.
- If equipment decontamination is not possible; e.g., leather straps:
 - Store equipment in specified areas to prevent cross-contamination.
 - Dispose of equipment when no longer needed.
- Fire Protection

Alaska regulations in Article 13, GSC and 05.060 Construction Code require provisions and maintenance of procedures and equipment to prevent or, if necessary, respond to fires.

Fire prevention includes:

- Design of appropriate storage facilities.
- Maintenance of necessary fire fighting equipment.
- Selection of approved containers.
- Routine inspections to ensure that facilities are maintained as designed.
- Identification of fire hazards.
- Elimination or reduction of known fire hazards.
- Ignition Sources are heat and/or energy sources which can ignite flammable or combustible materials under appropriate conditions; i.e., concentrations sufficient for ignition, temperatures of materials, and heat of energy source exceeding flash-point.

Several kinds of ignition sources have been identified (NSC, 1974) including:

- Electrical wiring and circuits
- Employee or visitor smoking.

4. Station for different steps in the decontamination process should be physically separated and arranged in order of decreasing level of contamination.
5. Separate flow patterns and stations should be provided when it is necessary to isolate workers from different contamination zones containing incompatible waste.
6. Entry and exit points should be well marked and controlled.
7. The decontamination area should be separate from the entry path to the contamination area.
8. Dressing stations for entry should be separate from redressing areas for exit.
9. Set aside distinct stations for decontamination of personnel, portable equipment, removed clothing, etc.
10. NOTE: The decontamination process is easier if the outer layer is disposable.

The following is a list of recommended equipment for decontamination of personnel, clothing and equipment where DOL is responsible for decontamination.

- Drop cloth(s) (plastic or other suitable material) for heavily contaminated equipment and extra outer protective clothing such as overboots, second pair of gloves, monitoring equipment, drum wrenches, etc.
- Disposal collection containers(s) (drums or suitably lined trash cans) for disposable clothing and heavily contaminated personal protective clothing or equipment to be discarded.

- Lined box with absorbents for wiping or rinsing off gross contaminants and liquid contaminants.
- Wash tub(s) of sufficient size to enable workers to place boots in and wash off contaminants. (Without drain or with drain connected to collection tank or appropriate treatment system.)
- Rinse tub(s) of sufficient size to enable workers to place booted foot in and hold the solution used to rinse the wash solutions and contaminants after washing (without drain or with drain connected to collection in tank or appropriate treatment system).
- Wash solutions selected to wash off and reduce the hazards associated with the contaminated wash and rinse solutions.
- Rinse solution to remove contaminants and contaminated wash solutions.
- Long-handled, soft bristled brushes to help wash and rinse off contaminants.
- Lockers and cabinets for storage of decontaminated clothing and equipment.
- Storage containers for contaminated wash and rinse solutions.
- Plastic sheeting, sealed pads with drains, or other appropriate method for containing and collecting contaminated wash and rinse water spilled during decontamination.
- Shower facilities for full body wash or, at a minimum, personal wash sinks (with drains connected to collection tank or appropriate treatment system).
- Soap or wash solution, wash cloths and towels.
- Clean clothing and personal item storage lockers and/or closets.

There is no dogmatic training program for PPE training because each situation has its own set of requirements or needed level of protection.