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**OPPORTUNITIES FOR HEALTH AND SAFETY PROFESSIONALS
IN ENVIRONMENTAL RESTORATION WORK**

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I. Introduction

The safety of workers in waste management and in environmental restoration work is regulated in large part by the Occupational Safety and Health Administration (OSHA). Many of the OSHA rules are given in Part 1910, Occupational Safety and Health Standards, of Title 29 of the Code of Federal Regulations (CFR). Section 120 of 29 CFR 1910 specifically addresses hazardous waste operations (which include clean-up operations and work at treatment, storage, and disposal facilities) and emergency response operations. The remainder of this discussion focuses only on clean-up operations.

All that is written in the Code of Federal Regulations is judicially recognized as having the force of law in the United States. Section 5 of 29 CFR 1910 states that the OSHA standards apply as well to work in the Commonwealth of Puerto Rico. Thus, compliance with the OSHA standards is mandatory both in the United States and in Puerto Rico.

Environmental restoration work in compliance with the OSHA safety and health standards requires written site safety plans, documented

training of workers, and the introduction of effective new safety technologies and equipment. Each of these topics is discussed more fully below. These safety requirements result in opportunities for participation by professionally trained individuals, and some of these opportunities are indicated. Students interested in pursuing employment opportunities would do well to note the many documentation requirements, for which effective communication skills are an advantage.

II. Requirements and Opportunities

Employers are required by 29 CFR 1910.120 to develop and implement a written safety and health program for their employees in waste management and environmental restoration operations. One element of this safety and health program is a site-specific safety and health plan. A copy of the site safety and health plan must be kept at the site of the hazardous waste work.

(A) Site safety plan

The minimum elements of a site safety and health plan are:

- (1) A safety and health risk or hazard analysis for each site task and operation found in the workplan.
- (2) Employee training.
- (3) Personal protective equipment to be used.
- (4) Medical surveillance requirements.
- (5) Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used.
- (6) Site control measures.
- (7) Decontamination procedures.
- (8) An emergency response plan.

- (9) Confined space entry procedures.
- (10) A spill containment program.
- (11) Pre-entry briefings to be held prior to initiating any site activity, and at such other times as necessary to ensure that employees are apprised of the site safety plan and that this plan is being followed.

The first point specified by the regulations for a site safety plan is a safety and health risk or hazard analysis. I expect the number of people required to prepare such risk or hazard analyses will increase substantially in the future. Students who enjoy applying statistical analyses and probabilistic modeling to real-world problems, such as health and safety analyses, should find opportunities in increasing worker safety during environmental restoration operations.

(B) Site safety and health supervisor

The regulations for hazardous waste operations are written with the expectation that a "site safety and health supervisor (or official)" will be present at the site where waste clean-up operations are in progress. The regulations define the site safety and health supervisor as "...the individual located on a hazardous waste site who is responsible to the employer and has the authority and knowledge necessary to implement the site safety and health plan and verify compliance with applicable safety and health requirements."

The site safety and health supervisor plays a key role in the safety program at a hazardous waste site. Los Alamos National Laboratory plans to hire one such person this year and more in the future. I perceive that individuals with an interest in the safety of field operations and some

background in industrial safety, industrial hygiene, and - at places like Los Alamos - radiation protection will find many employment opportunities.

C. Training

Workers performing environmental restoration field work are required by 29 CFR 1910.120 to meet specified training requirements.

The specified minimum training is:

40 hrs of off-site instruction and 3 days of on-the-job training for general site workers;

24 hrs of off-site instruction and 1 day of on-the-job training for workers on site only occasionally for a specific limited task, such as geophysical surveying, and for workers at fully characterized sites with no health hazards;

8 hrs of specialized training for supervisors in addition to training that is the same as that of the workers being supervised; and

8 hrs of refresher training annually for workers and supervisors.

The number of companies providing off-site training for hazardous waste operations is large and appears to be growing. Those with a background in industrial safety and associated disciplines, plus a desire to teach, will find some opportunities in training hazardous waste workers.

(D) Engineering controls and personal protective equipment

The use of engineering controls generally is the best way to protect worker health. An example is the development and use of remotely operated clean-up equipment to help keep employees away from danger. There is lots of opportunity for innovative engineering to help this field of safety. One requirement of the OSHA standard states that employers shall develop and implement procedures for the introduction of effective new technologies and equipment developed for the improved protection of

employees working with hazardous waste clean-up operations. An example of beneficial work for health and safety is an innovative means to suppress the level of air contaminants during excavation. Perhaps foams, absorbents, adsorbents, or neutralizers could be used in an innovative manner to suppress the level of air contaminants. Other engineering solutions to the problem of keeping workers away from hazardous substances are most welcome.

Workers who have to be in proximity to hazardous materials wear personal protective equipment. Personal protective equipment can be as simple as a pair of disposable shoe covers or as elaborate as a totally encapsulating "moon suit." The equipment currently employed often has drawbacks, such as lack of ease in use or insufficient chemical impermeability for a particular hazardous material. Improving personal protective equipment is another field where I see potential opportunities for good engineering that could significantly improve worker safety. The engineers in this work certainly do not need to be health and safety professionals, however.

III. Additional Regulations

This discussion has addressed several, but not all, of the OSHA regulations from 29 CFR 1910.120. Potential workers at environmental restoration sites should know that their employer is required to enroll them in a medical surveillance program of documented physical examinations, if they are likely to be exposed to hazardous substances at or above the permissible exposure limits for 30 days or more in a year, if they wear a respirator for 30 days or more in a year, or if they develop symptoms because of possible overexposure involving hazardous substances from hazardous waste operations. OSHA regulations other than in the

hazardous waste operations section must be followed, also, such as the construction industry safety standards in Part 1926 and the general industry safety standards in the remainder of Part 1910.

Environmental restoration workers at U. S. Department of Energy (DOE) sites where radioactivity may be present must follow regulations given in DOE orders, as well as the OSHA standards. DOE Order 5480.11, **Radiation Protection for Occupational Workers**, is particularly important. This order specifies radiation safety training for workers at locations like Los Alamos National Laboratory. Exposure to radiation is to be kept as low as reasonably achievable. Innovative engineering can help achieve the mandate in this DOE order to protect worker health and safety.

IV. Summary

The purpose of this paper was to review areas of employment opportunity in environmental restoration work for health and safety professionals. Safety and health risk analyses were mentioned as one area of opportunity, and these analyses are required by the standards. Site safety and health supervisors will be needed during field operations. Those who enjoy teaching might consider helping to meet the training needs that are mandated. Finally, engineering help both to separate workers from hazards and to improve personal protective equipment, when it must be worn, would benefit those actively involved in environmental restoration activities.