A HEALTH AND SAFETY PRIMER FOR THE PRACTICING HEALTH PHYSICIST

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INTRODUCTION

Environmental restoration (ER) is the process of removing a facility from service, the demolition of structures, the identification and disposal of all hazardous and radioactive wastes, the decontamination of equipment and materials, and the restoration of a site for unrestricted use. The number of ER projects encompassing hazardous, industrial, and radiological conditions is expected to increase in response to various program requirements or mission changes. As a result, the practicing health physicist (HP) may have to address unique health and safety (H&S) issues beyond those of performing routine radiological activities. These unique H&S issues could include, but are not limited to the razing of buildings, the removal of radioactive materials and hazardous chemicals, below-grade excavation, confined space entry, storing flammable or combustible liquids, monitoring exposure to hazardous substances, contacting energized systems (e.g., electricity, hydraulics), noise abatement, the nullification of manufacturer warranties, and the operation and movement of heavy equipment. The purpose of this paper is to educate the practicing HP about these issues by reviewing specific regulations governing all H&S activities, and to provide an example of a site-specific H&S primer (e.g., Health and Safety Plan [HASP]). This primer advises the practicing HP about sound H&S principles, furnishes basic strategies for performing a hazard assessment/job safety analysis (HA/JSA) that can be applied to any ER project, and describes various engineering and administrative controls to mitigate hazardous exposures to ER personnel. In addition, 26 inspection checklist topics are available from the primary author to evaluate the adequacy of the engineering and administrative controls, or to necessitate the use of personal protective equipment (PPE) thereby mitigating the corresponding hazard.

REGULATIONS, STATUTES, AND ORDERS

The specific regulations governing all H&S activities are found in *Title 29 of the Code of Federal Regulations, Parts 1910 - General Industry Standard* (1) and *1926 - Construction Standard* (2). Also, applicable state, tribal, and local statutes, including U.S. Department of Energy Orders will have to be considered depending on the geographical location and regulatory jurisdiction of the ER site. Essentially, the regulations, statutes, and Orders are intended to provide uniform guidance that is generic in nature, thus allowing for the evaluation of site-specific H&S conditions at all ER sites. The regulations, statutes, and Orders also address general program guidance issues such as monitoring performance, records and reporting, and requirements for training ER personnel commensurate with the hazards encountered at the ER site.

SITE-SPECIFIC HEALTH AND SAFETY PRIMER

The types of hazards and inherent risks encountered by ER personnel often exceed the scope of performing routine HP activities. Therefore, to educate the practicing HP about these hazards and inherent risks, H&S personnel have developed a site-specific H&S primer. The primary element of this primer that will influence budgets and overall operations significantly, is the HA/JSA of site activities performed by ER personnel. A typical HA/JSA involves the following:

A) The identification of the job, task, or operation.
B) The breakdown of the job, task, or operation into individual steps.
C) The identification of all hazards associated with each step.
D) The application of controls to mitigate exposures corresponding to the identified hazards.

The methods available to mitigate exposures to ER personnel are listed in order of preference:

A) Engineering controls - the most preferred option for worker protection that includes the specification, design, purchasing, and performance of specialized equipment.

B) Administrative or work practice controls - the incorporation of H&S provisions into working-level procedures, and performing in-house inspections.

C) The allocation of PPE - since the complete elimination of the hazard may not be practical, ER personnel may be required to wear applicable PPE (e.g., respirators). However, the use of PPE is always the least desirable option since it may require additional training, medical examinations, as well as the cooperation of ER personnel to wear the PPE properly.

To familiarize the practicing HP about the proper use and application of H&S engineering and administrative controls at ER sites, a list of common elements and their H&S implications are provided for information only, and are not limited to the following:

A) Berms and tarps - designed to contain leakage of chemicals.

B) Below-grade excavation - the application of trenching, shoring, and barriers to prevent the collapse of materials.

C) Confined space entry - the placement of barriers (e.g., fencing) preventing unauthorized entry to confined spaces having limited or restricted means for entry or exit, and are not designed for continuous occupancy. Other requirements may include atmospheric testing, respiratory protection, and capabilities for emergency rescue of ER personnel occupying the confined space work area.

D) Fire hazard analysis - the availability and type of fire equipment shall be posted, and commensurate with the type of combustible materials and ignition sources present at the ER site.

E) Hazard communication program/material safety data sheets (MSDS) - the complete inventory and storage of chemicals in approved cabinets, and proper labeling of containers and tanks.

F) Lockout/Tagout (LOTO) of energized systems - the deactivation of pneumatic, hydraulic, gravitational, and electrical systems prior to initiating maintenance activities.

G) Noise abatement - the selection and placement of noisy equipment in proximity to ER personnel, or the use of sound barriers.

H) Equipment warranties - modifications compromising the intended design and/or operation of equipment shall be removed from service, and may result in nullifying agreements between the manufacturer and the purchaser.

I) Operating heavy equipment - drivers operating trucks, dozers, and scrapers have limited visibility and shall be given right-of-way privileges. The application of brakes and tire chocks shall be applied when equipment is stationary for purposes of inspection, or not in use.

In addition, 26 sample checklist topics are available from the primary author to enhance inspection capabilities by ER personnel. The sample checklists are provided as guides only, and are not limited to the following:

1. Chemicals
2. Compressed Gases
3. Construction Tools
4. Dusts, Gases, and Organic Solvents
5. Dusts, Gases, and Organic Solvents (Medical)
6. Ergonomics
7. Life Safety Code - Exits, Walkways
8. Explosives and Blasting Agents
9. Fire Prevention and Fire Protection
10. Flammable and Combustible Liquids
11. Hand and Portable Tools
12. Heat
13. Machinery and Machine Guards
14. Job Planning and Job Briefing
15. Material Handling and Storage
16. Medical and First Aid
17. Noise
18. Noise Stress (Medical)
19. Personal Protective Equipment
20. Sanitation
21. Temporary Grounding
22. Traffic Barricades
23. Trenching and Shoring
24. Vehicles and Cranes
25. Walking and Working Surfaces
26. Welding, Cutting, and Brazing

Additional components of the site-specific H&S primer should include, but are not limited to the following:

A) A brief summary of the historical information, physical characteristics, and meteorology of the site.

B) A map identifying structures, areas of remediation, and traffic patterns.

C) Access control and training requirements.

D) Medical monitoring and surveillance requirements for ER personnel coming in contact with hazardous substances.
E) First aid and response to medical emergencies.
F) Decontamination of ER personnel and equipment.
G) Transportation safety.
H) A waste minimization/pollution prevention program.

CONCLUSIONS

The types of industrial and hazardous conditions encountered at ER sites will require practicing HPs to address unique H&S issues beyond the scope of performing routine radiological activities. Therefore, the implementation of a site-specific H&S primer developed by certified ER personnel (e.g., Certified Safety Professional [CSP], Certified Industrial Hygienist [CIH]), in conjunction with the application of engineering and administrative controls will offer the practicing HP an opportunity to grow professionally by gaining experience with new disciplines associated with ER projects. In addition, the cooperative effort provided by H&S and HP personnel will provide a strategic approach to affirm balance between disciplines, maintain ease of communication between applicable participants, and identify pertinent issues at multi-hazard (e.g., chemical, industrial, and radiological) ER and similar project sites.

REFERENCES

1. "Occupational Safety and Health Standards for General Industry," *Title 29, Code of Federal Regulations, Part 1910,* Occupational Safety and Health Administration (OSHA), Washington, DC.
2. "Occupational Safety and Health Standards for the Construction Industry," *Title 29, Code of Federal Regulations, Part 1926,* Occupational Safety and Health Administration (OSHA), Washington, DC.