SUSTAINABLE DECOMMISSIONING BASICS

for Research Laboratories and Facilities

Authored by

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Core sampling to detect chemical contamination in concrete flooring

The purpose of this paper is to provide laboratory researchers and engineering/ facilities staff a basic understanding and overview of decommissioning basics using a multi-phased approach to identify, document, manage, and clean up areas of environmental concern and minimize potential liability.

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Introduction

The need for more or less space is a common laboratory problem. Solutions may include renovating existing space, leaving or demolishing old space, or acquiring new space or property for building. All of these options carry potential environmental risk. Over the past 50 years there are many federal and state regulations that have been adopted that impact the decommissioning laboratories and facilities. Out of necessity, federal regulations (RCRA) and agencies were established (EPA) to protect the environment. These regulations are directly applicable to the decommissioning of research laboratories and facilities. Over time these environmental regulations and standards have been adopted by state and local governments.

As a result of these environmental standards and legal actions taken by federal, state and local agencies, a functioning system, environmental due diligence auditing, has evolved over time to assess environmental risk and reduce associated financial liability. This system involves a 4-phase approach to identify, document, manage, and clean up areas of environmental concern or liability, including contamination. Environmental due diligence auditing includes a) historical site assessment, b) characterization assessment, c) remedial effort and d) final status survey. Regardless of the option chosen to solve the space problem, the potential environmental risk must be mitigated and the laboratory space and/or property must be decommissioned or rendered safe prior to any renovation, demolition, or property transfer activities. Not mitigating the environmental risk through a formal and well documented decommissioning process can incur significant financial liability for any costs associated with future decommissioning cleanup activities.

Whether it is leaving a space, renovating, or the acquisition of a new space, careful consideration must be given to any potential to the facility such as lead paint, asbestos or underground tanks, but are often hazardous materials used in research and development activities (e.g., radionuclides, biological agents or chemical elements). There are a number of different types of laboratories used by scientists and organizations to conduct research. The types of activities conducted and the hazardous substances used generally determine laboratory space requirements. It must be emphasized that decommissioning of these spaces requires more than just removing hazardous material and wiping down surfaces. Not mitigating the environmental risk through a formal decommissioning process can result in significant legal and financial liability. In the sections below, we will review the environmental due diligence auditing requirements: p1) historical site assessment, p2) characterization assessment, p3) remedial effort and p4) final status survey.

Applicable Decommissioning Standards
• The AIHA published the American National Standards Institute (ANSI)/AIHA Z9.11-2008, American National Standard for Laboratory Decommissioning in 2008.
• Code of Federal Regulations Title 42 (CFR 42), 40 CFR §312.21. (Resource Conservation and Recovery Act (RCRA) and their applicability to the cleanup process under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, 42 U.S.C. § 9601)
• NRC - U.S. Nuclear Regulatory Commission (NRC) license termination limits and 10 CFR 20.1003), ALARA is an acronym for “as low as (is) reasonably achievable,”
• Comprehensive Environmental Response Compensation and Liability Act (“CERCLA”)
• ASTM Standards- ASTM. Standard Practice for Environmental Site Assessments: Phase I&II Environmental Site Assessment Process, Philadelphia: American Society for Testing and Materials, 2000; E1527/E1903
• Environmental Protection Agency (EPA) debris standard- U.S. EPA. U.S. EPA Method 1311: Toxicity Characteristics

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Phase I: Historical Perspective

Laboratories often house and utilize hazardous chemicals, radionuclides and biohazardous materials. These and other potentially hazardous items may be housed in facilities that contain asbestos, lead, PCB's, CFC's, universal waste (e.g. fluorescent fixture, elect. switches, etc.) and other potentially dangerous materials. Identifying not only the age of the facility itself but also the type of research conducted past and present is important. Due diligence auditing to identify potential areas of environmental concern, including contamination, or future liability is the key first step. Areas of environmental concern or liability usually arise from historical or current uses of hazardous substances. To gain a deeper understanding the auditor should perform:

a. Key stakeholder interviews: to obtain as much information as possible about the property itself and the laboratory operation and activities. Included in this inquiry would be past and present environmental practices, facility improvements or alterations, building/property operations and maintenance, and plans for future disposition of the facility.

b. Document review: to determine if any information is available, either at the laboratory facility or via public records, regarding potential environmental contamination resulting from laboratory operations or other activities conducted at the facility or property.

c. Site inspection: to observe the current uses (and past uses, whenever possible) of the property, including those likely to involve the use, treatment, storage, disposal, or generation of hazardous substances (i.e. chemistry, biological hazards or radioisotope).

d. Written report: to document Phase I findings, observations, and recommendations, including suspected or identified areas of environmental concern or liability and what, if any. With regard to laboratory closure, the report shall provide direction for necessary decommissioning activities. Once Phase I procedures are complete, it is important to provide a copy of the written report to all relevant parties, including owners, lessor and pertinent laboratory personnel. It may be necessary to provide a copy of the report to the appropriate Federal, state, and local agencies (e.g., CUPA) Certified Unified Program Agency.

Phase II: Characterization Assessment

Areas of concern identified in the Phase I report are evaluated during the second phase of the environmental due diligence process. The potential contaminant(s) of concern shall be identified along with the applicable cleanup or clearance criteria. In cases where it has been determined that hazardous substances and residuals are likely to be present (e.g., radioisotope, biological, chemical contaminates), effort should be expended in making sampling a conscious consideration. Phase II sampling and analyses activities should be conducted to verify the suspected areas of concern of contamination. A sampling and analyses strategy are developed so that enough data may be obtained to allow a designated individual to conclude that:

a. The contaminant of concern is present at levels above the cleanup clearance criteria and a remedial effort is necessary.

b. The contaminant of concern is present at levels below the cleanup or release criteria and no further action is required.

c. The contaminant of concern is not present, and no further action is required

d. Characterization assessment considerations should include a concise scope of work, sampling analysis plan, assessment procedures, data review and findings/results.

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Phase III: Remedial Effort

A remedial effort must be made to decontaminate, the area(s) of concern if the laboratory property is contaminated with a hazardous substance(s) and the Phase II assessment determines that it presents an unreasonable risk to human health or the environment. This effort will reduce or eliminate future liability for cleanup and assure that future uses of the laboratory will not result in unreasonable risk to human health and the environment from the contamination. The selection of the decontamination method and procedures will depend on the nature of contamination (radiation, microbiological, chemical), and the specific contaminant, and the contaminated surface (impervious vs porous, and structural vs nonstructural). A decontamination plan should be prepared once the decontamination method is selected and the appropriate work procedures are established. A field screening method for measuring the effectiveness of the decontamination method should also be included. Possible decontamination method and procedures include:

a. Mechanical Cleaning: the surface is washed or wet wiped with an appropriate solvent, or contaminants are removed by vacuuming, scraping, or brushing. Example: acrylamide powder can be HEPA (high- efficiency particulate air filter [a dry filter consisting of fibers]) vacuumed or wet wiped.

b. Disinfecting: the surface is washed with a disinfectant that kills or deactivates the agents. In the case of biological agents, the Association for Professionals in Infection Control and Epidemiology, Inc. has developed a practice standard for selection and use of disinfectants.

c. Complete removal: the contaminated surface/structure is completely removed intact for disposal.

Phase IV: Final Status Survey

This step is to document the final conditions of the space/property after remediation has been completed. The due diligence process usually ends after the remedial efforts have been documented in the Phase III report. In practice, this report is the end of a paper trail that documents that appropriate inquiry and actions were undertaken to identify, manage, and remediate all areas of contamination. Although this paper trail is then used as a basis for the final property transfer agreement or to initiate renovation or demolition, there likely regulatory additional terms and conditions that must be met by local, state and federal agencies.

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Summary

The intent is to outline the environmental due diligence auditing process and provide guidelines when an organization is planning to vacate a space, renovate, or acquire a new space.

Local personnel and various contractors may face potential exposures hazards while working in and around contaminated areas. TSS offers a 4-phase approach (accordance with ANSI Z.9.11) to identify, document, manage, and clean up areas of environmental concern or liability.

NOT mitigating the environmental risk through an official decommissioning process can result in significant financial and legal liability with local, state and federal regulators.