

## **Environmental, Health and Safety Concerns During Facility Decommissioning**

**Bryan Bailey, P.E., C.H.M.M.  
Operations Manager  
Allegiant Global Services, L.L.C.  
Dayton, OH**

**Craig Galecka, P.E., C.S.P.  
Associate  
LJB Inc.  
Lansing, MI**

The proper decommissioning of facilities or parts of facilities is important to the success of an organization's plans for the site or property. Just as the decision to close or substantially modify a facility is taken with significant planning and risk assessment, the environmental, health and safety issues need to be addressed satisfactorily as well. A mishap in addressing environmental health and safety concerns could have negative ramifications financially and legally and result in poor public perception of the organization. This presentation and paper focus on environmental health and safety issues throughout the common four phases of facility decommissioning: investigation, design, decontamination/demolition and closeout.

### **Investigation**

During the investigation phase, determination of the current conditions of the facility is vital in identifying the most cost effective and efficient manner to exit the property. This investigation is focused primarily on the environmental conditions of the site and the impact they have on the required scope of work. For example, soil and groundwater remediation may be required. The site disposition options may include site demolition, "cold/warm hold," or no action based on the findings of this phase. Additionally, when considering the scope of the project, it is equally important to identify the local, state and federal regulations that apply to the site. In order to address the current environmental conditions, the organization should conduct an environmental site assessment (i.e. Phase I and Phase II), a building decommissioning assessment, an asbestos survey, a physical property assessment (i.e. capital equipment), and utility analysis. These assessments allow the organization to understand the impact of the current conditions and effectively conduct a final site disposition analysis.

## **Design**

Once the scope of the project has been decided with information provided in the final site disposition analysis, the emphasis is placed on the design phase. In this phase, the organization will plan how the work will be conducted for the vital aspects of the project. The planning will result in job specifications that identify the following:

- Proper cleanup standards and methodologies
- Local, state and federal site-specific requirements
- Waste removal and disposal
- Health and safety requirements

The enhanced planning and research done in this phase will result in minimized costs and risks in environmental health and safety issues.

## **Decontamination/demolition**

The preliminary work conducted in the prior phases will allow the decontamination/ demolition phase to be set into action. Prior to the commencement of work on the site, it is essential for the organization to have reviewed the contractors' safe operating procedures, environmental procedures, and health and safety procedures. These plans should include noise, fugitive dust, erosion control, emergency response, health and safety (HASP), a project work plan, waste management, and fire protection.

The decontamination work exposes workers and the environment to a great number of health and safety risks. This can potentially result in adverse financial and legal issues, such as from the mishandling of wastes or improper cleanup methods. This phase requires the removal of regulated materials, proper disposal, and verification that all regulations for facility closure have been followed. Prior to demolition, it is essential that the owner inspect the site and its buildings and verify that regulated materials and essential physical assets have been removed.

The demolition portion of this phase requires significant coordination between entities to reduce the risk of injury to those on site. In addition to the demolition of the buildings, this phase typically includes the recycling of metals and other materials deemed to have monetary value. At the end of the demolition phase, the organization should be left with a site that had been envisioned during the initial planning phase.

## **Closeout**

The closeout phase ensures that the site will be maintained according to all applicable requirements and regulations. During this phase, it is prudent to alleviate potential risks as best as possible. Thus, it is important to determine site security needs, evaluate remaining structures, and maintain the site to pre-decommissioning standards.

## Decommissioning considerations

The above phases provide a bird's-eye view of decommissioning a facility. From this vantage, a project of this nature may seem simple. On the contrary, it is anything but simple. This is one reason many organizations planning to close a facility choose to work with engineers and firms well-versed in the intricacies of this business. Decommissioning requires an almost microscopic attention to details, particularly those involving health and safety. Regulations and safety standards are in place to protect not just workers, but the general public and the environment. Applying this assortment of recommendations and regulations can result in a safe and environmentally sound decommissioning of a facility or parts of facilities.

### Build a team

As an organization approaches a decommissioning, it should assemble a knowledgeable team with the skills and expertise necessary to plan and carry out the project in a way that serves the organization and all other stakeholders. Team members could include some or all of the following, depending on the project:

1. Process or facilities engineer
  - a. Typically from inside the organization
  - b. Conduct the assessment of the capital inventory and physical property
2. Financial manager
  - a. From inside or outside the organization
  - b. Determine potential for reuse, sale or disposal of equipment
  - c. Evaluate the tax and financial implications of various closure options
  - d. Work along with the process or facilities engineer to prepare a report of their findings to the organization's decision-making powers and to other members of the decommissioning team
3. Tax consultant
  - a. Help the company analyze the effects of their decommissioning decisions on their tax responsibilities
  - b. From inside or outside the organization
  - c. *Note: this aspect of decommissioning is often overlooked, and the financial impact of such an oversight can be considerable*
4. Environmental consultant
  - a. From inside or outside the organization
  - b. Conduct environmental site assessments to determine the potential for contamination of soil or groundwater (Phase I ESA)
  - c. If necessary, take samples to determine the extent of contamination (Phase II ESA)
  - d. Evaluate process equipment for residual hazardous chemicals
  - d. If issues are identified, estimate the cost of cleanup, either immediate or delayed, and assess whether the organization might be eligible for state or federal funds earmarked for environmental cleanup initiatives
  - e. *Note: This cost estimate is often a decision-making point for the organization. Sometimes, it may be more cost-effective to maintain some operations rather than clean up the facility for closure or sale.*
5. Environmental engineer or geologist
  - a. Manage soil or groundwater remediation design if such remediation is found to be necessary

6. Design-decommission contractors
  - a. Work in the manner of a design-build contractor, but with the opposite end in mind
  - b. Design and carry out the decommission—including demolition and asbestos/hazardous materials removal
  - c. Manage the recycling, disposal or sale of waste materials
7. Structural engineer
  - a. From inside or outside the organization
  - b. Aid in the design of the building deconstruction, focusing on the structural elements
8. Civil, structural or mechanical engineer
  - a. From inside or outside the organization
  - b. Design the layout for any utilities that need to be moved or capped
9. Health and safety manager
  - a. Often an employee of the demolition contractor
  - b. Prepare site health and safety plans and procedures
  - c. Review health and safety practices as the demolition occurs
  - d. A person with credentials such as a Certified Safety Professional, Certified Hazardous Materials Manager or Certified Industrial Hygienist will be knowledgeable and reliable in this role

### Regulatory overlap

In most decommissioning situations, multiple—indeed, often dozens of—agencies and governmental bodies have jurisdiction over some aspect of the closing of a single building. With these often intentionally redundant regulations from multiple bureaucratic channels, any engineer in the business will volunteer that “it’s very easy to miss something.” A simple oversight can be costly to the bottom line, but even worse, to a life. Leaving behind hazards to people, the infrastructure, or the environment can be both dangerous and expensive.

While the regulations of the Occupational Safety and Health Administration and the Environmental Protection Agency apply as the minimum standard for any decommissioning in the United States, owners must also comply with the regulations of local jurisdictions and state-level EPAs, many of which have more stringent requirements than OSHA and the U.S. EPA.

For example, in Ohio, some closings are governed by a state-level EPA program called “Cessation of Regulated Operations.” The program was formed in 1996 to prevent situations such as that which occurred after a 1987 break-in to a closed-down tire company. Vandals, who were after the copper components of transformer cores left onsite after the closing, caused the release of Askerol—PCB oil—into a nearby stream. This prompted a three-year, multimillion-dollar cleanup. Today, in order to prevent such mishaps, the CRO program requires the owner or operator to complete specific tasks within 90 days of cessation. According to the Ohio EPA Division of Hazardous Waste Management companies must do the following:

1. Submit to the director of Ohio EPA the most recent emergency and hazardous chemical inventory form submitted to the State Emergency Response Commission (SERC)
2. Submit to the director of Ohio EPA a current OSHA hazardous chemical list or Materials Safety Data Sheet for each chemical at the facility required to be on file with the SERC
3. Submit to the director of Ohio EPA a list of every stationary tank, vat, electrical transformer and vessel that will remain at the facility that contains or is contaminated with a regulated substance prior to or at the time of cessation

4. Drain and remove all regulated substances from each stationary tank, vat, electrical transformer and vessel and from all piping
5. Lawfully dispose, sell or transfer the regulated substances offsite
6. Lawfully transfer offsite all debris, non-stationary equipment, furnishings, containers, motor vehicles and rolling stock that contain or are contaminated with a regulated substance
7. Certify to the director on a form prescribed that the actions required in the previous three items have been completed.

Only after the equipment has been “cleaned” of lead dust, asbestos fibers, oils and chemical lubricants can it be scrapped, sold or transferred offsite. Switches, thermostats, fluorescent bulbs and other devices or controls containing mercury or other regulated substances also must be removed and recycled, sold or disposed of according to the applicable statutes.

Ducts for heating, ventilation and air conditioning—all potential harbors for environmental safety hazards—should be cleaned and/or removed. Refrigeration equipment for air conditioning or cooling processes must be removed, and all refrigeration gases in any machines—transformers, for example—must be recycled or disposed of as well.

Underground and above-ground storage tanks often have entire agencies dedicated to their removal and closure.

### Financial options

After a complete capital asset inventory, which logs the values of all assets in a facility, a decommissioning contractor often works with a tax consultant, who can evaluate the tax implications of actions such as failing to liquidate inventory that hasn't fully depreciated. Fully depreciated inventory, such as machinery in a tool room, can be a tax deduction. However, if it still has appreciable value, a company can't just dispose of it, and keeping it can mean a big tax hit. Since a facility's county keeps records and depreciation schedules for pieces of equipment, it behooves a company to be honest about the value of its inventory and diligent about selling it.

### Procedural matters

When actual decommissioning begins, the project manager must be aware of procedural requirements for each task. For example, in some jurisdictions, asbestos abatement requires 10 days' notice to the local or state air pollution control agency. Don't overlook that one. The repercussions for it could be more than fines; someone could wind up in prison over it.

“Out of sight, out of mind” doesn't apply when it comes to disposal of potentially hazardous chemicals. If 10 years from now, a drum of solvent or other regulated substance is discovered to have been disposed of at a non-regulated facility, authorities will want to find out exactly who was—or might have been—responsible and collect damages. Any business owners that sent material to the landfill have the burden of proving the substance didn't come from their decommissioning projects. In other words, follow all the rules, and choose the right landfill. Unlined construction and demolition landfills aren't a good choice.

### Good corporate citizenship

If a company wants to leave a building, it's recommended that it be a “good and responsible environmental citizen” in the interest of the environment, workers, and the future owner of the site.

One particularly good environmental citizen was a certain car battery manufacturing facility in Michigan. The business owner, which had been leasing its production facility, asked a facility decommissioning contractor to collect and analyze surface swipes from floors and rafters to ensure that the space was clean enough to turn over to the next occupant.

Owners have several options for this good citizenship. If redevelopment and reuse are likely, it's considered "the right thing to do" to conduct the Phase I and Phase II environmental site assessments, even taking soil samples to identify issues that might affect the desirability of the property. The objective is to identify the potential for contamination—any of which would eventually be discovered by potential buyers in assessments required for financial lending.

### Shutdown scenarios

Once all of the assessments, inventories and evaluations have been completed, various options could be recommended. Among them:

1. "Cold hold": Essentially, this equates to shutting off the lights and locking the doors. Though it may be the easiest and least expensive option, it's seldom a legal option. Any asbestos in the facility will deteriorate over time, and a future cleanup is almost a guarantee. Fire protection systems are not operational, so fire departments and insurance companies won't advocate this. Because electricity is not on, lighting is unavailable, so fall hazards, open pits and structural hazards can pose grave risks to any unauthorized occupant who might find his way into a facility for shelter or otherwise. Even with barriers to the facility, safety hazards can remain. An owner who takes the cold-hold option has to consider whether it is doing all it can to protect people—authorized to be in the facility or not—from hazards.
2. "Warm hold": With this approach, a facility's water and heat are minimally supplied to keep pipes from bursting and to maintain fire protection systems.
3. Decommissioning: In this method, all that's left of a facility is its shell and utilities. Process equipment is removed, and hazards are eliminated. Barriers to the site are required or recommended, and a competent person should walk the site periodically to satisfy insurance and fire protection requirements.
4. Tear-down to slab: This approach, which is just as its name implies, requires major health and safety considerations, most notably for workers doing the deconstruction; hazards are hard to identify until tear-down begins. Separating materials, for example, can expose workers to even more potentially severe injuries than a construction project.
5. Removal of all components to soil level: Once the site is cleared, including any contaminated subsurface soil, the site is secured and left until other plans call for its reuse.

## **Conclusion**

Decommissioning should be planned and executed with advice from qualified professionals, in cooperation with local agencies, and according to the recommendations, regulations and best practices of OSHA, ANSI, EPA and other organizations. Doing this will allow the closure and/or demolition of a facility or operation to be completed in a way that is safe for workers, the community and the environment and will allow the facility owner to make the best possible choice for the future of the facility.

If not, however, the circumstances could be more dire.

Consider an incident from Dayton, Ohio, in which a man recognized that there was copper remaining in an abandoned facility. The man entered the closed-down Howard Paper Mill and located a prime length of wiring, which he then cut. To his great disadvantage, this industrial site, while abandoned, had not been disconnected from the city power grid. Thus, 12,000 volts surged through him, burning 40 percent of his body. The explosion and fire that followed burned a 40-foot-tall power pole and nearby brush and cut power to nearby buildings. The man stumbled away from the mill and collapsed in a nearby parking lot, where he was picked up by an ambulance crew. Fortunately, he was expected to survive.