INCORPORATION OF POLLUTION PREVENTION AND WASTE MINIMIZATION PRACTICES DURING THE DECOMMISSIONING OF BUILDING 310 AT ARGONNE NATIONAL LABORATORY-EAST

John Mezaraups
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439 USA

Pete J. Yerace
DOE - Fernald Ohio
P.O. Box 538704
Cincinnati, OH 45253-8704 USA

Dr. Michael A. Krstich
Environmental Management Solutions (EMS)
3520 Stettinius Avenue
Cincinnati, OH 45208 USA

Dr. Michael J. Gresalfi
Lockheed Martin
12800 Middlebrook Rd., Suite 102
Germantown, MD 20874 USA

ABSTRACT

The decommissioning of radiologically contaminated buildings at Department of Energy (DOE) sites provides a major opportunity to include pollution prevention and waste minimization (P2/WMin) practices to minimize waste using authorized release opportunities, and recycle and reuse (R2) activities on a complex-wide basis. The "P2/WMin Users Guide for Decommissioning Projects" (a.k.a. Users Guide or Guide) will be used to incorporate P2/WMin practices into the decommissioning and dismantlement (D&D) of Building 310 Retention Tanks at Argonne National Laboratory–East (ANL-E).

The Building 310 service floor retention-tank facility contains ten isolated retention tanks that served to store excess radioactive liquids generated during process operations. The building consists of three rooms containing three tanks each and a larger room containing one tank. Due to a concern that the deteriorating facility could expose personnel working in the vicinity to radioactive contamination, a decision was made to decommission the building. Completion of this project would remove six release sites from the ANL-E D&D Program Release Site list.

The Users Guide, a document prepared under the auspices of the Office of Pollution Prevention (EM-77), details a step-by-step approach for incorporating P2/WMin options into a project's documentation and subsequent decommissioning activities. It is a compilation of lessons learned and strategic P2/WMin initiatives from across the DOE complex.

The benefits derived from using P2/WMin initiatives for the D&D of Building 310 include an accelerated decommissioning schedule, reduction in health risk, and the elimination of six release sites from the DOE EM-40 list. The benefits derived from implementation of P2/WMin initiatives into this project include cost savings, reduction in long-term liability, and deployment of technologies without impacting scope or schedule for the project.

THE USERS GUIDE

The Guide is a user-friendly tool with outlines and worksheets that direct integration of P2/WMin options into planning and sequencing of D&D projects. It provides project managers, project engineers, P2 coordinators, program planners, contract representatives, procurement specialists, and other personnel involved in a site's D&D activities with a valuable tool for evaluating where and how P2/WMin practices can be incorporated into their projects.

The format of the Users Guide allows it to be used in two different ways. First, it takes a project team through a sequential process that details the P2/WMin approach and how P2/WMin is evaluated and implemented during characterization, project planning, decision analysis, and final disposition. This format provides all project-team personnel a logical flow of P2/WMin options that includes checks and balances to determine where P2/WMin initiatives can potentially be implemented and how to incorporate them into the project. Second, the Users Guide provides guidance for distinct areas of a D&D project, serving as a tool that can be used by project personnel for a specific task. The types of information needed by project personnel to implement specific activities that incorporate P2/WMin options will be consistent from project to project; however, the approach taken will be project specific.

The organizational structure of the Users Guide draws upon the expertise of project personnel who have been routinely involved in D&D projects. Their understanding of the opportunities to minimize the amount of waste resulting from D&D activities has been captured in the Users Guide and has been translated into a series of evaluations that are driven by worksheets. It incorporates lessons learned into a strategic approach for all D&D projects, supporting these evaluations by providing case-specific references that point the user to specific examples of how other projects have incorporated P2/WMin considerations.

The Guide contains only eight sections and an appendix. Each section is sequentially arranged within the Guide to provide a logical

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process flow for evaluating a project and corresponding P2/Wmin opportunities. The detailed information to support P2/WMin evaluations is contained in the appendix and provides the user with case studies, specific objectives, and examples of P2/WMin initiatives. Worksheets assist project personnel in evaluating their D&D project and P2/WMin opportunities.

FACILITY BACKGROUND

The Building 310 service floor retention tank facility was originally installed over 30 years ago. The facility consists of three rooms containing three tanks each and a larger room containing one tank, for a total of ten tanks. Each tank has a 3300 gallon capacity and weighs approximately 6700 pounds. The dimension of each tank is roughly 13' in length by 7 1/2' in diameter. The primary purpose of the tanks was to act as excess storage capacity for the Building 306 tanks, but they were infrequently used for this purpose. The major isotopes of concern are Cs-137, Sr-90, Am-241, and Pu-239. The "Characterization Report of the Building 310 Retention Tanks" also found notable quantities of U-238, U-234, and U-235. The tanks were reportedly isolated about 15 years ago when it was decided that the excess capacity was no longer required. The tanks have remained dormant since then.

Access to the tanks is by a metal grate walkway about one meter above the floor in each room. An access tunnel and a pipe tunnel connect the tanks to the Building 306 service floor "tank farm." The pipe tunnel runs under the paved area south of Building 310 to a space under the Building 306 north dock. This tunnel was sealed at the Building 306 end; in Building 310 the access is blocked by a steel grate.

SCOPE OF D&D WORK TO BE PERFORMED

The Building 310 project involves the D&D of tanks, piping tunnels, and walls. The scope of work focuses on three categories of waste materials that include non-structural steel, concrete, and soils. The non-structural steel consists of piping and tanks. The concrete walls and flooring and the adjacent soils are included in the concrete and soil categories, respectively.

The pipe tunnel contains contaminated stainless steel piping, non-stainless steel piping, associated hangers, drains, concrete, and adjacent soil. Once everything is removed and the area surveyed for residual contamination, this area will be back-filled with gravel and paved over with blacktop.

The ten retention tanks are contaminated on both the inside and the outside. Four of the ten tanks have water and sludge inside that will be cleaned out by ANL-E Waste Management Operations personnel prior to the start of other activities. Once these four tanks are emptied, all ten tanks will be decontaminated on the outside. Piping will be disconnected from the tanks and all pipe penetrations leading to or from the tanks will be sealed with blind flanges or other means as required. After the tanks have been disconnected from their floor supports, they will be ready for removal from Building 310.

An excavation contractor will be mobilized at this time and a trench will be dug along the entire length of the south wall of Building 310. The south wall has access to the retention tanks by way of four separate "knock-down" walls which will be replaced at the end of the project. Prior to removal of the knock-down walls, all contamination will be removed from the walls and areas of work where disturbance of the structure may result in spread of contamination. Although the air in Building 310 will be continuously monitored for radioactivity with continuous air monitors (CAMs), the intent during this project is to eliminate any airborne radiation and thereby eliminating the associated cost of secondary containment. After the knock-down walls have been removed, the tanks will be removed from the building by either the ANL personnel or the excavation contractor.

Once removed, the tanks (which are currently thought to be glass-lined on the inside) will be loaded onto trucks. A recycling vendor will either decontaminate them as "clean" scrap or smelt them in order to reuse the material as shield blocks for other nuclear facilities. In accordance with the requirements of 49 CFR DOT transportation regulations, the tanks, which contain radioisotopes, will be shipped as strong, tight containers, thereby eliminating the need for additional shipping containers. The radioisotope inventories have been quantified by Argonne National Laboratory health physicists as part of a characterization performed in 1996.

After removal of the tanks, the tank supports, miscellaneous piping, HVAC ductwork, catwalks, etc. will be removed. The method of disposal will be based on economics, as determined by the Users Guide. The south wall of the Building 310 service wall will then be replaced and the area adjacent to the wall will be back-filled. The paved area outside will be restored. At this point, the Building 310 service floor will have a Health Physics final survey performed, and this portion of the building will be free released for unrestricted use.

IMPLEMENTATION OF THE USERS GUIDE AND PROJECTED COST SAVINGS

The Building 310 Retention Tanks Project was initially planned using a strategy which involved cutting up the tanks into pieces within a contamination control envelope. The tank segments could then be easily handled by personnel, decontaminated and packed into boxes for shipment to Hanford for disposal. When the "P2/WMin Users Guide for Decommissioning Projects" became available, a different strategy was applied after evaluating the need for size reduction of the tanks, the purchase of waste disposal boxes, the purchase of void filler, and the costs associated with disposal at Hanford. It was determined that the south wall of Building 310 could be penetrated and the tanks removed as single units. The tanks could then be shipped as strong, tight containers in accordance with DOT regulations, and the metal could be recycled by a recycling vendor.

Economic analysis of this project has shown that by implementing P2/WMin initiatives, the project cost could potentially be reduced from $2,988,300 to $1,930,100 by the use of a recycling contractor, as opposed to size reducing, packaging, and shipping to Hanford, Washington. This projected cost savings of over $1,000,000 (35% of the original cost estimate of the Building 310 D&D Project) for DOE was derived by evaluating P2/WMin options for a D&D project.

A primary benefit of using a P2/WMin approach is that the project duration can potentially be shortened by five months from its original baseline. A shortened project duration is economically attractive because it saves project management and engineering costs for five months. Other labor areas where significant savings could

potentially be realized are:

- Project management/engineering costs
- Health physics coverage
- Surveillance and maintenance needs.

In addition, savings could be potentially realized by:

- Eliminating the need for size reduction of tanks
- Eliminating the need for piece-by-piece transfer from building
- Eliminating the need for building a contamination control envelope for tank cutting
- Reducing the extent of decontamination necessary
- Eliminating the need to purchase boxes, liners, and void filler for disposal
- Eliminating the disposal costs at burial site.

It should be noted that there may be specific labor areas where additional cost may be realized by using P2/WMin initiatives. These areas include:

- Cost associated with excavation of parking area to access tanks
- Cost of wall removal and replacement
- Cost of refilling excavation and repairing of driveway
- Cost of a recycler to dispose of or recycle 10 tanks.

SUMMARY

Using the approach detailed in the Users Guide to evaluate P2/WMin options during a D&D project will demonstrate a product/methodology the entire DOE complex could implement in other various and challenging projects nationwide. The Building 310 Retention Tank Project was chosen because ANL's D&D personnel have expertise in this area, the project is fairly simple and compact as compared to other DOE projects and the overall project cost is minimal. This project will verify in one year or less the effectiveness of the waste minimization strategies being tested.

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