Excavation of the sand filter sump at the Riverbank Army Ammunition Plant, Calif. The facility was opened in 1942 and initially served as an aluminum reduction plant to support World War II aircraft manufacturing. PHOTOS COURTESY AHTNA ENGINEERING SERVICES

A Hazard No More

The closing of the *Resource Conservation and Recovery Act* Part B permit for the Riverbank Army Ammunition Plant was achieved within five years of approval of the closure plan—with no deviations from the schedule, and with no comments from the regulators.

By Karina Quintans, M.SAME

Closing a hazardous waste management unit permit in accordance with *Resource Conservation and Recovery Act* Part B is no small feat, let alone when the work is for a 74-year old U.S. Army facility where various types of operations were stopped and restarted several times in response to wartime needs. Yet at the Riverbank Army Ammunition Plant near Modesto, Calif., that is just what happened.

Ahtna Environmental Inc. under the guidance and leadership of the U.S. Army Corps of Engineers identified a viable path forward and worked to successfully close the permit in 2016, within five years of approval of the closure plan.

Riverbank was established in 1942 and operated until 1944 as an aluminum reduction plant to support aircraft manufacturing. In 1951, it was reopened to manufacture steel cartridge cases for the Korean War. It was the largest producer of steel cartridge cases until 1958. The facility was again reactivated in 1966 to manufacture mortar shells and projectiles for the Vietnam War, at which time employment peaked at nearly 2,000 people. After Vietnam, the facility continued to manufacture casings until operations were ceased in 2010.

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During Riverbank's long history, many upgrades were made, which created a complex infrastructure that combined both old and new systems. The site was put on the National Priorities List in 1990.

and new systems, some functioning and others not. The site was put on the National Priorities List in 1990, and in 2005, the plant was identified for closure under the Base Realignment and Closure program.

PERMIT COMPLEXITY

Long before the R*esource Conservation and Recovery Act* was passed by Congress in 1976, the Army implemented a large-scale industrial waste treatment plant at Riverbank and ultimately had 13 hazardous waste management units permitted as part of its casing manufacturing process. These units handled various wastes, with tanks ranging in size from 500-gal to 675,000-gal. After several years of operation, Riverbank's first Part B Hazardous Waste Facility Permit was issued by the California Department of Toxic Substances Commission (DTSC) in 1985.

Obtaining a *Resource Conservation and Recovery Act* Part B Permit is complex and lengthy. The application describes how the facility's design and operations will be protective of public health and the environment; how emergencies and spills will be handled; how potential environmental contamination will be cleaned up and financed; and what the closure and cleanup procedures will be when the facility is no longer operating. The permit application must be deemed complete before it will be reviewed for approval. In California, DTSC's permit completeness checklist alone is 177 pages long. Approval can take years, and the fees associated with the permits are in the tens of thousands, especially for a large facility like Riverbank.

OVERCOMING CHALLENGES

Upon contract award for the Riverbank work, the original approved closure plan that accompanied the final Part B permit had to reflect the current status of the units to close the facility. A new closure plan would have required a full regulatory review, delaying the project at least one year. However, by demonstrating there were no new risks to evaluate, based on the fact that there was no change to the analysis or methodology required to close the facility, the regulators concurred with the existing closure plan, avoiding project delays.

Established relationships with the Environmental Protection Agency, DTSC, and the California Regional Water Quality Board, as well as in depth understanding of regulations, were instrumental in obtaining an unqualified concurrence. In addition, close coordination with the Army enabled the submission of the closure notification to DTSC before year-end, avoiding thousands in permit renewal fees.

Though the regulatory hurdles had been overcome, Riverbank had enormous quantities of hazardous and nonhazardous waste left onsite after operations ceased in 2010, requiring an extensive disposal effort before demolition and decontamination closure

work could begin. An entire laboratory that ran analytics for the hazardous waste management units, for example, had to be cleared of more than 60 types of waste. An onsite "haz pack" crew prepared and packaged hundreds of chemicals without a safety incident. From the entire plant, more than 1.2-million-lb of residual waste was disposed of safely.

Closure work began in 2012. All structures and appurtenances except concrete tanks were demolished, including a three-story steel tower used to store 75-T of lime coagulant. The remaining concrete structures were then decontaminated: five concrete tanks ranging from 7,000-gal to more than 675,000-gal, and three subsurface concrete sumps ranging in size from 14,000-gal to 80,000-gal. However, confirmation samples showed that the decontaminated concrete structures did not meet the regulatory criteria for closure. From 2015 to 2016, these were demolished to achieve closure status.

COST AND SCHEDULE

Given the facility's age and complexity, various challenges were encountered in executing the work, putting both schedule and cost at risk. While removing sludge bottoms from one of the tanks, an additional 2-ft of sludge was discovered underneath the tank liner. Work was stopped and the site crew transferred to another area to maintain operations and minimize schedule disruption. The project management team evaluated options to quickly remove the liner to access and remove the sludge underneath. Within two days, an excavator with a thumb attachment was mobilized to remove the liner through a side access port. Pump and treat operations were restarted to remove the remaining extra sludge.

Every effort was made to reduce costs where possible. Identifying opportunities to recycle and reuse saved offsite transportation and disposal costs. Specifically, 37 metal tanks were recycled in coordination with the local reuse authority. All concrete was profiled prior to demolition and deemed nonhazardous, allowing for 5,000-T of concrete to be recycled. Offsite disposal of acid and caustic soda was avoided by identifying a chemical company to retrieve the chemicals for reuse within their own facility.

In addition, 700,000-gal of heavy metals-contaminated wastewater that was left in the industrial waste treatment plant equalization basin was properly disposed of onsite by using the existing plant, avoiding offsite transportation and disposal. The onsite sludge press also was restored to treat 120,000-gal of residual sludge, reducing its volume by more than 66 percent and saving $400,000 in offsite transportation and disposal costs.

PRIORITIZING SAFETY

The Riverbank closure work involved several safety-intensive activities, including permit-required confined space entry, working at heights, hot work, hazardous chemicals, excavation/trenching, as well as the daily usage of large demolition equipment, cranes, and Level C personal protective equipment. A detailed analysis of site risks, danger zones, and overlapping work phasing was performed. A certified industrial hygienist with 30 years of experience was assigned as the site safety and health officer to oversee daily field operations.

Because the Riverbank Army Ammunition Plant is an active industrial business park, work was at times performed on weekends, at night, and on holidays to avoid disruptions to ongoing manufacturing operations.

Because Riverbank is an active industrial business park, work was at times performed on weekends, at night, and on holidays to ensure safety and avoid disruptions. Over more than 10,000 hours of complex fieldwork, the project was completed with zero health and safety incidents.

Closing Part B permits is always a struggle given the complexity of hazardous waste operations and associated regulations. By thoroughly leveraging years of onsite experience at Riverbank, Ahtna worked closely with the Army to navigate a path forward and successfully complete the project with no deviations from the approved work plan, and with no comments from the regulators—an accomplishment rarely achieved on such terms. TME

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