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ENVIRONMENTAL RESTORATION, TEAM

The Ravenna Army Ammunition Plant (RVAAP) Environmental Restoration (ER) Team, a multi-agency team consisting of the Ohio Army National Guard (OHARNG), Army National Guard (ARNG) and U.S. Army Corps of Engineers (USACE), has a critical mission to fulfill: investigate and remediate more than 80 legacy contamination sites (from former RVAAP operations) to enable military training at the facility now known as Camp Ravenna Joint Military Training Center (Camp Ravenna). Camp Ravenna is the training powerhouse for OHARNG, providing an impressive—and ever-expanding—array of training capabilities on its 21,683 acres. A former ammunition plant, the final transfer of the facility from BRAC to the USP&FO for Ohio occurred in 2013. OHARNG has had a presence on the facility since the 1960s, and since then the installation has evolved dramatically. The post's extensive road network has been repurposed to serve tracked and wheeled vehicle training. Dismounted maneuvers, convoy and ambush exercises are offered across the training site, as well as a Regional Training Institute (RTI) field site and warrior field training. Bradley and M1 tanks are operated on Camp Ravenna's laser tank range and the installation qualifies troops in transportation as well. An engineering school on post qualifies Soldiers in equipment operation with a dedicated dig site and other horizontal engineer assets. Aviation capabilities include Chinook and Blackhawk training, drop zones and aerial spray training. For OHARNG, FEMA, emergency responders, and local police and fire departments, Camp Ravenna's simulated collapsed structure provides disaster response and readiness exercises. Camp Ravenna has long been the primary training resource for OHARNG, but it is only recently that range capabilities have been significantly developed there. The installation has developed ranges for the MK-19 and M16 weapons training, hand grenades and other firing maneuvers. Redevelopment of the cantonment area in the near future stands to transform Camp Ravenna even further. The ER Team is critical to creating functional military training areas, as they complete necessary investigation and remediation prior to the construction of military venues like the MK-19 range, the future multipurpose machinegun (MPMG) range, and maneuver and military vehicle parking areas.



Over the past few years, the Team has successfully targeted a key legacy cleanup challenge, the 211-acre Winklepeck Burning Grounds (WBG). Initial investigation and remediation was initiated by BRAC, who formerly managed the cleanup program to allow for WBG to be converted to a MK-19 range; an effort that required remediation to occur concurrently during range construction so that the MK-19 range could be constructed on time with relatively minimal cost. With the advancement of military weapons and ranges and after the initial remediation and development of unfortunate restrictive land use controls (LUCs), OHARNG developed plans to utilize the WBG/MK-19 range as a MPMG range, necessitating a more comprehensive site solution. At issue was the end result of the prior remediation (restrictive LUCs and end use) and incompatibility with the proposed future MPMG range.

WBG consisted of 211 acres and was a former open burning area used for munitions disposal from the 1940s to the 1990s. Bulk explosives, propellants, sludge from the ammunition load lines, explosively-contaminated wastes (rags, paper, cardboard), waste oils and domestic wastes were destroyed on the open ground and eventually in lined trays on the site; munitions

debris and ash were left onsite after burning, along with possible residual explosives. The original BRAC cleanup action placed site restrictions on use and digging due to risks of residual chemical and munitions contamination in the soil and the potential for munitions explosive hazards. Quarterly monitoring of the 30-mile facility perimeter fence was required. The OHARNG and ER Team were responsible for monitoring and maintaining the fence, providing LUC training prior to access, implementing digging restrictions and limiting down range access to range maintenance personnel. Additionally, due to digging restrictions, maintaining targetry for the MK-19 range was difficult and future development of the site was restricted.



A munitions removal action was conducted in 2005 to begin the process of restoring WBG to its new use as a MK-19 range. Identified munitions and associated contaminated soils were removed within the proposed range target arrays and firing points to enable construction of the MK-19 range in 2006. At the conclusion of a 2005 MEC removal action, confirmation sampling indicated that additional soil contamination remained on-site. Portions of the soil at Pads 61/61A and 67 were contaminated with hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) or SVOCs at concentrations greater than levels that were considered safe for range construction worker and range maintenance personnel. In addition, transite and friable asbestos were observed at Pad 70. Approximately 180 acres at WBG were transferred from BRAC to the USP&FO for Ohio in 2006 (excluding the 180 contaminated acreage in the proposed Lane 1 of the MK-19 range) to facilitate the construction of the MK-19 range. An additional soil removal action was completed in 2009 and the final portion of WBG was transferred to the USP&FO for Ohio.

With the onset of proposed MPMG range and restrictive LUCs placed on the site after remediation, the RVAAP ER Team set out to do additional investigation and remediation to achieve a less restrictive end use (Commercial/Industrial use) to allow for the future range construction. A Data Quality Objectives Report was completed in 2011 and a RI/FS Supplement was completed in 2015. With the pending design and funding of MPMG range in sight, an Explanation of Significant Difference (ESD), Remedial Design and Explosive Safety Submissions documenting necessary additional removal action to achieve Commercial/Industrial use were completed in 2015. **A soil removal action addressing soils contaminated with explosives and poly aromatic hydrocarbons (PAHs) and achieving Commercial/Industrial use was completed in 2017. Restrictive LUCs are no longer required and the MPMG range will be designed in FY18 and constructed in FY19.**



This CERCLA cleanup site achieved Commercial/Industrial use allowing for its next mission as a MPMG range to be constructed in FY19. Completing remedial activities at this site was a joint effort and partnership between USACE, ARNG, OHARNG the Ohio EPA and supporting contractors.

The RVAAP ER Team:

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Completion of remediation at WBG is a major program milestone for the ER Team, representing the resolution of a long-standing cleanup program obstacle and the creation of two critical training resources on the installation. The final leg of the CERCLA process was completed within a very short timeline. Within 2 years, beginning in 2015 and ending in 2017, the ER Team completed a RI/FS Supplement, ESD, RD and RA. This involved submittal and approval of documents to the Ohio Environmental Protection Agency (Ohio EPA), issuance of a contract to a remediation contractor, excavation and disposal of 5,250 cubic yards of soil, identification and demolition/venting of 26 munitions determined as an explosive hazard (MDEH), site restoration and recycling of 700 pounds of scrap metal. Critical to this success was not necessarily the fieldwork or boots on the ground, but rather the negotiations and partnering the Team undertook with the Ohio EPA to complete the project within a short timeframe to facilitate the future MPMG range construction. Additionally, much of the final leg of the project (RI/FS Supplement, ESD and RD) was completed in-house by USACE.



The ER Team began the additional remediation planning process by addressing the receptors and end use to be achieved and evaluated during the risk assessment and RI/FS process. Armed with the data gap analysis and subsequent sampling by USACE, the Team began to negotiate risk assessment parameters and receptors with the Ohio EPA to allow for a more flexible reuse of the site. Most of the previously developed and utilized receptors were retired during this negotiation and the Commercial/Industrial receptor was discussed and put into play. The main reason for the negotiation of using the Commercial/Industrial receptor is the Ohio EPA was familiar with the receptor and, therefore, understood its parameters and protectiveness and it was negotiated that only one LUC would be required (non-residential use) when achieving this end use. Renegotiating these parameters took several years and essentially halted much of the cleanup activities at the former RVAAP/Camp Ravenna. Successfully making this case to the Ohio EPA was essential to proceeding with the additional cleanup action for WBG and for the future construction and use of the MPMG range. This process ultimately led to a stronger relationship between the OHARNG/ARNG/USACE and the Ohio EPA, streamlined the cleanup process and provided a clearer understanding of end use and long term management requirements. Rather than requiring meticulous record-keeping of soldier activities, mandated management of the facility perimeter fence, ultra conservative restrictions on digging, and quarterly reporting, the Commercial/Industrial end use permits the OHARNG to conduct any full-time military training activities on WBG while providing flexibility to construct and maintain the MK-19 Range and the future MPMG Range.



This up-armored excavator is loading contaminated soil into the dump truck which will transport the soil to the munitions screening area at Winklepeck Burning Grounds during the 2016 Remedial Action.

The actual final site remediation was completed on an aggressive schedule, targeting five former burn pad areas. Four of these were excavated to a depth of 2 feet, and one pad was excavated to a depth of 10 feet. In total, this encompassed excavating 5,250 cubic yards of contaminated soil, screening out munitions items, collecting waste characterization and confirmation samples and restoring the site to achieve Commercial/Industrial use. Our ER Team identified and ultimately destroyed onsite utilizing a Buried Explosion Module (BEM) 26 munitions items; also incinerated and recycled as scrap metal 700 pounds of material documented as safe. The field equipment employed was armored with blast shielding to protect field crew in the event of an inadvertent munitions discovery. Encumbered by Director's Findings and Orders with the Ohio EPA, past munitions



demolition operations counted the demolished munitions as hazardous waste. However, in utilizing the BEM and discussing the operations with the Ohio EPA, it was determined that the munitions demolition operations qualified under the Military Munitions Rule and munitions demolished would not count as hazardous waste treatment. The BEM, a newer approach for munitions demolition treatment, involves detonating munitions below the ground surface in a lined sand pit with nearly 7 feet of sand. The buried detonation limits noise and prevents shrapnel while creating a smaller fragmentation footprint. The BEM and sand can be reused and munitions fragments easily recovered.



For excavated soils that were comingled with munitions, a magnetic separation process was implemented to treat the soil, with the goal of safely and effectively screening excavated soils to verify and certify them as free of munitions prior to transport and disposal. Excavated soil was fed into a hopper that discharged into a chamber, where the soil was pulverized to pass through a 0.75-inch screen. Fine material that passed through the screen was sent to a large conveyor and stacked adjacent to the on-site borrow stockpile. Fines were screened at intervals as a form of quality assurance /quality control to ensure that no metallic material was escaping through the grating. Soils not ground finely enough to pass through the screen were then passed onto a short conveyor and under a ferrous metal separating magnet. Ferrous material was picked up by the magnet and deposited to the side of the small conveyor. The ferrous material picked up by the magnet was inspected at the end of each workday. Material that passed the ferrous magnet was stockpiled at the end of the conveyor in an oversize pile. Oversized material was resent through the screening plant to reduce the overall volume. The remainder of oversized material was screened by the UXO Technicians with magnetometers. Exceptions to the aforementioned procedures involved vegetative soil and the ash material from Pad 61/61A, which was screened manually by magnetometer by the UXO Technicians. Due to the clayey, moist nature of the soil, the impactor plant could not operate without regular downtime for removal of accumulated soil and was

replaced with a trommel plant several weeks into the removal action. Confirmation sampling was conducted following the excavation activities to confirm that cleanup goals for the Commercial/Industrial receptor were achieved.

While the vast majority of excavated soil was confirmed to be non-hazardous, the ER Team did have an unexpected discovery at one former burn pad location. Fine, ashy material was discovered and determined to be characteristically hazardous for cadmium. Ultimately, 550 tons of this material was excavated and disposed of in a specialized hazardous waste facility.

Backfilling of the excavated areas was completed early in the summer using off-site soils. Site restoration was then completed to restore disturbed areas with native vegetation in accordance with the installation Integrated Natural Resources Management Plan (INRMP).



The ER Team's work clearly benefits the OHARNG training mission by lifting restrictive LUCs and monitoring on the MK-19 Range and facilitating the future construction of the MPMG Range. The Team's efforts to reassess and delineate the site to facilitate the future MPMG range eliminated the quarterly LUC monitoring and reporting regulatory burden. The new MPMG range, in combination with the Commercial/Industrial end use, will benefit all training soldiers at Camp Ravenna in the coming decades and reaffirm the compatibility of training with environmental stewardship. Completing this final leg of remediation in less than 2 years safeguards the \$6.4 million in funding designated for this resource and allows the OHARNG training mission to continue.

The new MPMG range will be designed in FY18 and constructed in FY19, and with the remedial action complete, crews will have full autonomy to build and configure the range as designed. Range construction will require UXO construction support as munitions still remain onsite and reconfiguration of groundwater monitoring wells as groundwater still continues to be sampled and monitored. The process of completing this remediation has improved the ER Team's partnership with Ohio EPA and shows that when working together, great things can be accomplished to achieve site restoration and the military mission.



When considering the lessons learned from this project, the ER Team identified the following key takeaways for States facing similar challenges and projects:

- Evaluate all alternatives, including achieving more comprehensive cleanups such as Commercial/Industrial Use and Unrestricted/Residential Use. The military mission and training/range designs are dynamic and forever changing. Evaluation of end uses during the cleanup process needs to be comprehensive and not pigeonhole operations into strict uses with restrictive LUCs. Also remember to use risk scenarios and receptors that the



The MK-19 Range was constructed in 2006 after a munitions removal action was completed at the site in 2005. Three of four lanes of the range (approximately 180 acres) were transferred to OHARNG for development of the range, but the northernmost lane was not transferred or developed due to remaining contamination, which was later remediated in 2009. Redevelopment of this site to support an MPMG range with full reconfiguration capability is essential to the OHARNG mission.

regulatory agency is familiar with. This will help ensure that all agencies understand the end use and are comfortable with the protectiveness of the completed cleanup.

- Communicate with regulators throughout the process and inform them of mission-critical, fast-paced projects—they are often willing to put in the extra effort. Contact them when issues are encountered or when interpretation of a regulation is unclear. For this project, renegotiating the receptors and risk assessment parameters to achieve a more comprehensive use (Commercial Industrial use) was critical. It facilitated a flexible use, as residential use was cost prohibitive, thus allowing the Team to lift restrictive LUCs and construct the range. Additionally, it eliminated the generation of hazardous waste during munitions demolition operations by just asking the question about the Military Munitions Rule, reexamining the Findings and Orders and utilizing a munitions demolition method that was better for the environment.



Members of the public toured the MK-19 Range in 2007 as part of the annual Restoration Advisory Board tour of cleanup sites at the former Ravenna Army Ammunition Plant (RVAAP). Public members were able to stand at the firing points, view down range in the range tower and ask OHARNG military and civilian staff questions about training, range and restoration program activities.

Under CERCLA regulations, the ER Team hosted a public meeting when the proposal of alternatives for WBG was presented in 2005 and again in 2015 when a public notification was printed in local newspapers announcing the plans for additional remedial actions. The installation also has an active Restoration Advisory Board that engages community members and local officials in quarterly meetings to discuss ongoing cleanup projects and restoration program topics of interest. Additionally, the RAB was able to visit the project site during a scheduled facility tour. The community response to cleanup at the former RVAAP/Camp Ravenna has been extremely positive, with area residents pleased to see the installation reused to support such a worthwhile mission, training our nation's military.

