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US Army Corps of Engineers ®
Buffalo District

Remedial Action of Adjacent Properties
FUSRAP Linde Site Remediation, Tonawanda, NY

U.S. Army Corps of Engineers, Buffalo District
Shaw Environmental & Infrastructure, Inc.
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Several properties located adjacent to the Linde Formerly Utilized Sites Remedial Action Program (FUSRAP) site in Tonawanda, New York were radiologically contaminated during Manhattan Engineer District (MED) era activities. These properties include an active railroad line, a dining and entertainment complex, and an operating trucking transportation facility including associated offices and warehouse buildings. Contamination in these areas may have originated during the delivery of uranium ores via the rail line adjacent to the Linde site along with use of contaminated material as industrial backfill. These properties exhibited a combination of unique characteristics not previously encountered at the Linde Site. The unique characteristics included:

- Significant building debris throughout the area,
- Various metallic constituents and Cesium-137 (Cs-137) commingled in the soil, and,
- Thorium-230 (Th-230) being the dominant radioactive MED contaminant.

This unique combination of characteristics required USACE and its remedial subcontractor to reevaluate and modify many standard protocols for characterization, remediation, and execution of the Final Status Survey (FSS) process.

Characterization

Based on previous data collection activities, it was determined that the radiological contamination was contained predominantly in a black colored lens located at various depths below the ground surface. The purpose of the characterization was to confirm the presence and determine the extent of this radiologically contaminated "lens".

A modification of the existing Class 2 sampling protocol was developed to account for the irregular land surface, mixed hard-fill, and building demolition debris within the property area.

Fig. 1 - Heterogeneous hard fill material

The modified protocol employed a combination of sampling techniques including test pits, split-spoon sampling, and hollow-stem auguring methods as alternatives to exclusive use of split-spoon sampling.

Due to the presence of the commingled contaminants the analytical results provided by on-site high purity germanium detector gamma spectroscopy were determined to be inconclusive due to self-shielding of emitted radiation and matrix interference of the metallic constituents with contaminants of concern. In addition, the presence of Cs-137 required that previously developed investigation levels for overland gamma surveys be revised.

To ensure optimal accuracy and detection limits, all characterization samples were sent off-site to a USACE-validated laboratory for alpha spectroscopy analysis. The results from the alpha spectroscopy analysis confirmed that the previously developed investigation levels required revision, Th-230 was the dominant contaminant and the contamination was concentrated in a two to thirty inch thick black colored lens located at various depths below the ground surface.

Remedial Action

Based on the information acquired during previous remedial action and characterization events, a method was developed to segregate the soils that exceeded subsurface Record of Decision (ROD) criteria (black lens material) from soils that did not exceed surface ROD criteria (overburden). This allowed for the segregated overburden soils to be utilized as post-excavation backfill while ensuring that this material met the New York State Department of Environmental Conservation (NYSDEC) beneficial use standard (6 NYCRR 360-1.15[b][8]). The method was developed through the combined efforts of USACE-Buffalo District, NYSDEC, and the remedial action contractor.

Fig. 2 - Dark lens of material in the excavation

By evaluating gamma count rates relative to background in the area of the dark lens, field scanning data could contribute to identifying area requiring remediation. Elevated count rates and the visual observations of the black lens provided sufficient evidence to support the presence of MED material in excess of subsurface ROD criteria. This effort resulted in time and cost savings because the excavation of the area could proceed as guided by the Health Physics Technician, while confirmatory alpha spectrometry analytical results were being processed. To support documentation of this effort, daily photographs of the dark lens material were taken. Additionally, GPS coordinates of its location, thickness, count rate, and the count rate of overlying material were also recorded. This methodology proved to be extremely successful during the remediation of this area.

Final Status Survey

Due to the interferences caused by the unique combination of contaminants in the area, final status survey sampling in conjunction with gamma walkover scans of the unit could not verify that the entire unit met subsurface ROD criteria.

To overcome this challenge and verify that the unit met ROD criteria, bias samples were taken on the perimeter benches of the excavation and analyzed by alpha spectroscopy. If these analytical results revealed radiological contamination in excess of subsurface ROD criteria then the impacted perimeter benches were excavated. The floor of the excavation consisted of natural red clay which was encountered at a depth that was below the elevation for this property as it existed in the 1940's. This information, along with the final status survey sampling results, was presented in the final status survey technical data packages for this area.

The final status survey Technical Data Package (TDP) documenting the successful remediation of the area to meet the requirements of the ROD was reviewed and approved by the USACE. The property was backfilled with USACE approved backfill material in accordance with the Linde Site Restoration Plan and was restored to pre-remediation grade and function.

Conclusions

The unique combination of radioactive and overburden characteristics associated with the adjacent properties presented characterization, remediation and final status survey challenges not previously encountered at the Linde Site. These challenges were met by developing and implementing innovative solutions through the combined efforts and cooperation of the USACE-Buffalo District, NYSDEC, and the remedial action contractor.

The implementation of the USACE-approved approach for reuse of overburden material as backfill resulted in approximately 6500 tons of overburden material being utilized as post remediation backfill. This approach not only reduced the amount of material requiring off-site transportation and disposal but also reduced that amount of backfill required to restore the excavation. As a result, a savings of approximately $1.3 million in transportation, disposal and backfill costs was realized. In addition, the ability to utilize non-impacted overburden as post-remediation backfill was shown to be a viable option that would benefit the project during future remedial actions.