

Unique Construction and Social Experiences in Residential Remediation Sites – 13423

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ABSTRACT

Sevenson Environmental Services, Inc., (Sevenson) has performed several radiological remediation projects located in residential urban areas. Over the course of these projects, there has been a wide variety of experiences encountered from construction related issues to unique social situations.

Some of the construction related issues included the remediation of interior basements where contaminated material was located under the footers of the structure or was used in the mortar between cinder block or field stone foundations. Other issues included site security, maintaining furnaces or other utilities, underpinning, backfilling and restoration. In addition to the radiological hazards associated with this work there were occupational safety and industrial hygiene issues that had to be addressed to ensure the safety and health of neighboring properties and residents.

The unique social situations at these jobsites have included arson, theft/stolen property, assault/battery, prostitution, execution of arrest warrants for residents, discovery of drugs and paraphernalia, blood borne pathogens, and unexploded ordnance. Some of these situations have become a sort of comical urban legend throughout the organization. One situation had historical significance, involving the demolition of a house to save a tree older than the Declaration of Independence. All of these projects typically involve the excavation of early 20th century items such as advertisement signs, various old bottles (milk, Listerine, perfume, whisky) and other miscellaneous common trash items.

INTRODUCTION

Over the course of past two decades Sevenson Environmental Services, Inc. (Sevenson) has performed numerous ER projects in urban areas that were contaminated with TENORM. Sevenson has encountered several unique construction challenges in supporting old building foundations that were built on top of or with TENORM contaminated soil or sand. Some of these urban areas were located in run down and economically challenged areas which presented a variety of unique social situations that workers had to adjust to and work around. This included residents resentful of the intrusion into their homes and the disruption of their lives, criminal elements, and political and historical influences. During preconstruction radiological surveys, health physics and safety personnel typically found drugs and associated paraphernalia (crack vials [ready for sale and empty], burnt spoons, hypodermic needles); blood borne pathogens (human and animal waste, used hypodermic needles); signs of rodent and insect infestation; rubbish and garbage piles.

UNIQUE CONSTRUCTION CHALLENGES

Most urban ER projects that involved residential areas required both interior and exterior excavation to remediate a property. The removal of contaminated material from the basement of a

home and in some cases the installation of foundation supports presents unique challenges. Access to basements in older houses is not ideal for bulk removal of contaminated soils or the placement of backfill material. Severson utilized several methods for removing soils, installing foundation supports, and replacing soils from the basement of homes that required remediation. Some interior excavations require the use of structural support.

Interior Excavation of Contaminated Material

Severson utilized a vacuum truck to remove contaminated material from interior excavations. A vacuum truck would be parked in front of the house on the street. Steel reinforced rubber suction hose was used to transfer the contaminated material to the vacuum truck. Figure 1 shows a vacuum truck parked in front of house with basement remediation.



Fig. 1 – Vacuum Truck

Figure 2 shows two temporary support holes that were made by removing the contaminated soil with the vacuum truck and rubber suction hose. Laborers use shovels, pick axes, and pneumatic jack hammers with various bits for breaking the concrete slab and loosening soil.



Fig. 2 – Rubber Hose for Vacuum Truck

The vacuum truck provided enough suction to remove at least one cubic meter of soil an hour and can easily hold up to six cubic meters of soil. There are several occupational safety and industrial hygiene concerns that need to be address when utilizing this technology. The blower for the vacuum truck is powered by the truck's engine. The truck's engine and blower can produce as much as 105 decibels A scale dependent on the amount of vacuum required for soil removal. With noise levels that high it was imperative to perform noise monitoring for workers and members of the public. On some occasions impacted neighbors that worked at night and slept during the day were relocated to a rental house or hotel until the vacuum truck work was finished.

Supporting Building Foundations

There are two factors that determine the need for additional support; depth of excavation and the presence of contaminated material under the foundation footer. There were two types of supports operations utilized to protect building foundations from damage or movement during remediation, concrete underpinning or steel beam with timber bracing or screw jacks.

The preferred method was to underpin the existing footer with concrete. Figure 3 shows a foundation that has been underpinned to support remediation.



Fig. 3 – Foundation Underpinning

Concrete underpinning was usually completed in four foot sections on each wall that required underpinning. Laborers would excavate a trench approximately 1.2 meters from the wall to the required remediation depth but no greater than 1.2 meters. As the trench was being excavated the soil located against the foundation would be sloped at a 45 degree angle towards the inside wall of the trench. This provided sufficient support for the foundation until underpinning could be completed. Laborers would remove a 1.2 meter wide section of the soil exposing the entire bottom of the footer. Where the excavation was greater than 1.2 meters in depth, the laborers would remove the material directly under the footer to the required excavation limit. Once the material was removed a health physics technician would survey the bottom of the underpin excavation and the bottom of the footer with a sodium iodide (NaI) detector and an alpha/beta scintillation detectors. When remediation goals were achieved, the laborers would place poly sheeting around the inside of the space to keep contaminated soil from impacting the new concrete. This process

would continue until the foundation was completely supported. Once the foundation was properly supported the laborers would remove the remaining contaminated soil.

Steel beams were typically only used when the entire foundation wall had to be removed. Foundation wall removal was typically required when the mortar used was made with contaminated sand or the foundation wall was not structurally sound for underpinning. Figures 4 and 5 show a field stone wall that had to be removed to support remediation activities. This particular wall was being removed because the mortar used to build the wall contained TENORM contaminated sand.



Fig. 4 – Field Stone Wall Removal



Fig. 5 – Field Stone Wall Removal

Backfilling

Placing backfill into the basements was labor intensive. Operations manufactured various size shoots that could be placed inside basement windows. This would allow an operator to use a small excavator or skid steer unit to place backfill material onto the shoot and have a laborer push it through the window with a shovel or rake. Several laborers would use wheel barrows to move the dirt around the basement with additional laborers grading and compacting. Figure 6 shows a typical shoot being used in a basement window.



Fig. 6 Backfill Shoot

UNIQUE SOCIAL SITUATIONS

Remediation in urban areas sometimes means you are not performing work on a light industrial or commercial facility that has a designated protected site perimeter. Project sites were set up right in the middle of residential neighborhoods on available lots or dead end streets. Figure 7 shows an overview of one of the neighborhoods office and support trailers were located. Most of the houses in Figure 7 had some type of TENORM remediation performed on the property. Two particular projects were in extremely poor, rundown neighborhoods where the residents were not the property owners. This type of environment presented never before experienced situations for most of the workforce.



Fig. 7 – Office and Support Trailer Location

Hoarding

It was not uncommon to find the condition of the properties in horrendous states of mess or clutter. Figure 8 shows an example of some of the cases. Figure 8 was taken in the basement of a hoarder. It was also not uncommon to remove as much as a 30 cubic meter dumpster full of garbage and debris from a home or property. In some cases the resident wanted all of their belongings put into storage and returned upon the completion of work.



Fig. 8 Basement of Hoarder

The hoarding seen in Figure 8 also presented a biological hazard concern. Site personnel have

discovered medical sharps, animal dropping, animal carcasses, mold, insects, and wild animals. As well as illegal drugs and drug paraphernalia, and in rare cases; unexploded ordnance.

Criminal Activity

While working on the first floor of a house removing a contaminated fire place, two plain clothed law enforcement officers busted into the work area with their guns drawn in an attempt to serve an arrest warrant for a former tenet only to find workers in Tyvek and respirators. It seems, the magic orange fence and posted HAZARDOUS WASTE AUTHORIZED ENTRY ONLY, RADIOACTIVE CONTAMINATION AREA wasn't going to stop them from serving the warrant.

Every now and then workers would find prepackaged street drugs that were either hidden for future sale or tossed to keep from being discovered by law enforcement. These items were handed over to the safety officer who in turn destroyed the material or disposed of it in the trash.

Upon starting the work shift one morning after a safety meeting, several site workers saw a man sitting on one of the site's Jersey barriers totally naked. Upon discovery, the local authorities were notified. Seems the gentleman sitting on the barrier had just been robbed of everything he had, including his clothes.

At another project, a laborer was performing traffic control when a motorist became aggravated. When the motorist was waved through by the laborer he threw a glass bottle at the laborer striking him on the side of his hard hat. After that, traffic control was performed by a uniformed law enforcement officer.

Two people stole a \$79,000 Lexus and in an effort to evade the police tried to drive the car through the jobsite. The car crashed through the eight-foot security fence, and a jersey barrier before hitting a berm created from backfill material and both occupants abandoned the vehicle. One subject ran into the radiologically controlled area, jumped into an excavation and attempted to hide behind a piece of black poly sheeting used as a demarcation barrier. Upon being apprehended a health physics technician performed a contamination survey on the individual while in handcuffs before being placed into a patrol car.

Unexploded Ordnance

On another occasion, workers were relocating belongings from a back yard garage that was to be demolished when a hand grenade fell out of a broken box. Workers immediately evacuated the area and notified the local authorities. The grenade was not a high explosive piece of ordnance; however, it was a practice round with a live fuse installed. During one excavation a live bomb fuse was discovered buried in the dirt by a laborer who served in the Marine Corps. The local bomb squad removed the device for destruction.

Unique Historical Situation

At most sites, trees are removed so remediation can be performed. In this case a house was demolished to save a tree. This was not ordinary tree however. The town boasts that the tree was there before the Declaration of Independence was signed and turn the property into a community park.

CONCLUSION

The use of vacuum truck to remove contaminated material from the interior of houses increases production rates significantly as compared to removing the material a 20 liter bucket at a time. Utilizing foundation support allowed the excavation to be completed without having to develop numerous final status units. The unique social experiences can present a significant exposure to hazards not common to traditional environmental remediation. Some workers have made the comment that working with radioactive material is easy compared to dealing with the things they see and find working in or around the neighborhood.