EFCOG Best Practice #100

05/13/2011

Best Practice Title: Open Air Demolition of Asbestos Gunite by Using Track Mounted Wet Cutting Saw

Facility: Lawrence Livermore National Laboratory (LLNL) B328 Demolition

Contact: Rob Vellinger 925-200-3181 RVellinger@TerranearPMC.com

Brief Description of Best Practice:

"LLNL's B328 building is a metal structure with a corrugated metal exterior façade. The walls of the structure consist of a corrugated metal exterior surface, a one & one-half inches (1.5'') of Gunite, and four inch (4'') thick fire bricks subsurface. In addition, there are 6" x 6"x 1/2" tube steel columns and beams for structural support. In order to size reduce the structure and prevent exposure of personnel to asbestos material, a track mounted wet cutting saw with a diamond blade was used.

The use of a track mounted wet cutting saw reduced the need for respirators and additional PPE during this D&D operation (except for the saw operator) and eliminated Health & Safety (H&S) concerns encountered during typical asbestos removal operations. By using this method, the D&D workers were kept at a safe distance during the size reduction operations since the cutting saw was mounted on tracks on the outside wall of the structure. The saw had a thirty-six inch (36'') blade and was operated remotely. The saw has an integral cooling system that prolongs blade life, reduced sparks, and minimized dust. A supplemental shroud was constructed out of PVC and fire retardant plastic to capture any over spray and direct the runoff into a catch basin located around the perimeter of the building. Captured water was filtered and transferred into a holding tank for sampling and disposal."

Summary:

Before dismantlement, sampling of firebrick on a burn-building at LLNL led to the discovery of 8% friable asbestos sandwiched material. The outer skin of the structure was made of metal and corrugated metal that dissipated heat. After considering 3 different methods for dismantlement, it was determined that the best option was to cut the building into sections using a diamond blade track mounted wet saw.

This process consisted of multiple cuts using the wet saw. First, the roof was cut off and lifted off the building using a crane. Once the roof was at ground level it was cut into smaller sections. When the wet saw became too cumbersome a hydraulic wet chainsaw was used for the final cut.

Before the removal of wall sections, the building was structurally supported by welding steel members measuring 6" x 5/8" by 8 to 10 feet onto the building. The welded steel supports restricted the building from flexing and/or crumbling thus preventing the asbestos from dispersing in the air. Rather than scabbling the walls of the building which would break-up asbestos making it disbursable into the air, the asbestos was kept sandwiched between the walls. The wet saw cutting, effectively contained the asbestos between the gunite and metal layer. Other sections, including metal, on the building that did not contain asbestos were torch-cut.

Once the wall sections were removed from the building they were placed on a sheet of plastic on the ground. Then the wall sections were cut into smaller sections measuring no more than 8' for transportation via roadway to landfill. The sections were then separated and double wrapped in plastic.

Although the minimum requirements were already met by having the sections double-wrapped in plastic, they were also placed in Polytech bags to insure that asbestos was fully contained while transporting the sections to the landfill.

EFCOG Best Practice #100

05/13/2011

Why the best practice was used:

The wet saw was used as it was the best method to control, contain, and prevent the asbestos from becoming airborne and contaminating surrounding areas and personnel. What problems/issues were associated with the best practice: (Briefly describe the problems/issues experienced with the initial deployment of the best practice that, if avoided, would make the deployment of this best practice easier the" next time".)

1. Originally the plan was to cut the walls into two sections. However the long horizontal cuts were difficult to execute as the building structure would flex and the saw would bind under the weight of the wall. The solution was to cut the wall in sections after it was moved to the ground thereby minimizing the number of horizontal cuts on the building.
2. Rigging was necessary to remove the wall sections from the building. This entailed special equipment including riggers and a crane. Not only did this process contribute to higher cost but also delayed the cutting process. It is paramount that the riggers and the cutting team collaborate together so that once wall sections are cut they can be removed in a timely manner. Other site priorities had a tendency to divert resources from this process and resulted in slowing down the execution.
3. A wet saw was used as the cutting tool in this operation and due to the characteristics of this tool, overspray was present. The track mounted wet saw, similar to a concrete saw, possessed a diamond tip blade and had been tested on a concrete structure prior to starting this project. The wet saw used in this project had never been tested on this particular sandwich type wall construction before. The wall consisted of metal, gunite and fire brick. Cutting metal was a crucial factor because it caused the wet saw to bind, created sparks and slowed down the process.
4. Due to the hazards, proper PPE was used i.e. full rain gear, hearing protection, gloves, hard hat, respirator, and personal air monitor. Asbestos particulates mix with the water, although there was no asbestos found in the water after sampling because the water was pumped through a cuno filter system. A custom manufactured PVC frame fitted with a fire retardant blanket material helped to prevent overspray. The spray hit the material then dropped into plastic covered hay bale burms setup to capture water. The plastic and hay were easy to fabricate and easy to move. The residual sediment left over was kept wet to prevent contaminants from being dispersed in the air.
5. Water was then pumped from the burms through cuno filters and stored in retention tanks. The cuno filters successfully captured particulates and regulators approved the disposal of water into the sewage drain after reviewing sample results.
6. Although the cumbersome PPE was stressful on the body while performing work on the lift, it was better to make cuts from the outside of the building rather than performing work inside the building and having broken firebricks dislodge and injure workers.
7. The building’s metal exterior walls were painted with lead based paint. The lead paint was removed using a paint remover. Because lead is hazardous a respirator was worn while performing the work and added time and cost to the demolition process. It was necessary to remove the paint because the bar stock needed to be welded on the exterior of the building to prevent flexing while being lifted with the crane.
8. When using a track mounted saw there is a track that is mounted to the building. The length of track available was 3’, 8’ and 10’. There were not enough support brackets for continuous track setup.

9. Unfortunately the brackets weren't commercially available due to the age of the saw. The saw was purchased 15 years ago and the company has since gone out of business. This limited our ability to move the saw around from cut to cut without losing setup time.

How the success of the Best Practice was measured:

Two factors contributed to measurement of this project's success:

1) Time required to complete demolition safely. While this was initially planned as a six week activity, difficulties with the saw and other processes contributed to extending the timeline.
2) Safety of workers was a key consideration throughout the project and these practices resulted in a safe work process, minimizing worker exposure to potential hazards.

What are the benefits of the best practice:

The use of the track mounted wet saw allowed the walls to be cut and removed while keeping the asbestos contained between the gunite and metal layer of the building. This method prevented asbestos contamination to surrounding areas and personnel.

The use of hay bales covered with a plastic sheet to capture water was very effective and a good way to capture overspray water. Once filtered the water could be disposed of through the sanitary sewer system.

Alternative solutions considered:

1. Alternative Method 1 was to go inside the building and set-up air hogs then scabble (or chip-out) the firebrick in order to get to and remove the asbestos layer. Once done the metal skin would be demolished as a regular building. However obtaining the Brokk unit was problematic. The Brokk unit was too expensive to purchase and would have to be rented. Obtaining the equipment proved challenging, given the proposed project schedule, and also would require a specialized operator.

   Safety concerns: Although the Brokk unit is remotely operated the bricks on the structure measured 4'x4' and 4" thick weighing approximately 700lbs. If these bricks fell on a person or equipment it would cause extensive damage or personal injury. Another safety concern was that asbestos exposure levels would have required an airline respirator for workers to work safely.

2. Alternative Method 2 was to tent the entire building. This process would require that all equipment be moved inside. There would be an operator inside with a negative environment and the building would be demolished in a sort of bubble created by the tent.

   Building the tent structure would have required a structural engineer to design and approve. How to pull a negative environment and be sure that the tent structure would not implode on itself was questioned. It was also to be noted that the building was in a confined area with other buildings in close vicinity, making it difficult to construct an over-sized structure. Another conflict was the waste that this process would produce as equipment such as the enclosure structure, and excavator would need to be cleaned or it may be deemed as asbestos waste.

Due to the elevated costs and health concerns affiliated with these alternatives it was concluded that the best method was to use a diamond blade track mounted wet saw for cutting the building into pieces and then disposing of the building in sections. This was the safest alternative to both workers and the environment.

EFCOG Best Practice #100

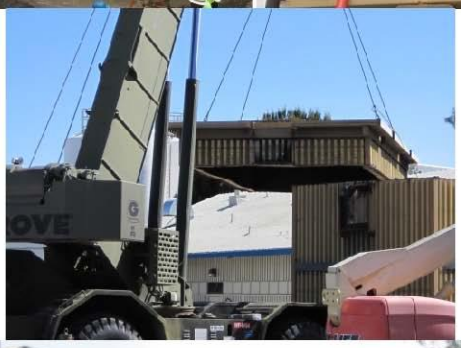
05/13/2011

Additional Information

Technology Links:

Vendor Links:

Videos Pictures:



Comments: