Liquid Waste Cell Decommissioning at the West Valley Demonstration Project – 16454

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ABSTRACT

CH2M HILL BWXT West Valley, LLC (CHBWV) began decontamination and deactivation activities in the Liquid Waste Cell in the Main Plant Process Building (MPPB) at the West Valley Demonstration Project (WVDP) in 2013. The work is being done under CHBWV's Phase 1 Facility Disposition Contract with the U.S. Department of Energy, and is a prerequisite for demolition of the 3,716 square meter (40,000 square foot) MPPB, which is planned to begin in 2018.

At the start of deactivation activities, the Liquid Waste Cell contained nine large contaminated vessels and approximately 1,220 meters (4,000 linear feet) of piping. Due to high levels of contamination and high radiation dose rates, frequent or prolonged manned entries into the cell were undesirable. CHBWV's strategy for preparing the cell for building demolition was based on conducting dose reduction and contamination stabilization activities using remotely deployed long-reach tools where possible, supported by manned entries where situations warrant or conditions were favorable. This paper discusses the conditions, challenges, decontamination approach, specialized tooling and expected end result of the Liquid Waste Cell deactivation project.

INTRODUCTION

In 2013, the CHBWV began decontamination and deactivation activities in the Liquid Waste Cell of the MPPB at the WVDP in Western New York State. Between now and 2020, CHBWV will complete deactivation and demolition of the MPPB structure, which was formerly used as a commercial nuclear fuel reprocessing facility. The structure is being prepared for open-air demolition, based on a similar "proof-of-concept" radioactive building demolition project completed by CHBWV at the West Valley site in 2013 [1].

At the start of its deactivation, the Liquid Waste Cell was one of a few remaining untouched hot cells in the 55-room, five-story structure. The heavily reinforced concrete cell walls were poured in place to surround in-cell vessels and piping, resulting in a cell that has only limited access and no point of egress for tank removal. At the start of the cell deactivation, high contamination and high radiation levels in some areas precluded prolonged manned entries.

CHBWV's extensive planning for cell deactivation and decontamination involved characterization studies to identify "hot spots" and cross-discipline subject-matter expert involvement to plan for efficient dose reduction and material removal. Employing As Low As Reasonably Achievable (ALARA) principles while reducing radiological dose, work planning centered around reducing or removing in-cell hazards while minimizing worker dose and preventing the spread of contamination. The overall objective of the Liquid Waste Cell decontamination is to reduce, remove, and stabilize contamination to permit vessel removal as low-level waste (LLW) during MPPB structure demolition.

LIQUID WASTE CELL DESCRIPTION

The Liquid Waste Cell is an L-shaped room constructed of reinforced concrete, much of which was placed after the tanks were set in place. The north-south leg of the cell measures approximately 14 meters (46 feet) long by 5 meters (17 feet) wide and the east-west leg is 6 meters (19 feet) long by 5 meters (16 feet) wide. The overall cell height is 6 meters (19.5) feet, with the floor resting 2.5 meters (8 feet) below grade in the five-story MPPB structure. The cell is centered between the facility's other main

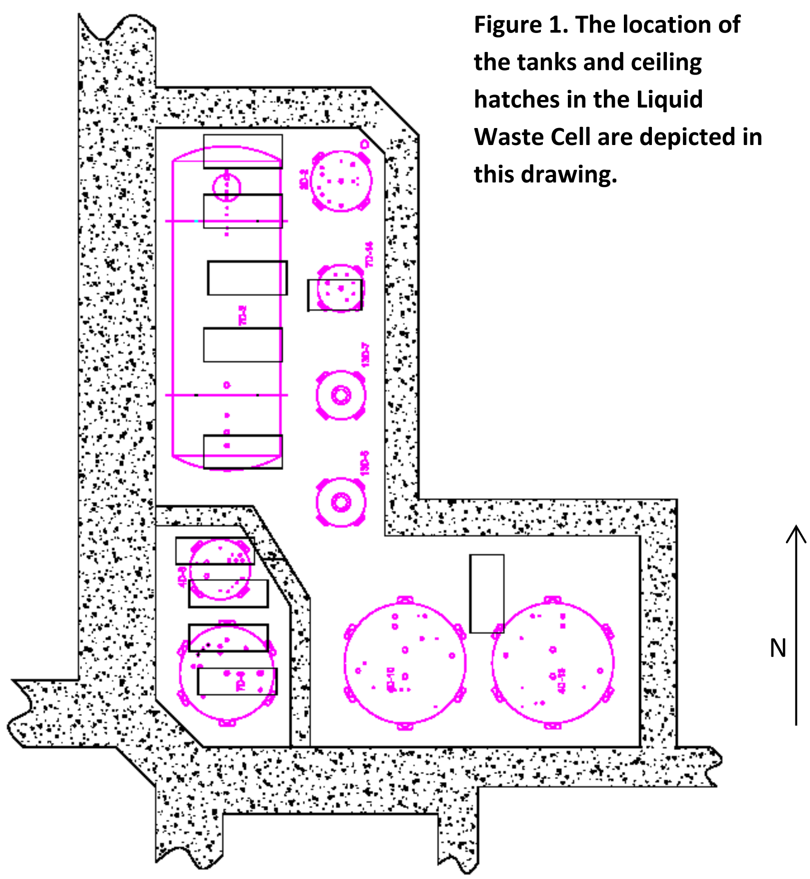

Figure 1. The location of the tanks and ceiling hatches in the Liquid Waste Cell are depicted in this drawing.

processing cells, which limits opportunities for providing secondary access to the cell. Liquid Waste Cell wall thicknesses range from 0.7 meters (2.25 feet) to 1.8 meters (5.75 feet) and some of the concrete is high density material. The floor and bottom most 0.5 meters (18 inches) of the walls are lined with 304L stainless steel.

The main part of the cell contains seven tanks of varying size. The southwest corner of the cell contains two additional tanks and is isolated from the rest of the cell by a floor-to-ceiling high density concrete criticality wall. Access to the main area of the cell is through a single man-sized door in the southeast wall, equipped with a ship's ladder that extends to the cell floor. A small 0.7 meter (2.25 feet) by 1.3 meter (4.25 feet) hatch provides limited access to the area behind the criticality wall.

There were nine vessels and approximately 1,220 meters (4,000 linear feet) of process and utility piping (mostly up to 10 cm (4-inches) in diameter) in the Liquid Waste Cell at the start of deactivation. The vessels range in size from 1 meter (3.5 feet) to 2.7 meters (9 feet) diameter to 2.4 meters (8 feet) to 7.6 (25 feet) tall/long.

The Liquid Waste Cell was a central collection area for liquid radioactive wastes generated during spent nuclear fuel reprocessing operations at the West Valley site. The facility reprocessed fuel from 1966 to 1972 and handled 640 metric tons of irradiated nuclear fuel. During the subsequent DOE-led cleanup of the site, the Liquid Waste Cell accepted liquid waste generated in other areas of the MPPB.

Liquids collected in the cell included laboratory effluent, dilute nitric acid, aqueous waste from extraction cells, and decontamination solutions from other areas of the MPPB. Pre-deactivation liquid waste inventory in the cell was expected to be minimal, consisting of tank heels in the previously drained vessels.

PRE-START DECONTAMINATION ACTIVITIES

A complete inventory of cell features existed at the start of Liquid Waste Cell deactivation planning. Detailed as-built drawings depicted vessel, piping and structural component locations and process records supported radionuclide inventory compilation for both the fuel reprocessing and cleanup eras of the facility. Cell conditions were known to be adverse from a radiation level and high contamination perspective, based on dose rate measurements performed in 2004 and on scoping entries performed in 2010. Confirmatory radiological surveys in the Liquid Waste Cell were performed in 2012 to establish starting conditions and develop the basis for planning the cell's deactivation.

To obtain detailed survey data, manned entries using Modified Level A suits (supplied air bubble-suits) were conducted. The general area, tank and piping, and floor conditions were all surveyed and locations of radiological significance were identified. In-cell contamination levels were recorded as high as 4 million disintegrations per minute (dpm) for Alpha and 67 million dpm for Beta/Gamma. General area dose rates were found to range from 5 mR/hr in the low dose region of the cell up to 150 mR/hr in the higher dose region. The side walls of the tanks were also surveyed and found to range from 100mR/hr up to 1R/hr, while the bottom of the tanks ranged from 500 mR/hr up to 2.5 R/hr. Although radiological information was not obtained for the area located behind the criticality wall during this entry, historical data was available from a previous dose survey conducted through a hole cored through the ceiling of the Liquid Waste Cell from the operating aisle above. The existing data indicated general area dose rates in this area were between 500 mR/hr to 1R/hr. Based on this characterization information and historical knowledge of the cell's use and expected condition, the preferred method to prepare the cell for demolition was remote or semi-remote decontamination and dose reduction activities. Prolonged manned entries were restricted by the cell's conditions, however, limited short-duration entries could take place in instances where work could not be performed remotely.

WORK PLANNING CONSIDERATIONS

The challenging in-cell conditions, lack of access and desired end-state were deterrents to prolonged entries in the cell and were major considerations in planning the Liquid Waste Cell deactivation and decontamination. As stated previously, the main area of the cell is accessible through a man door, but entry to the corner of the cell behind the criticality wall is limited to the use of ceiling hatches and a small access hatch.

The tanks and some process piping were determined to be major dose contributors, therefore, removal was initially considered as an option for all of them. While piping removal was determined to be practical using remote methods for gaining access and waste retrieval, tank removal was determined to be impractical due to their location in the center of the bottom of the MPPB. In-cell size reduction was also considered but rejected due to the complexity of conducting size reduction in a limited access area where high levels of both internal and external contamination was known to exist. The most practical planning approach was therefore determined to be widespread dose reduction using pipe cutting and retrieval and dose reduction of the tanks through content removal, flushing and contamination lockdown techniques.

Initial activities were planned to be conducted remotely using long-reach tools deployed from overhead, supported by limited manned entries where required. When significant improvements in radiological conditions were achieved, manned entries could be permitted to complete the deactivation and decontamination.

Figure 2. This in-cell photo taken before decontamination began depicts the configuration of piping and vessels in the Liquid Waste Cell.

While manned cell access already existed at the floor level, overhead access would also need to be established to reach piping above the tanks, including piping more than 4.6 meters (15 feet) above the cell floor. Cell access could be reasonably achieved using a combination of core borings and hatch cutting, however, significant evaluation and planning were necessary to avoid embedded structural components and prevent floor overloading while removing ceiling hatches that weighed up to five tons each.

Visual access was improved with the installation of in-cell cameras for monitoring and inspection purposes. Existing negative ventilation through the existing Main Plant Ventilation System was in place at the start of Liquid Waste Cell deactivation, but supplemental ventilation supply was added using two Portable Ventilation Units (PVUs) to augment the airflow into the cell through hatches and bored openings. A containment structure was erected in the access aisle above the Liquid Waste Cell to provide additional protection against the spread of contamination and to maintain adequate air flow.

Liquids from the tanks and piping had been previously drained, however, residual tank heels and small amounts of liquids in the piping were anticipated. Early characterization data indicated the tanks would be classified as Transuranic (TRU) waste, which would require additional processing and packaging after removal. Internal decontamination techniques were written into the work plan to reduce contamination inside the tank to levels that would result in a LLW classification, thereby allowing them to remain in place for removal during demolition and allowing for their immediate packaging and disposal upon removal, with no additional processing required. In addition to simplifying tank removal operations, this approach would result in significant cost-savings for waste disposal. To facilitate tank decontamination, tank modifications were required for the removal and capture of tank liquids. Those modifications included provisions to capture trapped tank heels that would escape through newly drilled drain ports and collection of liquids encountered during pipe removal. The collected liquids were directed to a floor sump and pumped into the last tank to be deactivated in the Liquid Waste Cell. The contents of Tank 7D-2 would subsequently be retrieved and treated for waste disposal. The tanks would be disconnected from the piping and tank nozzles plugged or capped and tank internals stabilized to secure internal contamination. Contamination on external tank surfaces would also be fixed to meet open-air demolition criteria. The prepared tanks would be considered sealed units for demolition.

Through characterization and work planning, a number of unique challenges were identified and solved. Each of those challenges would be resolved using conventional, modified conventional, remote, or semi-remote methods and tooling, to perform deactivation in an efficient manner that ensured the safety of workers and the environment.

IN-DEPTH WORK PLANNING

Given the defined objectives of reducing in-cell hazards while minimizing worker radiation exposures, the focus of the Liquid Waste Cell deactivation project shifted to devising options that could significantly reduce worker exposure. Consistent with this strategy was Raschig ring removal from two tanks to reduce radiological dose in that area of the cell. This was accomplished from outside the cell, working through existing hatches that correspond to flanges in the tops of the tanks. Access was obtained to other areas of the cell using a combination of core bore holes, existing hatches, and newly established hatches, using long-handled, semi-remote tooling and equipment. The following sections provide descriptions of how these operations were accomplished.

Figure 3. Mockup testing of HEPA filtered vacuum system for Raschig ring removal.

Tanks 13D-7 and 13D-8 Raschig Ring Removal and Decontamination

Two tanks in the Liquid Waste Cell contained Raschig rings with associated heel dose rates in the range of 1 to 2 R/hr. The tanks have flanged tops with existing hatch plugs built into the ceiling to access the tank tops. Long-handled tooling was designed to remove the tank flanges to access the inside of the tanks. Long-handled tooling was also designed to remove a perforated Raschig ring sample tube from each tank. The sample tubes were a design feature of the tanks that enabled semi-remote retrieval of a string of rings for periodic sampling. A custom vacuum system was designed and built with an integral High-Efficiency Particulate Air (HEPA) filtration system, collection silo, and 55-gallon drum waste loading station.

Due to the configuration of the cell and the tanks, the system had to be capable of "lifting" the rings approximately 9 meters (30 feet) from the bottom of the tanks into the collection silo, which was staged in the aisle above the cell.

The vacuum system was specifically designed for this application, based on the expected conditions inside the two tanks. Significant "carry over" from the collection silo to the HEPA filters was experienced early on in the operation, due in part to a larger volume of small particulate comingled with the Raschig rings than was expected. This necessitated more frequent filter changes than originally planned.

Adjustments were also made in the equipment shutdown procedure to incorporate gradual vacuum shutdown to mitigate a positive pressure condition that resulted when the system was abruptly turned off. By powering the vacuum down in a gradual sequence, negative pressure was maintained throughout the operation and the potential for contamination migration outside the filter bag out port was successfully mitigated.

The vacuum system proved to be a valuable piece of equipment for Raschig ring removal. It successfully vacuumed all the rings out of both tanks and was subsequently placed into on-site storage for possible re-use elsewhere.

Follow-on tank decontamination was conducted, using two specially-designed high-pressure, hot water spray lances that could be deployed from the aisle above the tanks. The first lance utilized an off-the-shelf spray head that rotates two axis to give 360 degree tank spraying coverage. This spray lance was deployable in short sections to accommodate aisle headroom space constraints. A guide system to keep the lance constrained in position was also designed to ensure proper spray coverage. A second spray lance was also custom designed with two articulating air-operated joints. This design allowed for the positioning of spray nozzles in closer proximity to the tank walls, allowed more control over surface coverage, and has the ability to wash at higher pressures. Like the rotating lance, this articulating lance also had to be deployed in short sections and also utilized the same guide system.

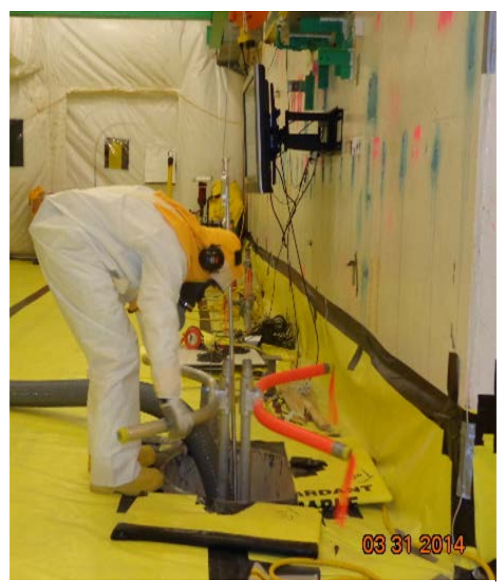

Figure 4. Vacuum system deployment in the Liquid Waste Cell.

Prior to conducting decontamination, a system was designed to collect the liquids generated during the process. To accomplish this, a cell entry was made to re-direct the tank drain lines to the cell sump. At the sump, a diaphragm pump was installed that could be operated remotely from above. A camera was also installed to enable monitoring of the sump level from above. The discharge from the pump was routed to the 7D-2 tank, the largest tank in the cell and the last tank planned for decontamination. All liquids generated during decontamination were collected in Tank 7D-2. Liquids were transferred into the 7D-2 tank through a newly drilled hole in the tank top. For ALARA purposes, hole drilling was accomplished from the aisle above using a core bore drilled through the ceiling above the tank. A custom designed drilling guide tube was installed in the core bore, and a long custom designed drill shaft assembly was used to drill through the tank top. After the water collection system was installed, both spray lances were deployed in the two tanks (13D-7 and 13D-8), and both tanks were successfully decontaminated to radiation levels of approximately 20 mR/hour. A number of samples were collected for radiological analysis, including Raschig rings and piping that transferred the fluids from the tank during their operational period. Once decontamination was performed, additional samples were collected from the walls of both tanks. The analysis confirmed that the tanks would be classified as LLW upon removal.

Decontamination of Tanks 4D-10 and 4D-13

Tanks 4D-10 and 4D-13 did not contain Raschig rings, however due to high internal dose rates, flushing of the tank internals was expected to be required to reduce the associated dose rates. There were no existing hatches above Tanks 4D-10 and 4D-13, so core bore holes were drilled above the tanks in the ceiling to gain access to the tank tops. Holes were drilled into each of the tank tops in same fashion as the 7D-2 tank described above. These two tanks also do not have bottom drain lines, so bottom drain holes had to be drilled in them. To accomplish this, a custom right-angled pneumatic magnetic drill with an integral catch pan was designed. The design also included pneumatic cylinders that were used to secure the drill assembly in position under the tanks. The drill spindle could be operated using a long-handled tool that enabled personnel to operate it from a lower dose location.

Figure 5. A concrete hatch block is transported on the lifting frame.

A manned entry into the cell was required to perform this drilling operation. A catch pan was designed to capture liquids exiting the bottom of the tank during decontamination. The liquids were routed to the sump for subsequent pumping to Tank 7D-2. Tank 4D-10 was then decontaminated utilizing the same equipment used in Tanks 13D-7 and 13D-8. As a result of the decontamination processes, doses were reduced from 2.5 R/hour in the tank heel to approximately 200mR/hour while dose rates elsewhere in the tank were significantly less. Similar to Tanks 13D-7 and 13D-8, piping samples were collected and analyzed for radiological constituents. Based on the level of decontamination achieved and using the new analytical data on radiological contaminants, the tank was re-classified as LLW. After the top holes were drilled in Tank 4D-13, an internal dose survey of this tank determined that decontamination of this tank was unnecessary. As a result of the successful decontamination of Tank 4D-10, dose rates were reduced to levels that permit manned entries to perform piping removal in this area of the Liquid Waste Cell.

Figure 6. Workers install a ceiling hatch cover on a hatch opening.

Installation of Ceiling Hatches

Removal of the piping in the cell area behind the criticality wall posed one of the largest challenges for the Liquid Waste Cell project. This area exhibits some of the highest dose rates in the cell, and has only very limited access from within the cell. Most of the piping in this cell area is near the ceiling in the overhead area above tanks 7D-8 and 4D-8, residing 4.5 meters to 5.5 meters (15 to 18 feet) above the floor. These issues led to the decision to create ceiling hatch openings which could be used for pipe cutting and debris removal, while taking advantage of the 1 meter (3 feet) of concrete ceiling for shielding.

Figure 7. This is a downward view into the cell looking through a newly installed hatch.

A structural evaluation of the ceiling slab was conducted, and led to a conceptual design of cutting four hatches in this area, each being approximately .6 meters (2 feet) wide by 1.8 meters (6 feet) long. As part of the structural evaluation, options for similarly sized hatches above the 2.5 meters (8 feet) diameter, 6.7 meters (22 feet long horizontally mounted 7D-2 tank were also considered. The piping above Tank 7D-2 is in a lower dose area, however significant accessibility issues would have required the use of specially-constructed scaffold and resulted in significant worker stay times for hands-on removal, thus resulting in substantial personnel radiation exposure.

Five hatches were installed over the area of Tank 7D-2 to allow piping removal through the ceiling above the tank. Based on a structural analysis of the cell, sufficient structural integrity would be maintained with the addition of several posts to provide additional support under the main supporting beam members that were embedded in the concrete structure of the ceiling. Installation of the posts was performed from above for ALARA purposes. To accommodate the installation of the heavy posts, 30 cm (12-inch) core bores through the ceiling slab were drilled adjacent to each post location. A custom-designed post was fabricated in three sections, enabling it to be assembled during the installation process while eliminating headroom issues. The core bore holes provided sufficient clearance to allow the assembled posts to be laterally shifted into position. A brief manned entry was required to plumb the posts and to operate the jacks located at the base of the posts to take up the required load on the posts. The hatch installation sequence required a significant investment in design to accomplish the following sequential tasks:

After considering a number of hatch cutting techniques, a specialized concrete cutting service was selected to cut the hatches. A wire cutting gear was custom-designed for the Liquid Waste Cell cut layout. The gear could plunge cut downward through the top of the block, enabling the collection and recycling of a large percentage of the water used during the cutting operation.

A method for securing the concrete blocks during the cutting and extraction was also developed. It consisted of designing and installing custom lifting lugs anchored to each block. The lugs were designed to support the blocks from the floor during the cutting process and were also used as lifting lugs during the block extraction process.

Challenges were associated with lifting and handling the blocks, including severely constrained headroom issues in the aisle and floor capacity issues in some areas of the aisle along the block removal flow path. Those challenges were overcome by the design and deployment of a low headroom lifting frame that could be reconfigured into three different arrangements to accommodate the configuration of the block being removed. The frame was used to lift the blocks out of the floor and move them laterally to a position where the block could be placed on a custom designed floor cart. Some of the heaviest blocks weighed 4.5 metric tons (5 US tons) each, necessitating a horizontal cut at the center of the block to reduce weight and accommodate floor capacity limits. Blocks were wrapped inside the containment tent and removed through the adjoining access aisle. They were packaged in waste containers inside the building and subsequently removed as waste.

As each block was removed, the corresponding hatch opening was fitted with a custom-designed hatch frame assembly and a 2.5 cm (1-inch) thick steel shield cover. The shield covers permit easy access to the cell for pipe cutting and pipe removal activities, while providing adequate shielding when the hatches are inactive.

Pipe cutting and pipe removal

Once the concept for the hatches was developed, attention was directed toward defining the types of tools required to cut and remove the pipe. Since the Liquid Waste Cell served as a central liquid collection area in the Main Process Building and received liquid waste streams from various locations, characterizing the waste generated during pipe cutting activities posed a significant challenge. The option of cutting pipe and allowing it to fall into a common pile was avoided because it would create difficult waste characterization challenges, so plans were made to extract the pipe from the hatches as each section was cut. Pipe cutting and extraction tooling included off-the-shelf varieties and custom-designed. The following is a listing of the tools and methods used:

Off-the-shelf hydraulic shear cutters were used to make cuts on pipes varying in size from 3 cm (1/8-inch) up to and including 5 cm (2 inch) schedule 40. The shears were deployed either manually using a lightweight chain, or suspended from a portable reversible boom crane that was purchased for the job. While shear cuts could be made on pipes that were located directly under a hatch or in close proximity to the edge of a hatch, removal of piping that was not located directly beneath a hatch required removal using an alternate method.

A custom designed “tool deployer” assembly was fabricated for the removal of offset piping. The deployer is designed to be easily moved from one hatch opening to another using a floor crane. It consists of a lower cart assembly that translates manually in a track along the length of the hatch opening. Mounted on top of the cart is a turntable bearing that adds rotational capability to the assembly. Mounted to the top of the bearing is a trolley assembly with its own integral track. The trolley’s function is to provide a second translating motion to the tool mast that can be used in any orientation relative to the cart motion.

The tool mast is a long multi-section square tube that travels in two sets of rollers that are centrally located in the trolley. The tool mast can be raised and lowered in the trolley utilizing the reversible boom crane. Cutting tools, such as abrasive wheel cut-off saws and reciprocating saws, can be mounted directly to the bottom of the mast. Alternatively, various tool adapter arms were designed to be installed into a receiver located on the bottom of the tool mast. This feature allows for extended reach tool configurations to enable pipe cuts up to 1.5 meters (5 feet) away from the edge of a hatch opening. It also allows tools to be mounted in virtually any conceivable orientation. The cutting operations are performed manually by pushing the cart or trolley, rotating the trolley bearing, or raising or lowering the mast. In addition to making pipe cuts outside of the perimeter of the hatches, the tool deployer is also used to make cuts on larger diameter offset pipes up to 15 cm (6 inches), which exceed the hydraulic shear's capability.

Figure 8. The tool deployer offered full rotational capability for tools to reach piping that was offset from the hatch opening.

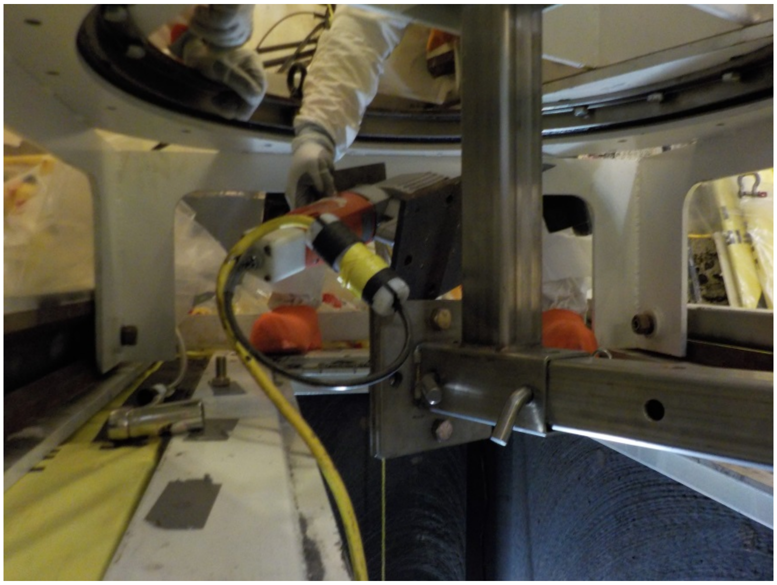

Figure 9. A portable saw is deployed in the Liquid Waste Cell using the tool deployer.

To remove the cut pipe, gripper assemblies are locked onto the pipe sections prior to making the final cuts. Two custom-designed pneumatic grippers were fabricated to extract the larger and heavier pipe sections. Hand-held, off-the-shelf long handled grippers were often used for extracting the smaller lines.

Contamination control was largely maintained by having two portable ventilation units drawing on the cell, which created a large ventilation draw downward through the hatch openings. All pipe was bagged or sleeved directly above the hatch openings as it was extracted. The aisles directly above the Liquid Waste Cell where all the operations take place have been enclosed within a large containment tent structure.

Nine hatches were installed in locations directly above the higher dose regions of the cell and the most difficult locations to access pipe from within the cell. More than 50 percent of the entire amount of pipe in the cell was removed through hatch removal methods. Following completion of the pipe removal through the hatches and the decontamination of the remainder of the tanks, most of the remaining work scope could be completed using conventional manned entry techniques.

Tanks 7D-8 and 4D-8 Decontamination

Tanks 7D-8 and 4D-8 are positioned behind the criticality wall. Prior to decontamination of these tanks, a significant amount of pipe above the tanks was removed to create access to the tank tops for drilling. Planning for decontamination of these tanks included the cutting of access holes into the tank tops, followed by decontamination consistent with the methods used for the previous tanks. Because of the unique features of these tanks, the following exceptions applied:

Rather than accessing the tanks through a core bore, these tanks have existing hatches above them. Therefore, all the tank top drilling gear and decontamination gear was adapted for use on the hatch frames.

Because of the high dose rates behind the criticality wall, a method of drilling the bottom holes in the tanks from above the cell was designed using a longer, smaller diameter drilling guide deployed into the tops of the tanks through the newly created top holes. This assembly allowed the bottom holes to be drilled from the inside of the tanks.

High dose rates added to the complexity of pipe removal from this area of the cell. The dose rate on one section of pipe removed was measured at 235 R/hour.

Tanks 3D-2 and 7D-14 Decontamination

Tanks 3D-2 and 7D-14 were drilled and decontaminated in same fashion as Tanks

7D-8 and 4D-8. While the initial plan was to drill the bottom drain holes in these tanks by making an entry into the cell, the technique where drilling was done internally was considered a process improvement that was incorporated into the work plan.

Tank 7D-2

Tank 7D-2 will be the final tank decontaminated in the Liquid Waste Cell. Since all liquids generated during decontamination of the cell were pumped to Tank 7D-2, it is expected that up to 26,500 liters (7,000 gallons) of contaminated liquid will be present in the tank at the start of its decontamination. The plan is to sample and treat the liquid using Aquasorb® or a similar stabilization agent.

CONCLUSION

Decontamination of the Liquid Waste Cell presented a number of unique and challenging impediments that were overcome through the design and installation of specialized equipment and processes. Alternative process methods were successful at limiting worker exposure rates while achieving the desired end state – significant contamination reduction that supported leaving the tanks in place for removal during Main Plant Process Building demolition.

Characterization activities were conducted at the point waste was generated. That process not only enabled up-front waste segregation that supported touch-waste-once principles, it also helped ensure a clear pathway for disposal for the debris that was generated.

The use of remote tooling techniques avoided undesirable worker exposure rates while achieving the desirable outcome. Through the processes and equipment deployed for the Liquid Waste Cell project, total worker dose is estimated to be approximately 7 Rem. If conventional methods of decontamination had been used, the total dose could have been as high as 26 Rem.

REFERENCES

1. Catherine Bohan, et al; Structured Planning and Preparation Leads to Safe Open-Air Demolition of Contaminated Facility; WM2014 Conference, March 2-6, 2014, Phoenix, AZ