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ALARA Center of Technology Promotes Good Radiological Work Practices at Hanford

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ALARA Center of Technology Promotes Good Radiological Work Practices at Hanford

L. O. Waggoner (Fluor Daniel Hanford, Inc., P.O. Box 1000, Richland, WA 99352)

Introduction

The Hanford Nuclear Reservation occupies 560 square miles in the southeastern part of the state of Washington. The Columbia River bisects the reservation and was used to provide cooling water to reactor plants constructed along its banks during the 1940's and 50's. Before the end of the Cold War, most of the radiological facilities on-site were involved in the production of nuclear weapons material or other processes related to that effort. At this time, all reactor plants have been shut down and the DOE and its contractors are in the process of getting the last facilities in a safe condition for decontamination and decommissioning.

ALARA Center of Technology Opens on June 26, 1996

At the present, one of the main problems at Hanford is a legacy of contaminated areas in and around all these facilities. In addition, reactor fuel must be recovered from aged spent fuel basins, radioactive waste in underground tanks must be processed and plutonium must be placed in a safe condition.

The skills that were necessary to operate these facilities were different than the skills needed today to clean up Hanford. Workers were not accustomed to using the engineered controls described in this paper to reduce dose, limit the spread of contamination, or minimize the amount of radioactive waste generated.

As cleanup work began, glove bags and portable HEPA filtered ventilation systems were gradually introduced by personnel who had experience in commercial reactor plants, operating military nuclear plants, and in Navy Nuclear Shipyards.

In order to speed up the process of implementing the latest engineered controls for radiological work, advanced radiological training courses were developed and procedures written to provide direction to workers on how to work with the new engineered controls. Changing the way radiological work was accomplished was starting, but acceptance by the workers was a slow process.

The central Radiological Control Organization, originally under the previous Management and Operations contractor (Westinghouse Hanford Company) decided that a significant improvement in ALARA implementation would result if examples of engineered controls used for radiological work were assembled in one location to provide a "showcase" for workers and managers. The facility would be named the ALARA Center of Technology (ACT) and would include the latest technologies used to accomplish radiological work, as well as proven techniques, tools, and equipment.

A location for the Center was selected in the 200 East Area of Hanford in a central location to be easily accessible to all facilities and contractors. Since there was little money available for this project, a decision was made to contact several vendors and request loans of their tools, equipment, and materials. In return, the center would help market products on site and assist with

product demonstrations when the vendors visited Hanford. Out of 28 vendors originally contacted, 16 responded with offers to loan products. This included a containment tent, several glove bags, HEPA filtered vacuum cleaners, portable ventilation systems, fixatives, temporary shielding, pumps, and several special tools. Vendors who could not provide products sent videos and brochures.

Westinghouse Hanford Company began using the ACT in June 1996. Fluor Daniel Hanford, Inc., the present Management and Integrating Contractor for the Hanford Site, held the formal opening ceremony of the ALARA Center of Technology on October 1, 1996. The Center now has about 1200 ft^2 of floor space filled with tools, equipment and material used to perform radiological work.

ALARA Center of Technology Materials and Equipment

HEPA filtered vacuum cleaners - The latest HEPA filtered vacuum cleaner models available at the Center can be emptied without affecting the HEPA filter seal. This eliminates the need for aerosol testing the vacuum cleaner each time it has been emptied. Various kinds of commercial and home-made chip collectors are available to demonstrate collection of radioactive debris directly into a waste drum using the vacuum cleaner for suction. Several different models of vacuum cleaners have been obtained for workers and managers to inspect and use on a trial basis. If a facility decides to purchase the vacuum cleaner from the Center, the Center's vacuum is taken to the facility and a replacement is ordered for the Center.

HEPA filtered portable ventilation - Different HEPA filtered portable ventilation systems are available. During tours and training, these units are disassembled to demonstrate how they work. Containment hoods attached to the portable ventilation system are used to capture airborne radioactivity while sorting materials in waste drums.

Containment tent - Various containment tents are used as part of containment training classes and provide a location for the facilities to perform mockup training. One tent donated by a vendor has had considerable use in training workers.

More permanent containments are also available. The Center has a "Permacon" metal enclosure that is made up of 4' X 8' panels that can be quickly assembled. A special tape is applied on the seams to make the enclosure air-tight. Many different panels are available so the containment can be customized to meet the specific job requirements.

Inexpensive containment tents that are made from two layers of plastic are used on jobs which are short in duration. This reduces costs and expedites the procurement process.

Fixatives - Different types of fixatives are painted on pieces of metal and concrete blocks to demonstrate the techniques. Workers can touch and peel the fixative coatings off samples. Sample bottles of each fixative are available if a facility wants to test the products. These have been provided at no charge from the vendor. Use of these products has significantly increased.

Aerosol generation is used at Hanford to apply a coating over high levels of contamination to fix the contamination while work is performed. This technology was brought to Hanford when a local company called the ALARA Center to set up a demonstration at a private home. The demonstration showed that chemicals could be turned into an aerosol fog and slowly coat the inside of an enclosure (pup tent). A demonstration was set up on site and attended by about thirty personnel. Later, a Tank Farms Radiological Engineer arranged to have the vendor "fog" an outdoor underground valve transfer pit at no charge to see if the process would really work on high levels of contamination. The contamination was covered with a sugar-like coating and the work was able to be accomplished without any spread of contamination.

Shrouded Tools - These tools have shrouds that have a connection for a HEPA vacuum cleaner around working areas. Shrouded tools have been used in several areas to remove coatings and decontaminate concrete with a net result that work is completed with lower risk while wearing less protective clothing. The tools at the center have been borrowed by the facilities and tested on non-contaminated surfaces. This allows the facility to determine which tool works best for the particular job.

Closed-Circuit TV Systems - With the reduction in security at Hanford, security camera systems were being excessed because they were no longer required. The ALARA Center obtained several of these systems and has given them to facilities that needed to set up closed circuit TV systems in High Radiation Areas, Confined Spaces, or Hazardous Areas. While these cameras are old, they work reasonably well. The only cost to the facility is the cabling between the camera and the TV

monitor. Once several systems were installed, the value in using a camera system became more evident and new color cameras were purchased with better tilt and pan features.

Special Tools - There are many special tools that are used to reduce dose and limit contamination spread. Some of these tools are purchased commercially and others are fabricated by workers. Some examples of these tools are:

- Tweezers/tongs modified so a metal plate shields the person's hands and reduces extremity dose from beta radiation.

- Remote tools used to pick up highly radioactive sources while the operator uses distance to reduce dose.

- Special couplings that provide a quick way to install a valve in a section of piping that has no valve for draining the piping. Other devices are made that allow drilling into a pipe to drain the water from the line using a drain hose connected to the drill fixture.

- Expandable foam used for insulation is squirted into holes drilled into piping to plug the pipe. These holes are drilled at predetermined locations that correspond with the locations where the pipe is to be cut. The foam expands and plugs the piping. Workers can then cut the piping with significantly reduced risk of spreading contamination.

- Special scaffolding is used in facilities to reduce dose and cut labor costs. This scaffolding can be assembled quickly without tools which reduces time and dose.

- A Randolph pump connected to a plastic bottle can be used to safely transfer radioactive and toxic liquids without contaminating the pump. Rollers spin on the outside of tubing which causes the liquid to move in one direction.

Conclusion

These are just a few of the special tools, equipment, and materials that are at the ALARA Center for use and training of workers at Hanford. During the last 18 months we have seen a significant increase in number of engineered controls used on site as a result of the contacts made with the ALARA Center. The aerosol fogging of underground valve pits has eliminated the spread of contamination in the downwind direction that has required several days to clean up in the past. The number of glove bags used for radiological work has increased and the use of respirators has dropped by 40%. Other indications of the benefits of increased use of engineered controls at Hanford include a 28% reduction in skin and personal effects contamination, 20% reduction in cumulative whole body dose, 40% reduction in cumulative extremity dose and a 29% reduction in inhalation events. There have been several examples of significant reductions in dose by applying the ALARA principles promoted at the ALARA Center. Many of the planners and engineers visit or call the ALARA Center when they have a high risk or new job to obtain advice on new tools or techniques. Often times ALARA Center personnel will go to the facility and attend planning meetings or walk down jobs. This aggressive approach to implementing

workers that using good ALARA practices can save time, limit contamination spread and reduce their dose. The ALARA Center of Technology has become a valuable resource at Hanford, and will continue to help promote ALARA in the workplace.

To contact the ALARA Center of Technology, call (509) 376-0818, (509) 372-2881 or FAX (509) 376-7717