From: Waggoner, Larry O
Sent: Thursday, August 11, 2005 1:54 PM
Subject: ALARA Center Activities for Week of August 8, 2005

Attachments: PFP-LL-05-039 (BREATHING AIR BOTTLE CARTS).doc; DSCF0037.JPG

Visit our NEW Website at www.hanford.gov/alara/index.cfm

1. Sponsored training class for 35 workers at the ALARA Center. Tri-Tool taught a free hands-on class to familiarize Hanford workers on how Split-frame or Clam-shell cutting tools are used. See article at the end of this message and attached photo. The lessons learned from the training are proper set up of the cutting bits and timing the machine are critical elements to success. In addition, personnel who have used these tools before discovered they had been operating them at too fast a speed. Running them too fast creates heat which prematurely dulls the cutting bits. The instructor also demonstrated chipless tools that were designed for cutting thin wall tubing. A chipless tool is similar to a can opener. Tri-Tool is designing bigger models that will cut up to 4" Schedule 40 piping and these tools will be a significant improvement over the tools used now in gloveboxes to size reduce materials.

2. Received an Insta-Barrier from G/O Corp for display. The stanchion has a retractable reel of yellow/magenta barrier tape that makes it possible to quickly set up a radiological barrier. We had already received a "swing gate" with a magnetic base that mounts to a metal door frame. These products can be seen at http://www.gocorp.com/ under "Barrier Products". Took these products to the Radcon Directors staff meeting so all Radcon Managers could see them.

3. Gave two 40 CFM HEPA filters to BHI to use for venting resin catch tanks at ERDF during grouting. Gave them two sleeves to mount the filters to 55 gallon collection drums connected to the tank vents. The filters had been donated to the ALARA Center when work on Building 233-S was completed. We still have 18 filters left. Faxed BHI article on "Radioactive Contamination Incidents involving Protective Clothing". They are concerned about wicking through Beryllium contamination on to their modesty clothing.

4. Received a HEPA filter bag-in/bag-out housing for display from Flanders's Filters. Received call from Los Alamos concerning their need to purchase a 1600 CFM portable HEPA vent unit quickly. They had been looking at purchasing units that are the same as BHI uses for D&D work. See http://www.mintietechnologies.com/Products/negativeAirEquipment.cfm Referred them to H. Doolittle, who is a Field engineer from BHI who could provide first-hand knowledge on how these units perform. PFP personnel used the glovebox mockups to train new personnel on glove changes.

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VENDER INFO

Mark Ramos from Nilfisk Vacuum Cleaners will be at the ALARA Center on August 24 from 9:00 to 2:30.

FOR YOUR INFORMATION

DOE issued its Weekly Lessons Learned and this weeks included a report on "Vigilance in New or Infrequent High-Hazard Operations. See

http://www.eh.doe.gov/DOEll/login.asp?mAdmin=web2240 The report describes several incidents where workers were injured or killed. The causal factors in these events had similar inadequacies in work performed.
PROCEDURES: Steps were omitted; used an incorrect or unapproved procedure; and allowed worker's process knowledge to override procedural compliance.
HAZARDS ANALYSIS: Not recognizing the potential for multiple failure modes; failing to comply with existing safety requirements; and ineffective emergency management planning.
OPERATIONAL OVERSIGHT: less than adequate command and control during an unfamiliar operation and during upset conditions: and insufficient communication of process activities.
RECOMMENDATIONS: Below are recommendations for conducting infrequent or first-time applications when performing potentially high-hazard work:

- Perform a hazards evaluation and operational assessment that are commensurate with the activity's complexity and associated safety risks.
- Conduct a detailed briefing with all parties involved in the project evolution. Discuss expected responses and necessary actions if problems occur.
- Always follow the procedures.
- Ensure that procedures used are current and incorporate system or equipment modifications and ensure that operators are trained on any changes.
- Conduct a tabletop review or walkthrough of procedures for first-time or infrequent evolutions.
- Ensure safety systems, instrumentation, and alarms are functional.
- Practice, from start to finish, all activities involved in the project evolution.
- Ensure that all personnel, including supervisors, have the required levels of experience and that training or certifications are current.
- Ensure that the command and control authority is clearly understood by all parties and is present during the evolution.

Questions regarding this Safety Bulletin should be directed to R. Sigler at (301) 903-4658 or email Rolland.Sigler@eh.doe.gov

LESSONS LEARNED

1. PFP issued a Lesson Learned on a problem they discovered with the fittings on breathing air bottle carts. See attachment.

2. The following article was found in the November/December 2004 edition of RadWaste Solutions magazine. Read the complete article and see the colored pictures by visiting the Washington State University Library in Richland. Copies of magazines are located along the West wall. Give the librarian your car keys and she/he will give you your Company's credit card for the copy machine.

Tapping into Lessons Learned at West Valley. Workers at the West Valley Site recently completed high-risk work to decontaminate and remove equipment from an Extraction Cell (XC-2). Dimensions of the cell were 21' high by 20' wide by 57' tall. It contained 9,000' of piping and 35 vessels weighing from as little as 4 pounds to as much as 6,700 pounds. Workers had to traverse four levels of the cell using installed ladders to conduct decontamination operations. Loose alpha contamination levels in the cell exceeded 10 million dpm/100cm2. Radiation levels ranged from 30 mrem/h on the cell floor to 300 mrem/h near major vessels.

During the planning phase, historical records were evaluated to confirm the location and configuration of equipment, piping, and support structures. Plans were made to safely package and remove waste using an access door and ceiling hatch. In addition, they developed a detailed three-dimensional (3-D) model of the cell that was used as a virtual reference tool for planning and conducting removal operations. This 3-D model was an essential tool for examining the cell and developing strategies to accomplish the work. Four pan-and-tilt cameras were installed to improve coordination and viewing of the cell internals.

A ground-level access door was the normal access point to the cell. A containment was installed and it included a personnel airlock/entry area to enhance radiological control. A loadout area was created to streamline waste removal. A service hatch located between the cell's ceiling and the floor of room above was refurbished to facilitate movement of larger equipment and supplies out of the cell directly from the roof of the plant.

A rigid-style containment structure was installed over this hatch to provide a rigorous radiological control barrier. The structure consisted of prefabricated metal panels bolted together to form am L-shaped work area. The finished structure measured 49' long by 35' wide by 16' high. See www.nfsrps.com and look at Perma-Con. It contained multiple viewing windows, personnel air locks, an equipment airlock, and a Herculite plastic roof with a zippered access, which provided another path for removing waste and equipment. Within the containment structure, workers assembled equipment for lifting, staging, and moving large tanks and vessels that would be raised through the ceiling hatch of the cell. Existing cranes and monorail hoists in the room were refurbished to make them useable.

A stand-alone HEPA filtered ventilation system was installed so the work in the cell would not affect other work in the plant. The new system consisted of three portable ventilation units located at the third level of the cell.

Workers wore the same bubble suits they had used on previous high-alpha jobs. This consisted of an air-fed vinyl suit and hood over two inner layers of anti-C clothing, an air-fed cooling vest, and supplied-air-respirator and hood. On top of the vinyl suit, they wore coveralls. The same project manager and many of the operators and engineering staff from a recently completed similar job were assigned to this project and this made the project proceed smoothly. The same shift rotation was used with a partial crew beginning two hours prior to the main crew. This allowed three cell entries per day. Operators worked 10 hour shifts, but 12 hours of work was accomplished due to the 2 hour early start.

To increase safety, a cable-suspended work platform called the "Spider" basket was installed to move personnel through the ceiling opening to the platform located 30' below. This electric-powered work cage consists of a deck enclosed by a safety cage with an electric-powered cable winch mounted below the work deck. This OSHA Approved device works like an elevator to raise and lower workers. See http://www.spiderstaging.com/safetysolutions.html

When work started, debris was removed and then several coats of strippable latex decon paint were applied to the floor and then stripped up to lower contamination levels and reduce dose rates. The dose rates dropped to 10 mrem/h on the cell floor with hot spots to 50 mrem/h.

The piping and equipment removal stage required identification, sampling and draining of the piping. Workers used the 3-D model to inspect and confirm the location of specific sampling points. They then developed lists that were used with isometric views from the 3-D model software to complete detailed sampling instructions. The 3-D model was used to brief personnel of the layout of specific areas prior to entry.

Innovative work practices were used to lower worker dose. Removal of pipes and vessels were prioritized according to their dose rate rather than strictly by location. Worker entries to cut and remove pipe was restricted to the lower level until most of the work was complete. Once the lower level was complete, workers switched to entering the cell from the top. Seven tanks were removed through the upper opening by raising them into a sleeve. Once inside the containment, it was surveyed, decontaminated, and then raised into another sleeve by a 200 Ton crane located outside. Workers practiced size-reduction techniques for long columns in a nearby non-radioactive facility. To eliminate contamination spread and falling debris, a foam sealant was sprayed inside at the cut location. This eliminated contamination spread but debris still fell out. Workers found that by using a combination of foam and epoxy they could eliminate the falling debris. A Guillotine saw sold by E.H.Wachs Co was useful in sectioning long items. See www.wachsco.com. This saw attaches quickly and gives a straight cut, can be mounted in any position and works on both horizontal and vertical equipment.

Current plans are to remove all piping, vessels, and structural steel, decontaminate the floor, and then apply fixatives to all remaining surfaces. Questions? Call Kay Mortenson at (716) 942-4964.

USEFUL INFORMATION

The activity of any radionuclide is reduced to less than 1% after 7 half-lives

A piece of lead 12" X 12" by 1" thick weighs about 60 pounds.

You can put 7.481 gallons of liquid in one cubic foot of space.

A 55 gallon drum has a volume of about 7.35 cubic feet

The range of a Beta particle in air is about 12 feet per Million Electron Volts (MEV)

Water weighs 62.4 pounds per cubic foot.

CONCRETE: A cubic foot of regular concrete weighs about 150 pounds. High density concrete for use as nuclear shield walls can be produced by adding different materials for the aggregate. Candidate materials include barytes, haematite, iron shot, steel shot and lead shot. We found vendors that advertise high density concrete that weigh 240 and 288 pounds per square foot. Central Premix in Pasco, WA can mix high density concrete for your shielding needs.

Lightweight concrete can be made by mixing cement, pumice, sand and foam in various combinations that weigh from 19 to 100 pounds per cubic foot. Mixing foam pellets and concrete makes a good material for filling void spaces in radioactive waste containers. It fills the space but doesn't add a lot of weight.

Central Premix sells "Ecology" Blocks made from concrete left over when the cement trucks return from a job. The last price was $38.00 for a concrete block 2' by 2' by 6'. The blocks are stackable (3 high) and have a lifting lug so they can be moved with a crane or forklift. The blocks weigh about 3,200 pounds each. This is cheap temporary shielding.

DOE has a lot of information about concrete on their Office of Science and Technology Website. Go to website http://apps.em.doe.gov/OST/mainpubs.asp# and click on "Reports". The third category is on Innovative Technology Reports. Select "all reports alphabetically" and a list of about 180 reports will appear. The ones that concern concrete are:
Concrete Dust Suppression System
Concrete Grinder
Concrete Shaver
Concrete Spaller
Centrifugal Shot Blast System

Diamond Wire Cutting of Tokamak Fusion Test Reactor Vacuum Vessel
En-Vac Wall Scabbling
Liquid Nitrogen Cooled Diamond Wire Cutting
Low Density Concrete Void Filling
Remote Control Concrete Demolition System
Remotely Operated Scabbling

Radiological Control Techniques for Pipe Cutting with Clam-Shell Cutting Machine See www.tritool.com

The following techniques have been used in the nuclear industry for many years. Some of these may be new to Hanford so it's important that you discuss what you want to do with all involved organizations. Step 4 below requires a risk-based decision by Radcon on whether to permit some machining before glovebag installation. As we gain more experience using the Clam-Shell cutting machine we can look at relaxing some of the contamination control requirements and adopting these recommendations.

1. Drain/depressurize the piping in advance to reduce the amount of liquid/pressure that will be present when the pipe is severed. Try and get plant personnel to provide an estimate of how much liquid to expect when the pipe is cut.

2. If possible, connect a HEPA filtered vacuum cleaner or portable vent system to the pipe so that air flow is into the cut when the cutting bit makes severance. If a hot tap was used to drain the line, the drain hole can be used to connect the ventilation hose. If this isn't possible, then consider using a portable ventilation hose near the cutting machine to capture any airborne particulate.

3. If the work area is in a radiation area try and do as much set up of the cutting machine in a low dose area to reduce dose. Use a sample of the same size pipe to center the machine and position the cutting bits. If possible, turn the machine on and make sure it is operating properly. Then separate the machine by loosening the four bolts and transport it to the work area and reassemble it.

4. Decontaminate the outside of the pipe where the machine will rest. Decontaminate the cut area and remove all loose contamination, if possible. If the machine is going to be operated inside a glovebag, install the machine and make sure it operates before installing the glovebag, if possible. Request permission to machine part way through the pipe before installing the glovebag. This will reduce the chance the glovebag will interfere with the machine operation and speed up the job. It is important that the glovebag be installed and certified by an RCT before severance of the pipe. If the pipe is in a system

that had acid solutions flowing through the pipe, the acid could have eaten away part of the pipe wall. In this case, install the glovebag and certify it before any cutting.

5. If loose or fixed contamination is present on the outside of the pipe in the cut location, wipe the cut area with grease, Vaseline, shaving cream, etc., or apply tape. These products will reduce the chance that contamination will become airborne.

6. Install a metal or sheet plastic catch basin under the cutting machine to collect chips. Place a fire-retardant product in the catch basin if it's made from plastic to keep the hot chips from making holes through the catch basin.

7. If highly contaminated liquid is present in the pipe and it will likely run on to the cutting machine, consider applying tape or painting the machine with strippable latex decon paint to make it easier to decontaminate later. The machine is much easier to set up on the next cut or use in training if it is uncontaminated.

8. Operate the cutting machine at the optimum cutting speed to reduce the chance that any loose radioactive material will become airborne should the machine be operated at elevated speeds. Optimum cutting speeds recommended by Tri-Tool are determined as follows: Calculate the circumference of the pipe using the formula C=diameter X pi. Divide the result into 300 for carbon steel, 200 for stainless steel or 100-150 for Inconel, titanium, or Hastelloy. The result will give you the desired revolutions per minute.
For Example: Carbon Steel 4" diameter pipe has an outside diameter of about 4.5".
300 divided by (4.5" X 3.1416) = 21 RPM or **One rotation of the tool every 3 seconds. The harder the material, the slower the speed of the cutting machine.**

9. The original wall thickness of piping can be determined by looking at a chart. For example: The Tri-Tool pocket chart indicates a Schedule 40, 4" diameter pipe has a wall thickness of 0.237". Unfortunately, the pipes at Hanford have been used for many years and the inner wall may have been partially eaten away by acids. Usually, the thinnest part of the pipe is on the bottom. If you absolutely have to know the pipe wall thickness prior to cutting, contact your QA Department and request they perform non-destructive testing to determine wall thickness.

10. During the pipe cutting, watch for the presence of liquid or stop the machine occasionally and have the RCT take a smear survey to determine if the pipe wall has been penetrated. If liquid is encountered, stop cutting and collect the liquid in the catch basin in absorbent or a suitable collection facility. Decontaminate, as required. Once the flow of liquid stops, continue machining until the pipe is completely severed. Compare the amount of liquid collected with the "before cutting" estimate. If the flow of liquid continues, stop work and notify the Field Work Supervisor. The pipe may have more liquid than estimated due to a valve out of position and there may be a great of liquid in the pipe.

Work Practice: A technique can be used to keep the machine from becoming contaminated. During the cut it may be possible to remove the cutting machine just before severance. As the metal gets thin, it turns blue due to the heat. When you see the blue metal, stop the machine and remove the machine from the pipe. Move the machine to a clean area. Complete the severance using a pipe rolling cutter, chisel or wiggle it. Groom the pipe end with a hand file and use Emory paper to remove rust/debris from inside the pipe that might effect welding.   Watch for sharp edges.