From: Waggoner, Larry O
Sent: Friday, February 02, 2007 1:41 PM
Subject: ALARA Center Activities for Week of January 29, 2007

Attachments: Characteristics of a Portable HEPA Filtered Ven System.doc; DOE NNSA Lesson Learned; WAM1B_6.pdf; MPM1_2.pdf; Use of Remote Dosimetry.doc; devcon patch.jpg; Finding Info about Hanford History.doc
Visit our website at http://www.hanford.gov/rl/?page=974&parent=973

1. Met with Pat Burke of Bartlett Services and discussed the loan of new tools/equipment sold by Bartlett to the ALARA Center. He will talk to his home office and send samples of Polymeric Barrier System, TLC Stripcoat and other products and equipment sold by www.bartlettinc.com. Met with N. Clyma from GE Inspection Technologies. He is assisting SNF at looking inside hose-in-hose pumps to determine what is plugging the pump. He put a videoprobe on display at the Center so we could demonstrate it.

HEPA FILTERS: Forwarded info to WCH Radcon in the 300 Area on removing HEPA filters. Offered to give them sleeving if they wanted to mockup train and referred them to CH2M, who have a HEPA Filter Housing used for training. Recommended they look at the Nuclear Air Cleaning Handbook at http://www.hss.energy.gov/NuclearSafety/techstds/standard/hdbk1169/index.html and read lessons learned on HEPA filters at http://www.hss.energy.gov/csa/csp/hepa/lessons.cfm.

2. Gave 50' of 8" flex ducting to SNF (R. Merker) along with a coupler and a memo on using portable ventilation systems. He will contact Bartlett and purchase the ducting. See attached memo. Discussed the use of expandable foam with WCH in 324 building. They are looking for an expandable foam that has an NFPA fire rating of less than 1. Loaned 5 gallon poly bottle, adapter and HEPA filter to SNF to vent air pressure from the hose-in-hose piping system.

3. DECONTAMINATION: SNF Radcon called concerning methods to decontaminate the outside of 1300+, fifty-five gallon waste drums that read ~100 Rem/h that are located behind a 22" shield wall. Initial plan is to set each drum on a turntable and survey/decontaminate the outer surface using a manipulator. Residual liquid will be collected by absorbent pillows. Each drum reads 140-200 degrees F due to an exothermic reaction of the cement/liquid mixture. Forwarded them information received from England on the decontamination products sold by Forward Chemicals Limited. They sell De-Rad Swipes, De-Rad 100 detergent and De-Rad 41 hard surface cleaner. See http://www.forwardchem.com/products.html and look under "D".

4. Forwarded several documents on ALARA to EG&G person from Norfolk, VA who is working on training course on Chemical, Biological, Radiological, and Nuclear material. Conducted the PHMC Site ALARA Council meeting for February. Showed the committee examples of the Devcon Patch Kit and a diamond wire used to cut concrete and metal. Discussion included the recent problems with "Hard-To-Detect" isotopes and Tritium. See attached message sent to assist the concerned committee members on how to locate DOE documents and old Hanford records and documents.

5. BAG-OUTS: Loaned T-Plant a plastic ventilation scoop so they can reduce the chance that airborne contamination will spread during bag-outs of Pu material. Rocky Flats had the mold made for this scoop by Columbine Plastics Corp. at 303-442-0051. It is used at PFP for bag-outs. Also gave them a section of Loc-Line Modular Hose that works great at collecting airborne contamination close to the source. See http://www.modularhose.com/. T-Plant was also interested in a better tool to use to cut the sleeving during bag-outs. On some bag-outs, the twisted sleeve is ~4" in diameter. Found a vendor that sells a hot knife that can cut the sleeving without creating any small particles. The hot knife also sears the plastic making it less likely that contamination will be spread. A vacuum cleaner hose held under the cut should eliminate any fumes generated during the cutting.
See http://www.demandfoamcutting.com/handheld.html. Click on Hot Wire Hand Held Foam Cutters.

Then select Industrial Hot Rod Knives. Then look at Hot Rod and Hot Wire Handles. The company has offered to test their equipment on our sleeving and tell us whether it works. Requested T Plant forward them sleeving samples that have already been twisted so the company can perform the testing.

6. Received the ALARA Center Report from Savannah River Site. Their website is www.srs.gov/general/programs/alara. They have an internal database that describes the available personal protective clothing and safety equipment. They are using Kestrel 1000 pocket wind meters to determine ventilation flow rates. See http://www.gemplers.com/pestmgmt/weathermonitoring/125013.html This allows personnel in the field to determine the flow rates instead of relying on Vent & Balance to tell them. Cost is about $90.00.

Points of contact at SRS are Ellen Parrish at (803) 208-3603 and Robbie Bates at (803) 725-3601.

6. Provided tour of the ALARA Center to a planner and RCT from Pacific EcoSolutions. They were primarily interested in tools, equipment and work practices concerning contamination control. Gave them several documents and brochures that included a list of websites, foaming techniques, list of fixatives, characteristics of a good portable vent system and a list of all vendors that support the ALARA Center.

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FOR YOUR INFORMATION/LESSONS LEARNED

1. L. Waggoner returned home from the Health Physics Mid-Year meeting on D&D and Environmental Restoration. Gave a 2 hour Professional Enrichment Course on Cutting, Dismantling and Demolition Techniques and made a 30 minute presentation on Innovative ALARA Tools/Equipment being used at Hanford. The conference had many presentations related to field work. I have a CD and will distribute copies of these presentations as time permits. The first day of the conference I attended an 8 hour training class with R.Berk on Mitigating Heat Stress. We learned some new info that we will pass along.

CONCRETE CUTTING: I was able to spend time with the vendors and see their latest technology. Bluegrass Concrete Cutting is going to set up a demonstration showing methods of cutting thick concrete using large diameter circular saws and diamond wire. They are currently cutting concrete at Wanapum Dam to enlarge fish ladders. The demo should occur within the next few months. See http://www.bluegrassbit.com/ There were several vendors displaying the latest survey instruments.

The theme that most speakers had was that we needed a safe, secure, and compliant cleanup and a need to share lessons learned. Contractors needed to balance the safeties; industrial safety, criticality safety, rad safety, etc. In D&D work, many risk-based decisions are made. They defined risk as a combination of consequence and probability of occurrence. If the consequences that could result from a decision are unacceptable, we need to manage the risk. Some of the ALARA work practices used at other Sites included:

- Several sites are using equipment from Shonka Research Associates to survey buildings and property remotely. See www.shonka.com to learn about their technology

- F&J Specialty Products Inc showed their line of air samplers. The model DF-AB-40L looks like the ones that WCH is purchasing. These units have been tested by a Nationally Recognized Testing Lab (so has the air samplers from Radeco). See www.fjspecialty.com.
- Sites indicated they were going to use more cameras and less people in work areas where heavy equipment is in use during D&D
- Two facilities showed photos of walk-behind golf carts they modified to transport radioactive samples. PVC pipes were mounted to the cart and the large wheels allowed workers to move the cart over rough terrain and maintain their distance from the source. Another facility mounted a survey instrument to the cart to survey outside areas.
- On one demolition job it was necessary to find out if airborne contamination would spread in the downwind direction. 12" square "Sticky" pads were place in several downwind locations and then surveyed after the job was completed.
- One large neutron activated concrete wall was demolished by explosive blasting. Controlled Demolition Inc wrapped the wall in Geo-Textile fabric and then wrapped chain link fencing material around the wall to prevent large chunks of concrete from becoming missiles. When the wall exploded there was quite a bit of dust. Hanford personnel at the presentation decided that if a Fog Cannon had been used to saturate the area with a water mist there would not have been a dust cloud. See attachment WAM 1B.6.
- Two presentations revealed how soil-sorting machines were used to separate contaminated soil/debris from clean soil/debris. This equipment is being improved and is getting better. If Hanford didn't have the ERDF Trench this technology could be used to reduce the amount of contaminated soil that would need to be collected. Currently, contractors use the clean soil to mix with the contaminated soil to reduce the dose to workers.
- Large round objects needed to be transported by a dump truck. Sand was placed in the truck and the round objects were imbedded in the sand to prevent their movement.

NOTE: there is one additional attachment related to good ALARA practices. The grouting of the underground lines (MPM1_2) was done with workers wearing knee pads, in an open front containment using HEPA ventilation. A hot tap was used to vent the line and then a HEPA filtered vacuum cleaner was connected to the vent hole. When the line was cut at another location, the air flow direction was into the cut, which reduced contamination spread. The workers are wearing PAPR hoods with built-in hardhats. Kevin Funke, the author, formerly worked for BHI using these same techniques to cleanout the process hood at 233-S, prior to demolition by Fluor.

2. A current list of DOE Technical Standards can be found at http://www.hss.energy.gov/NuclearSafety/techstds/standard/hdbk1169/index.html The Standard on Good Practices in Plutonium Facilities was recently changed and can be found on the list.

MARSAME: There is a manual out for review that will effect how we release material and equipment. The Multi-Agency Radiological Survey and Assessment of Material and Equipment (MARSAME) manual can be found at http://63.151.45.33/marsame/system/index.cfm. This website provides directions on how to review and comment on this manual. All comments are due by April 1 with an intended issue date in July.
Besides commenting on the manual, they ask reviewers to address 5 questions:

1. Does MARSAME provide a practical and implementable approach to performing radiation measurements of radiation and materials?
2. Is MARSAME technically accurate?
3. Does MARSAME provide benefits that are not available using current methods? What is the value of MARSAME in comparison with other currently available alternatives?
4. What are the costs associated with MARSAME in comparison with other currently available alternatives?

5. Is the information in MARSAME understandable and presented in a logical sequence? How can the presentation of material be modified to improve the understandability of the manual?

ENGLAND: The Nuclear Decommissioning Authority has been established in the United Kingdom. See http://www.nda.gov.uk/Home_(1).aspx? Several companies at the Conference indicated they were competing for work in the UK to assist in the D&D of facilities.

MORE LESSONS LEARNED

1. See the attached lesson learned on Use of Remote Dosimetry.

2. WCH uses a dust suppressant to spray over the top of newly excavated soil and piles of debris. In the past, this required a worker to spray the suppressant with a "fire hose. During winter and windy conditions the worker would often get cold and wet during this operation. WCH has begun using "Fire Hose Monitors" to remotely accomplish the spraying from inside a covered enclosure or truck cab. See the website at http://elkhartbrass.com/ebmain.cfm?framename=template_product_listing&prod_catcode=smm&prod_type=sidewinder". The Elkhart Brass Sidewinder can spray 180 degrees up and down and 135 degrees to the front using a joy stick or switches. Contact Henry Doolittle at 372-9933 if you have questions.

3. We had some questions this week concerning the Devcon Patch product. We have attached a photo of a test we did on at 55 gallon drum that we drilled holes into. The patch is designed to be placed on systems as a temporary repair. The system can then be operated with pressures up to 2000 psi. We thought that applying this "Band-Aid to waste drums or or leaky systems would help control contamination spread. Cost is about $30.00. See www.devcon.com.

NEED FOR INFORMATION

Our Spent Nuclear Fuel facility is considering putting divers in a fuel pool to help with the final cleanup. All known fuel has been removed and we are left with residual sludge, debris, and unknown particulate suspended in the pool. We are interested in finding out whether any other Site has had experience with fuel pool diving. We know it has been accomplished many times in pools that never had spent fuel. Please forward your lessons learned or suggestions to us and we will pass them along. THANKS!

USE OF PORTABLE HEPA FILTERED VENTILATION

An effective portable ventilation system has the following characteristics:

1. The ALARA Center recommends that facilities purchase "Nuclear Grade" ventilation blowers equipped with a HEPA filter if it is going to be used for radiological work. These may be high-quality units that will be used at a facility for many years or cheaper units used for D&D and disposed at the end of each project. When you're looking for a unit, remember the smaller units (<1,000 cfm) run on ~110 volts but larger units may run on 220 volts. If you don't have the correct electrical resources, you may not be able to operate your ventilation system. There are several companies that sell cheap imitation units that might be all right for asbestos, but don't work well for radiological work. If you want to purchase inexpensive ventilation equipment check the unit carefully before purchase; especially look at how securely the HEPA filter is forced against the seal inside the housing. Remember – <u>You get what you pay for</u>. Contact the ALARA Center or Vent & Balance for advice.

2. The fan should have flow characteristics that allow it to operate over a large pressure range to account for inherent losses in the system and increased pressure drop as the filters collect dirt and debris. Some newer models can be ordered with speed controllers for the fan and air flow rate indicators that show the cfm through the system. These allow you to preset the flow you want and the unit will maintain that flow during the job.

3. The ventilation system should be located in well-lighted areas that allow easy access for maintenance. If outside, the unit should be protected from wind, dust, and other inclement weather conditions.

4. The length of hose or duct from the blower/fan to the work area should be as short as possible and contain a minimum number of bends. The ducting should have no sharp bends. Bends should have a minimum radius of 2-2.5 times the duct/hose diameter. NOTE: as a rule, a 90-degree bend is the equivalent of adding extra hose equal to 6-8 times the hose diameter.

5. The ducting should be routed through low traffic areas where it is protected to avoid damage. If the hose is dented, the air flow through the hose is restricted and the flow decreases. A straight duct section of at least six equivalent duct diameters should be used where the hose connects to the fan.

6. The hose/duct should be round, have a smooth bore, and be free of obstructions, especially at joints. Joints should be securely sealed to avoid leaks.

7. Use of blast gates or other types of dampers should be avoided. If a blast gate must be used to adjust the flow, place it in a vertical section near the midway point. Install a tamper proof device. Note: Many larger units have blast gates on the discharge side of the unit. Although this is not the most desirable location, the losses are made up by using a larger unit than needed to get more air flow. The extra air flow overcomes all the losses in the system.

8. Capture Velocity is the flow rate at the point where airborne contamination is captured is sufficient to cause the particulate to follow the air stream into the ventilation. This capture velocity is recommended to be a minimum of 125-200 feet/min for the type of work to be performed. If the airborne activity is released into quiet air, a capture velocity of 50-100 feet/min

is all that's necessary. If grinding is performed, the particles will have a high initial velocity so the capture velocity of the ventilation needs to be in the 500-2000 feet/min range in order to get the ballistic particle to turn and enter the vent hose. A significant improvement in the amount of debris captured by the vent system can be attained if the suction hose is positioned so the grinding particles flow directly into the hose.

9. Use of a funnel, scoop, or hood attached to the hose/duct to collect airborne contamination will increase the amount of contamination collected over a "hose only" application. The design of the funnel or scoop reduces the amount of air being drawn from unwanted directions. This forces incoming air to be drawn from in front of the hose/duct where contamination is being created. Any particulate that is present is more likely to be captured in the air stream and carried into the vent system. A screen can also be installed to reduce the possibility that large objects will be drawn into the hose or duct.

10. If work is done inside a containment tent or room the ventilation suction can be located on a wall or a trunk line run into the work area near the source of contamination.

- "Localized" or "Point-Source" ventilation: Position the ventilation suction hose so that any airborne particles are drawn away from the worker's breathing zone. Normally the ventilation suction is placed 90 to 180 degrees from the worker on the opposite side of the source at a distance of one duct diameter or less. If the suction end of the hose is greater than one duct diameter away from the source, very little contamination will be captured in the air stream; so get it close, but don't interfere with the work.

- "Dilution Ventilation: Typically, the suction hose is mounted low on a containment wall at a location that is opposite the entrance to the containment. Make-up air should enter the containment through filter media, HEPA filters or dampers located above the access door or nearby above head height. This arrangement will provide a general downward flow of air through the containment. This clean air mixes with the potentially contaminated air at the source and the diluted mixture is drawn towards the suction.

- Air Changes" An air change occurs every time the vent system draws a volume equal to the volume of the containment work section. The industry standard for air changes in a containment tent is 7-12 air changes per hour. In the nuclear industry, air changes up to 20 per hour are common in rooms and containment tents. This is enough flow to ensure that contaminated airborne particles flow toward the exhaust, not out the containment door. If the ventilation system fails during use, covers can be placed over the make-up air inlets so that no contamination escapes the containment. *NOTE: If you want to capture airborne particulate, the important thing to consider is the amount and direction of flow at the source of the contamination. So if you're removing a flange from a contaminated system look at which direction the air flows and how much flow is present. Smoke or powdered material can be blown near the flange to determine the direction and make an estimate whether the flow rate is adequate. Vent & Balance can also take flow rate readings and tell you the exact flow rate at different locations. The ALARA Center recommends that facilities purchase "Flowchecker Silica Powder, Item 7904C from Lab Safety & Supply @ (800) 356-0783. WCH uses "baby powder" because it's cheaper, but it makes the work area slippery and sometimes a great deal of powder is ejected from the container when you only wanted a "poof". Another tool coming into use is the Pocket Wind Meter made by Kestrel. Models 1000 & 2000 allow you to measure the flow at the face of the vent system at different distances. Using this instrument permits the*

worker to find out which areas have enough flow to capture airborne particulate. For more info, see http://www.nfsrps.com/cat_air_instruments.html

11. System fittings should be designed so there is a gradual taper on the HEPA filter inlet and outlet and a long straight inlet to the fan. Transition pieces that change from one dimension to another should also be tapered. Since having tapered connections on each side of the HEPA filter would require more space, you often find there is little or no taper. Manufacturers make up for this by using a motor that draws greater air flow.

12. If the HEPA filter is visible, check to make sure that any flow arrows on the filter are in the same direction as the system flow. *NOTE: The HEPA filter will filter in either direction but if it's installed so the flows arrows are pointed in the wrong direction, workers get concerned and shut down work. It's easier to just install it so the arrows are pointed in the same direction than deal with the concerns.*

13. If the system is going to draw moist or damp air, install a demister filter to remove the moisture before it reaches the HEPA filter. The demister media is similar to steel wool and the air stream has to change directions as it passes through the media. The water collects on the media and dribbles to the bottom where it drains or evaporates. Damp HEPA filters lose their tensile strength and could fail if they become stressed later, i.e., filtering the smoke from a fire.

14. Locate the ventilation system components in well-lighted areas with enough space to allow easy access for maintenance. Mark or label each hose or component to identify it has internal contamination.

15. If the system could become highly radioactive consider installing an in-line prefilter or HEPA filter in the suction hose. This filter will remove the particles with the highest radioactivity before they reach the ventilation system HEPA filter. The in-line filter can be changed when it becomes highly radioactive without affecting the HEPA filter aerosol test. Temporary shielding can be installed on the in-line filter and/or it can be replaced during work.

16. Air discharged from the blower flows in a straight line. If you measure the flow at the discharge point and call that 100%, you will still find 10% of the flow at a distance of 30 times the diameter of the discharge. Ensure the air being discharged does not disturb contamination or asbestos that might be present in the work area. This may require installing a hose on the discharge side of the blower and either pointing it up or routing it outside the work area.

17. If the system is going to be used for "hot work", a metal hose with a spark arrester is required to avoid causing a fire in the flex ducting and/or prefilter/HEPA filter. A spark arrestor contains a series of screens that are off-set so the air has to change direction several times as it passes through the screens. The sparks hit a screen as they flow along the tortuous path through the spark arrestor and this removes the sparks from the air stream.

18. After a ventilation system is installed, contact Vent & Balance at 373-2746 or 373-9275 to accomplish an aerosol leak test. This will ensure the HEPA filter is installed correctly against the sealing surfaces inside the housing. Additional tests will be required annually, whenever the unit is transported to a new location, when opened for maintenance, after becoming highly radioactive, or is exposed to hostile environments such as high moisture loading, chemical fumes or high temperatures.

19. Documents that are good sources of information include:

a. DOE/RL-96-75, Radioactive Air Emissions Notice of Construction, Portable/Temporary Radioactive Air Emission Units

b. DOE/RL-97-50, Radioactive Air Emissions Notice of Construction, HEPA Filtered Vacuum Radioactive Air Emission Units

c. Industrial Ventilation Manual, A Manual of Recommended Practice published by the American Conference of Governmental Industrial Hygienists, Library of Congress Card Catalog # 62-12929; phone (513) 742-2020 or http://www.acgih.org/home.htm

d. Handbook of Ventilation for Contaminant Control; http://www.acgih.org/home.htm

e. HNF-PRO-8323, Management of HEPA Filters; This document provides information on the procurement, storage and testing requirements for HEPA filters.

f. HNF-RD-8703, Air Quality- Radioactive Air Emissions, This document provides information on the environmental requirements for using portable ventilation systems.

g. DOE Nuclear Air Cleaning Handbook, HDBK-1169-2003; Note: We are not contractually bound to follow this document, but it contains a lot of useful information. See website at http://tis.eh.doe.gov/techstds/standard/hdbk1169/index.html