From: Waggoner, Larry O
Sent: Thursday, March 22, 2007 3:12 PM
Subject: ALARA Center Activities for Week of March 19, 2007

Attachments: Software Technology.doc; xband_large.jpg; cuttingstation_large.jpg; BSIPipeCrawler[4].pdf; Characteristics of a Portable HEPA Filtered Ven System.doc
Visit our website at www.hanford.gov/rl/?page=974&parent=973

1. Presented Containment Training to 21 workers that included RCTs, Millwrights, Pipefitters and Operators. Most of the personnel trained will be working on the booster pump replacement at K Basins. To date, we have trained 465 workers and RCTs on Containment Installation/Certification. The Parker-Hannefin demonstration van was at HAMMER and personnel were able to look at the latest hydraulic and motion control devices.

2. (Fuel Pool Diving) Contacted Steve Aitken at INEL at the request of Robin Hill to obtain names of personnel associated with past fuel pool diving. He forwarded names of radiological engineers who were still at INEL that had supported Fuel Pool diving. Forwarded these names to K-Basin Radcon. Sent information on the HexArmor cut and puncture resistant gloves to Don (Wade) Russell at the Nevada Test Site. He worked at Hanford when we first introduced the HexArmor gloves at Hanford. He intends to introduce them at NTS.

3. (Ventilation Flow Checker Powder) Received a call from personnel at the Naval Research Lab wanting our contact info. Provided them our website and they will call back later with questions about ALARA Tools and Equipment. Forwarded info to WCH on the Flowchecker powder we use to verify ventilation flow. Each 1.5 gram container contains a non-hazardous sand-like material that is a lot easier to use than a smoke generator. Purchase from Lab Safety Supply at (800) 356-0783. Ask for #7904C Flowchecker Powder. Met sales rep from A.J. Hanson & Co. These folks sell high-tech drill bits and other equipment that could improve our D&D work practices. Drill concrete and rebar with one bit. See www.ajhanson.com or call Phil Saltness at (206) 763-8550. We will obtain brochures and as many samples as they will let us have.

Larry Waggoner / Jerry Eby
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FOR YOUR INFORMATION

1. (ALARA Tools) Received a message from a company in the United Kingdom describing software that is used to package nuclear waste. If you're involved with waste packaging, see the attachment. There has been some recent interest in the battery powered porta-band saw made by Stout Tools. Attached are two photos showing how it can be used with one hand or placed in a docking station. The 18 volt unit works well in D&D work for cutting conduit and small piping without having to drag an electrical cord. It weighs 9 pounds.

2. (D&D Tools) Interested in decontamination and surveying of embedded and buried piping? See the attached Technical Bulletin (BSI Pipe Crawler) from Babcock Services Inc and read a DOE Innovative Technology Report at http://www.osti.gov/bridge/servlets/purl/621859-OIKp2w/webviewable/621859.pdf

3. (Shielding) A Microshield training class will be offered October 22-23 in Richland, WA. This will be Version 7. There have been recent updates to make this program User Friendly. If you desire to attend, recommend talking to your Manager to have money budgeted for next Fiscal Year. More information can be found http://www.radiationsoftware.com ***PLEASE NOTE THE NEW ADDRESS AND PHONE #***

Grove Software, Inc. 4925 Boonsboro Road #257, Lynchburg, Virginia 24503 USA; Phone: 434.386.8080

4. (Tool Development) Agreed to work with personnel who are doing D&D of Chemical Weapons Facilities and let them test a prototype nibbler at the ALARA Center. They have been working with Trumpf Tools to get a nibbler that will cut 1/2" carbon steel. Currently, the largest hand-held nibbler we have will cut up to 3/8" carbon steel. The D&D folks have many 3/8" and 1/2" carbon steel tanks that need to be size-reduced as they D&D old chemical weapons facilities and they are currently doing the work with a saws-all. There goal with a saws-all is to cut 6"/min. A nibbler cutting 3/8" carbon steel cuts 39"/min. A Group of the Chemical Plant D&D Managers were at the ALARA Center earlier this year and used all of our tools to cut metal scrap. The testing of the new prototype nibbler will be done at the ALARA Center in mid-April. Our points of contact on this project is Cris Dunaway of Bechtel (cdunaway@bechtel.com) and Aage Hval of Trumpf (agehval@attglobal.net or (509) 981-9119. Our plan is to take advantage of the work they're doing and promote any new nibbler that is developed with DOE D&D Personnel.

During all the containment training classes there was a lot of interest from workers when we operated a vent system and then showed them how the propeller in an air flow device slowed down as we moved it away from the face of the hose. We now think they have a better understanding why Radcon insists the position the suction within one duct diameter of the source. As a result, I refined our handout of using portable HEPA ventilation systems. THIS HANDOUT IS ATTACHED FOR YOUR INFORMATION.

FLUOR HANFORD FACILITIES - HEADS UP!!!

(HEPA Filter Testing) Got a chance to review a DRAFT Instruction HNF-32904 on HEPA Vacuum Unit (HVU) HEPA Filter Procurement Specification. Pat O'Brien (373-3929) is the Site Technical Authority for HEPA filters. The DRAFT Instruction contains some new requirements that are going to effect how you purchase HEPA and ULPA filtered vacuum cleaners. If facilities don't find a way to streamline the process of procuring a vacuum cleaner, it will probably add 2-3 weeks to the length of time it currently takes. Once in awhile, we get phone calls from facilities that need a HEPA filtered vacuum cleaner immediately. For you folks, please take note.

- All HEPA filters will have to be sent to the Filter Test Facility (FTF), currently located at the Air Techniques International Testing Lab in Baltimore, Maryland, for inspection and testing BEFORE they can be installed at Hanford. This Lab is a private company. They are then required to be retested again after they're installed in the vacuum cleaner to verify the filter is installed properly. See http://www.atitest.com/html/services/ATITestLab.html Point of Contact is David Crosby.
- All HEPA filters are required to be marked with the Manufacturer's name, filter serial number, filter model number, a flow arrow and the date of when it was tested for efficiency and resistance. Currently, we have twelve older models of HEPA filtered vacuum cleaners at the ALARA Center and none of them have all this data. Newer units might be different. Our portable vent units are the same and none of the models contain all the required data. This info is available by calling the vendor, but is not usually provided unless you ask for it.
- Sellers will not be paid by the Buyer until the HEPA filter passes it's testing at the FTF and documentation is received.

Actions that could streamline the process:

1. Vendors will have to be notified of the new requirements for labeling the filters. They will have to forward the information to their filter manufacturers. They also need to be informed that if a FH facility purchases a vacuum cleaner from them, they may have to ship the filter to the FTF and the vacuum cleaner to Hanford.

2. Facilities may have to come up with some "up-front" money and purchase several vacuum cleaners in advance. Their filters could be already tested at the FTF and in storage here along with the vacuum cleaner unit. Facilities could buy them out of stores and have Vent & Balance test them before use. The result is that a facility could obtain a HEPA filtered vacuum cleaner in less than one day.
3. Facilities could purchase the HEPA filters in advance, send them through the FTF and then put them in storage at Hanford. Facilities needing a vacuum cleaner could purchase a unit without a HEPA filter and install one of the HEPA filters from stores after it arrives at Hanford. The unit could then be tested by Vent and Balance before use in the field. Since many of the popular Nilfisk models use the same HEPA filter, this seems like it would be the most painless method of streamlining the procurement process. In addition, the government has a GSA Contract that permits it to buy some equipment for less. Cost of each HEPA filter is about $152.00. Recommendation: Buy several HEPA filters, test them at the Oak Ridge FTF and store them in a climate controlled environment at Building 2101-M.

Note: This instruction has not been issued yet and there could be additional changes made before final issue. Recommend talking to your procurement personnel and anyone else involved in the purchase of a vacuum cleaner and giving them a "heads-up".

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