From: Waggoner, Larry O
Sent: Thursday, June 16, 2005 1:21 PM
Subject: ALARA Center Activities for Week of June 13, 2005

Attachments: DSC01372.JPG; Remote Drum Hood.jpg; Table A-1 HEPA VAC NOC Rev 1A.doc; Characteristics of a Portable HEPA Filtered Ven System.doc; D&D of Extraction Cell at West Valley.doc

Visit our Website at www.hanford.gov/alara. Note: "The average Hanford worker is now 52 years old."

1. Provided tour of the ALARA Center to 14 members of the 222-S ALARA Committee. Met with representatives of NFS/RPS and discussed their product lines of vent equipment, Permacon Containments, Specialty Temporary Shielding and Engineering and Design Services. Forwarded info from Clark Barton to CH2M committee working on heat stress concerning a head cover with an absorbent gel. Once the gel is wetted, it stays damp for a long period and this cools the worker's head and neck. Email address is Coolcomfortbands@msn.com. Contact people are Sheila Askelson (360) 909-9734 and Sherry Selvick (360) 701-2391. Forwarded info on fixatives and foaming techniques to John Gadd of Bechtel-Jacobs at Oak Ridge. He is sending info on the use of foam at Oak Ridge.

2. Forwarded copy of "Modern Strippable Coating Methods" to BHI Radcon. Forwarded copy of "Decommissioning of the Reactor Vessel of the Compact Sodium Cooled Nuclear Reactor Facility (KNK)" to FFTF Engineering and Radcon. Forwarded copy of "D&D of Liquid Waste Storage and Liquid Waste Treatment Facility from Paldiski Nuclear Site, Estonia" to LEF Radcon Manager. Summarized the good ALARA techniques in a presentation on "Decontamination of Extraction Cell-2 at the West Valley Demonstration Project. *This info is attached to this report (the 5th Attachment) and if you're doing D&D work, it's worth your time to read it. It describes technology that hasn't been used at Hanford.*

3. Forwarded a diagram to WRAP Operations showing the flow dynamics when air is drawn into a hose and a copy of the ALARA Center Handout on setting up a portable HEPA filtered vent system. BOTTOM LINE: Get the hose as close as practicable, within one duct diameter, and do something to force incoming air to pass through the region where airborne contamination could be present. See attached Handout. Loaned three squeeze bottles of Flow Checker Powder to CH2M Radcon to check ventilation flow.

4. While searching the internet looking for high tech bolt cutters, discovered a hydraulic tool that "can cut any material, up to 3/4". Forwarded info to PFP D&D and they requested the ALARA Center obtain one for testing. Contacted the company and they will send a demo model. See www.diequip.com. This tool might be easier to use inside a glovebox that the chop saw currently used to size reduce materials. PFP operator stopped by looking for a better method to cut sleeving that has been "horsetailed". Present method is to use a serrated knife. The diameter of the twisted sleeving is 6-8" in diameter. Recommended they look at a "Electric Rope Cutter" used for cutting nylon rope. See http://cableorganizer.com/hot-knife/electric-cutters.htm. The hot blade simultaneously cuts and seals materials at the same time.

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FOR YOUR INFORMATION

1. Received message that the Washington Department of Health had approved adding several vacuum cleaners to the list in Notice Of Construction DOE/RL-97-50; HEPA Filtered Vacuum Radioactive Air Emission Units. This NOC applies to most of the radiological work accomplished outside radiological

work facilities with HEPA filtered ventilation systems. Rather than write a separate NOC for each job, this NOC allows facilities/projects to use radiological vacuum cleaners with a few restrictions and limitations. The current list of vacuum cleaners is attached to this report. It is also duplicated in HNF-15639, Guide for Using HEPA Filtered Vacuums and Portable Vent Systems. The following units were added:

Nilfisk 137	Nilfisk GM-625	Nilfisk GS-625
Euroclean WD260-H	Tiger-Vac B-4 DS	

NOTE: Prior to the ***first-time*** use of one of these units in the field, the NOC requires that the unit be inspected by WDOH. Once notified, they have 7 days to complete the inspection. This inspection is accomplished before Vent & Balance leak tests the unit so the inspector can disassemble the unit, if necessary. In addition, WDOH may observe the leak testing done by Vent & Balance. The ALARA Center will maintain a list of the units inspected by WDOH.

2. CH2M has obtained a HEPA Filter housing that has been stored near 105-C. It was designed similar to unit (EU-1) for exhausting the reactor fuel basins, but was never used. It will be moved to the CH2M cold test facility between 200 East and 200 West and will be used to mockup train workers on HEPA filter change out. A photo is attached. Thanks to George Carter of FH and Russ Boetes and Bob Thomas from CH2M for coordinating the operation.

3. The Savannah River ALARA Center is procuring a MAC-21 Portable HEPA Filtered Vent system equipped with a remote drum inspection hood from NFS/Radiation Protection Systems. The drum hood can be set up in a Contamination Area and a hose run to the vent unit which is located outside the CA. See attached photo. NFS/RPS sells drum inspection hoods for 55 and 85 gallon drums. The air flow across the top of the drum can be as much as 350 fpm, which is more than enough to capture any radioactive airborne particles or fumes and keep them away from the worker's breathing zone. Cost of this unit is $5,775 and the model number is GU-17P. See www.nfsrps.com

4. Received a CD with all the presentations from the Waste Management Conference conducted earlier this year in Tucson, AZ. I am gradually going through each presentation looking for examples of good ALARA that I can pass on to Hanford personnel. There is one presentation on "Closing in on Closure: Perspectives from Hanford and Fernald - An Update" co-authored by Judith Connell of Fluor Hanford and one paragraph discusses the scope of what we have to do.

"With Hanford's closure date more than 30 years away -2035 - the site has just begun to deactivate and demolish production facilities, and clean up waste sites and contaminated groundwater. The production of nuclear materials at Hanford has left a legacy of tremendous proportions, not just in terms of hazardous and radioactive waste, but also the infrastructure supporting the cleanup. Here are some of the statistics. From a waste management point of view, the task is enormous.

- 1,700 waste sites,
- 450 billion gallons of liquid waste (dumped into the soil),
- 70 billion gallons of contaminated groundwater,
- 53 million gallons of tank waste,
- 9 reactors,
- 5 million cubic yards of contaminated soil,
- 22,000 drums of mixed waste,
- 2.3 tons of spent nuclear fuel,
- 17.8 metric tons of plutonium-based material, ...
- and that's not the complete list.

On the infrastructure side, the numbers are almost as staggering.

- 500 miles of roads,

- 4 fire stations,
- 200 buildings containing 5 million square feet of floor space,
- 104 miles of water lines, and
- 200 miles of electric lines.

The transition from operations and engineering personnel to a preponderance of D&D/craft workers is just taking hold...with each reduction of force evidence that both the size and the skills of the workforce are changing. And the transfer of site operations-such as the transfer of fabrication services to a commercial company offsite-gives further evidence of a changing paradigm for doing business."

After reading this, we realized the scope of what the contractors have to do here is bigger than we imagined. The paper goes on describing the efforts to accelerate the cleanup and bring the 2035 closure date back, by as much as 10 years. It compares Fernald, which is very close to completion, with Hanford, "whose workers and the community are grappling with the concept of closing the site." Copies of this presentation can be obtained from Judith Connell at 376-6808 or email judith_connell@rl.gov or the ALARA Center.

5. PFP Engineering reported that Porter Cable makes an adjustable Saws-All that has a rotating handle making it only 8.5" long at 90 degrees. Most Saws-All are 18-19" in length and are hard to get into restricted areas. PFP needs a saw to cut panels out of gloveboxes in areas where there are lots of interferences. See: http://www.porter-cable.com/index.asp?e=4434&t=t&p=4822

6. Hand and Power Tool Safety. OSHA offers a computer class on Hand and Power Tool Safety for $29.00. The instruction takes about 60 minutes to complete. For info, see http://www.securityceu.com/shop/customer/product.php?productid=16158&cat=262&page=1

The following links take you to information on the use of tools commonly used in D&D Work.

- Hand and Power Tools:*http://www.ehsservices.com/Library/Hand%20and%20Power%20Tools.pdf*
- Reciprocating Saws: http://www.osti.gov/bridge/servlets/purl/792086-PjT3OB/native/792086.pdf
- Circular Saw: http://www.osti.gov/bridge/servlets/purl/792084-WnoHqL/native/792084.pdf
- Circular Saw: http://www.osti.gov/bridge/servlets/purl/792085-kNrV1u/native/792085.pdf
- Blade Plunging Cutter: http://apps.em.doe.gov/ost/pubs/itsrs/itsr2953.pdf
- Counter-rotating Twin Blade Circular Saw: http://www.osti.gov/bridge/servlets/purl/792082-CF5tb0/native/792082.pdf
- Worm-Drive Circular Saw: http://www.osti.gov/bridge/servlets/purl/792083-KhD7FH/native/792083.pdf
- Power Saw Safety: http://www.handctr.com/power_saw_safety_tips.htm
- Choosing a Miter Saw: http://www.taunton.com/finehomebuilding/pages/h00102.asp
- Miter Saw Safety: http://www.gryphoncorp.com/MiterSawInstructions.pdf
- Guide to Selecting Non-Power Hand Tools: http://www.cdc.gov/niosh/docs/2004-164/pdfs/2004-164.pdf
- Powered Fastening Tools Safety: http://newproducts.envirowin.com/e_article000357933.cfm?x=b11%2C0%2Cw
- Hand and Portable Powered Tools: http://www.dot.state.ny.us/progs/safety/sb-96-6a.html
- Drilling Concrete: http://www.qrents.com/docs/concdrilling.htm
- Protect Your Hands: http://www.webworldinc.com/wes-con/hands.htm

Other documents worth reading are:

- "Survey of Commercially Available Manipulators, End-Effectors, and Delivery Systems for Reactor Decommissioning Activities". It can be found at: http://www.osti.gov/bridge/servlets/purl/272556-uAcXSf/webviewable/272556.pdf
- Waste Minimization Handbook: http://www.osti.gov/bridge/servlets/purl/219278-toh2H3/webviewable/219278.pdf This booklet contains info on size-reduction techniques and decontamination.
- Heat Stress Links: http://www.pp.okstate.edu/ehs/links/heat.htm

VENDOR INFO

Nick Clyma of Everest Visual Inspection Technologies will be on-site Wednesday, June 22 and Thursday, June 23 talking to several contractors concerning their needs for remote viewing. He can be reached at (888) 332-3848. Recommend setting up an appointment with him in advance if you want to see his line of cameras, fiberoptic scopes, video probes or tractors. See www.everestvit.com

LESSONS LEARNED

In case you missed it, BHI wrote a lesson learned on Inadequate Contamination Controls in Windy Conditions. Since we are using more and more fixatives and misters to remove contaminated buildings and equipment this is a good one for personnel who plan this work to read.

Hanford Environmental Restoration Contractor (ERC)
Lessons Learned

Title: Inadequate Radiological Contamination Controls During Windy Conditions for the Demolition of the 107-N T-4 Regeneration Waste Storage Tank

Date: 05/27/2005

Identifier: ERC-05-004

Lessons Learned Statement:
The lesson learned from this experience was that greater care needs to be taken during the early radiological work planning stages to adequately address contamination control measures for potential adverse weather effects. Moreover, once changes in work area conditions are observed at the work site, contamination control measures need to be re-evaluated on an on-going basis to ensure controls remain adequate for all radiological hazards. Radiological work planning considerations should include: Size of contamination control boundaries, in-zone contamination controls, potential environmental impacts on conduct of operations, work site location, equipment selection, compensatory measures, and personnel selection.

Discussion of Activities:
The 107-N Facility was a recirculation, treatment, and cooling plant for radioactively contaminated 105-N Fuel Storage Basin (FSB) water. Part of the water treatment process involved the use of ion exchange resin media to chemically remove dissolved radioactive constituents from basin water prior to returning it to the FSB. Over time, the resin media became loaded with dissolved radioactive solids and required regeneration using sulfuric acid and caustic. Prior to being transferred and disposed off-site, the waste acid, caustic, and high levels of radioactive waste products from the regeneration process were stored in a 13-foot diameter, 53 foot 5 inches long, rubber-lined, carbon steel tank known as the 107-N T-4 Regeneration Waste Storage Tank (T-4 Tank).

During deactivation activities, the T-4 Tank was drained and flushed. To facilitate future building demolition, the T-4 tank had to be removed, demolished, and disposed. Prior to removal, all pipe connections and anchors were disconnected and/or removed in order to isolate the tank from the building. Radiological surveys were performed prior to and during these isolation activities to evaluate radiological work planning effectiveness. Results of these surveys suggested high levels of removable beta-gamma (i.e. ~ 15 million dpm/100cm^2) and moderate levels of removable alpha (~ 3,500 dpm/100cm^2) surface contamination were present inside the tank.

Upon extraction from the facility, the T-4 tank was demolished using an excavator with a shear attachment. Due to the limited work space available and the high levels of removable contamination present within the tank, fixatives and other abatement methods (high pressure water and misting during shearing) in addition to radiological postings and personal protective equipment (PPE), were used to control the potential generation of airborne radioactivity and spread of contamination from radiological zones during demolition. Several fixative applications (Polymeric Barrier System (PBS), latex-based Rust Doctor® compound, and latex paint) were used to achieve and maintain control of removable radioactive contamination and airborne radioactivity prior to shearing. Applications of these compounds on similar tasks within the Environmental Restoration Contract (ERC) (i.e. demolition of the 1304-N Emergency Dump Tank and 1300-N Emergency Dump Basin) proved effective for airborne radioactivity and contamination control on these steel structures. Accordingly, they were also selected for this task. Radiological zones were set up around the tank to provide contamination and airborne radioactivity control prior to starting work.

An initial application of PBS was applied to the inner tank surfaces through the man-way covers on the north and south ends of the tank. After this application was completed and allowed to cure, radiological surveys were conducted at accessible locations within one of the man-way covers to ascertain fixative effectiveness. Survey results at that location suggested contamination levels were within Contamination Area (CA) posting criteria. As such, work was allowed to proceed only at the end of the tank where survey data was available and only on a favorable weather day (i.e. little or no wind) to minimize the potential for contamination spread or airborne generation when the tank inner surfaces initially became exposed to the environment.

Once the tank end was removed, additional radiological surveys were performed on the inner tank surfaces. The results of these surveys indicated multiple locations within the tank that were well-above High Contamination Area (HCA) posting criteria. It was noted that some areas where fixative had been applied experienced sloughing of the fixative and underlying tank debris, which exposed additional HCA levels in the area where the fixative had sloughed off. It was decided that shearing would not proceed until additional contamination control measures were implemented.

Multiple applications of fixatives were performed in an effort to fix the contamination to the tank wall such that demolition could proceed, though a portion of this material also sloughed from the tank walls and effectively reduced the removable contamination levels on the tank walls. With the application of what was to become the last coat of fixative (latex paint), removable contamination levels on the inner tank surfaces were between 500-1000 dpm/100cm^2 alpha and approximately 300K-500K dpm/100cm^2 beta-gamma. It was therefore decided that airborne radioactivity and contamination controls would be adequate to continue with tank demolition work while being careful not to work during windy conditions.

Tank demolition work commenced in the afternoon on 03/31/2005. The final coat of fixative was applied earlier that day. Radiological postings were such that HCA/Airborne Radioactivity Area (ARA) boundaries extended approximately 10 feet from the tank on the demolition (west) side, with the excavator positioned at the boundary within a posted Radioactive Material Area/Radioactive Material Storage Area (RMA/RMSA). The excavator arm extended across the radiological barrier into the HCA/ARA posted area around the tank. This was done to avoid placing the excavator cab into a posted radiological zone.

No notable contamination spread or airborne radioactivity events were identified during or after work activities that day. Wind conditions at the work site were calm. As tank demolition work continued on 04/01/2005, wind speeds increased to 5-10 mph, with gusts to 15 mph. Work activities were temporarily suspended to allow for the refilling of the water trailer used for dust suppression. While waiting for the water truck to deliver water, a Radiological Control Technician (RCT) noted a paint chip (approximately 1 cm^2) immediately outside the HCA/ARA boundary in a RMA/RMSA/Underground Radioactive Material

Area (URMA). As the paint chip was the same color as the fixative applied to the inside of the tank, the RCT surveyed the chip and found it to be contaminated. As a result, work was suspended and all RCTs commenced a survey of the entire area. A total of four contaminated paint chips were located outside the HCA/ARA boundary. The highest direct readings obtained in the survey came from the first paint chip: 502,000 disintegrations per minute (dpm)/100cm^2 beta-gamma and 281 dpm/100cm^2 alpha. A subsequent recount of the paint chip (attached to a tape press) resulted in 1.35 million dpm/tape-press beta-gamma and 400 dpm/tape-press alpha. A smear survey was subsequently taken from this paint chip, which resulted in 2,028 dpm/cm^2 (202,800 dpm/100 cm^2) beta-gamma and <20 dpm/cm^2 alpha.

A subsequent critique and Root Cause Analysis for this discovery was performed. The result of this activity indicated that radiological postings and contamination control measures were not adequate for light or heavy wind conditions, though they were adequate for little- or no-wind conditions.

Analysis:
Contaminated paint chips were found outside of the contamination control boundary (HCA) for three primary reasons. First, fixative adherence to the tank walls was substantially inhibited by the presence of dirt and debris on the rubber liner inside the tank. Fixatives became attached to the removable dirt and debris, which sloughed from the tank walls. As a result, fixatives were not able to make an effective chemical bond with the liner. Failure of the fixatives to bond with the tank liner resulted in the generation of contaminated paint chips that could become mobile. Second, increasing winds at the work site during work evolutions contributed to the potential for paint chip migration. Third, radiological boundaries were established to provide adequate contamination control provided no more than one of the previous conditions co-existed. Failure to post radiological boundaries sufficient to handle both scenarios concurrently contributed to the presence of contamination outside of posted areas.

Actions Taken or Recommended:
Work area radiological contamination control boundaries (HCAs) were extended to include the maximum distance where radioactive paint chips were identified. Use of water and/or misting on the tank during shearing activities and regular application of soil sement on work site soils to prevent migration of contaminated soil/debris from posted work areas was continued. Routine radiological surveys of work area boundaries were increased in frequency to ensure contamination control measures implemented adequately addressed the deficiency. Work site air monitors were operated at zone boundaries to ensure airborne radioactivity controls remained adequate.

Estimated Savings/Cost Avoidance: N/A

Priority Descriptor: Yellow/Caution

Work/Function: Demolition

ERC Category: N/A

Hazard(s): Radiological Contamination Control

ISM Core Function(s): Perform Work Within Controls

Originator: Gregory J. Gibbons

Contact: Gregory J. Gibbons

Authorized Derivative Classifier: N/A

Reviewing Official: R. R. Nielson

Keywords: Tank Demolition, Radiological Control, Paint Chip

References:
Occurrence Report Number: RL—BHI-DND-2005-0005

BHI-RC-01, Radiation Protection Program Manual (RPPM)

10 CFR 835.1102 (a) and (b)