

Fluor Hanford ALARA Center

Activity Report for August 27, 2007

Assistance, Demonstrations, Research, and Tours Provided by the Center

1. CH2MHill Tank Farms requested information about “rock stoppers” for use with controlled vacuums. Rock stoppers protect the vacuum filtration system by providing a collection point for heavy material before it collects in the vacuum HEPA filter. Rock stoppers can be shielded which also helps manage the dose that would have collected in the vacuum. The simplest rock stopper we have found is a drum/can with a lid, where the lid can have two holes cut into it and two pipe inserts (the ID of the vacuum hose) welded into the lid. They have similar units available on the market, but we have found it cheaper and quicker to have the site fabrication shop build them. Keep it simple. Some facilities with large volume of material to be collected use the same drum/can lid for numerous containers. Just move the lid from one can to the next. Have spare lids and rings staged to seal the used cans when full. Commercial rock stoppers are available from NFS/RPS, web site: www.nfsrps.com or Nilfisk, at web site: www.pa.nilfisk-advance.com.
2. Indian Point Power Reactor requested shielding information (attachment 1) showing the effect of different materials/protective clothing and beta radiation. They recently experienced radiological conditions where high-beta emitting isotopes were present in sufficient amounts to cause ion chamber instruments to indicate a factor of 10 or higher than the actual gamma field. The betas were from Pr-144 and Rh-106.
3. Washington Closure Hanford subcontractors visited the ALARA Center seeking advice for tar removal from the surface of 116-C tank in preparation for demolition. We suggested they contact United Western Supply, which specialize in surface preparation. United Western Supply phone number is (888) 873-1066. You can also internet search “surface preparation” to find companies that specialized in that type of work in your location.
4. DOE Office of River Protection, TF Engineering, visited the ALARA Center to gather information about gamma cameras. The focus of the visit was to determine if a gamma camera could assist in mapping and clean up of the waste spill at S-102. For further information on gamma cameras, including an evaluation by Argonne National Laboratory on how gamma cameras assist D&D activities go to www.edocorp.com/NuclearDetectionImages.htm.
5. The ALARA Center continues to provide support for glove bag training as part of the RCT continuing training program. The course includes classroom training and "hands-on" practical exercises for students to practice working with and inspecting glove bags.
6. A CH2MHill Radiological Engineer contacted the ALARA Center to request information about how to obtain a gamma camera in support of clean up and recovery of the Tank Farm S-102 spill. We also provided “Guidelines for Decontaminating a Spill” (attachment 2) with the other requested information. S-102 spill recovery planning is ongoing.
7. The ALARA Center provided three new glovebags to WCH for anomaly processing. T-Plant originally ordered the glovebags but could no longer use them. The Center still has about 12 4 ft X 4 ft glovebags still available. Contact the ALARA Center if you would like some of these glovebags.

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New Process, Tools, or General ALARA Information

1. C2IR Services performs infrared thermal imaging and analysis to locate faulty lighting panel breakers, electrical hot spots, breaker connections, liquid in piping or walls, and even rebar in concrete walls. D&D could use this service to ensure there are no energy hazards in walls or buildings prior to demolition. This facility maintenance could also utilize infrared thermal imaging for several maintenance tasks. For more information about C2IR, contact them at (800) 450-7959. For more information about the use of infrared thermal imaging you may wish to review DOE Innovative Technology Summary Report, "Non-Intrusive Liquid Level Detection System" at <http://apps.em.doe.gov/OST/pubs/itsrs/itsr2403.pdf>.
2. We revised the "ALARA Center Fixative List." (attachment 3) to include three additional fixatives. The list is now on revision 10. We added Roadmaster Liquid Calcium Chloride, Durasoil, and Guar Tackifier and the MSDS for Rust Doctor. Please contact us if you have any questions.
3. Russell Silver of Hexarmor Gloves will be on site next week to demonstrate two new cut and puncture resistant gloves. One glove is a knit (item number 9011) and the other is leather (item number 5037). Hexarmor products can be view at www.hexarmor.com . Let us know if you have any specific questions that you would like us to ask Hexarmor next week.
4. The Savannah River Site (SRS) ALARA Center forwarded information about an event where a radiologically controlled Nilfisk vacuum HEPA filter failed during use. Apparently, the HEPA filter degraded to the point of failure when collecting concrete dust and nickel debris that was "dime" sized. The larger material penetrated the HEPA filter. SRS intends to issue a lesson learned soon. For more information about this event or the SRS ALARA Center, visit their website at www.srs.gov/general/programs/alara/alara_center.htm. For information about a simple method to avoid vacuum HEPA filter damage, see the information about "Rock Stoppers" on page one, item one, of this report.
5. Craftsmen often come to the Center and ask about inexpensive inspection cameras to look inside valves, tanks or pipe. The Ridge SeeSnake micro inspection camera fits most of their needs, and for about \$300.00. The SeeSnake micro has a 2.4 in. color display, lighting, and can be equipped with a reach of up to 30 ft. For more information about the SeeSnake or other Ridgid equipment, visit them on the internet at www.ridgid.com.

Decommissioning and Deactivation Activities and Information

1. Brookhaven National Laboratory Environmental Restoration Project generated a Lessons Learned (attachment 4) for DOE. The Lessoned Learned titled, "Don't Let Your Guard Down When Preparing Facilities for Decommissioning and Decontamination."
2. Florida International University and the ALARA Center have begun testing the question and answer section of the D&D website. The website, designed for anyone looking for D&D information, has a question and answer section that will direct specific questions to subject mater experts around the country. The web site should be up and running in February 08.

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Contacts

Come visit us at the Fluor Hanford ALARA Center; we are located on the Hanford site at 2101M/200E/226. We will do our best to help you with your radiological engineering, ALARA, and D&D challenges. You can also send us questions via e-mail or by phone. Contact information is below.

Jeff Hunter (509) 373-0656, Cell (509) 948-5906, jeffrey_l_hunter@rl.gov
Larry Waggoner (509) 376-0818, Cell (360) 801-6322, larry_o_waggoner@rl.gov
Jerry Eby (509) 372-8961, Cell (509) 528-3094, gerald_l_eby@rl.gov

ALARA Center Website: www.hanford.gov/rl/?page=974&parent=973

Attachments:

1. Shielding Materials
2. Guidelines for Decontaminating a Spill
3. ALARA Center Fixative List
4. DOE D&D Lesson Learned

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Attachment 1

Shielding Materials

Most radiation fields at Hanford are combinations of different kinds of radiation. Normally, temporary shielding is installed to reduce dose rates from fast neutrons, thermal neutrons, beta, and gamma radiation.

Fast neutrons are attenuated by materials containing large amounts of hydrogen. The interaction of the fast neutrons with hydrogen slows the neutron to thermal energies where they are more easily attenuated. Dense metals, such as lead, will also slow fast neutrons by inelastic scattering at higher energy levels. Shielding materials commonly used are water and polyethylene.

Thermal neutrons are slowed by water/polyethylene and can be virtually eliminated by the presence of high thermal neutron cross-section materials such as boron, lithium, or cadmium.

Beta radiation is best shielded using materials with few protons and neutrons in the nuclei so that bremsstrahlung, a secondary radiation similar to gamma, is not created. Plastics, rubber, concrete, and light metals like aluminum make good beta shielding. Rule-of-Thumb: Range of beta particles in air is ~12 feet/Mev of energy.

Energy (Mev)	Plastic (Lucite) (inches)	Concrete (inches)	Aluminum (inches)
0.5	0.1	0.05	0.05
1.0	0.2	0.1	0.1
2.0	0.3	0.2	0.2
3.0	0.4	0.3	0.3

Percentage of 1 Mev Beta Radiation Shielded by Various Common Materials/Equipment

Materials/Equipment	% Shielded
Cotton coveralls	20
Plastic Hoods/goggles	30
Cotton or rubber gloves	30
Neoprene gloves	50
Paper (0.3 mm)	90
Safety glasses or respirator	90

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Shielding Materials continued

Gamma radiation is best shielded with lead or other high-density materials such as steel, lead, concrete and tungsten. The gamma radiation reacts with electrons and denser materials have more electrons in each atom.

Shield material half-value layer in inches for gamma radiation:

Energy (Mev)	Lead	Iron	Concrete (150 lb/ft ³)	Water
0.5	0.2	0.4	1.3	3.0
1.0	0.3	0.6	1.8	3.9
1.5	0.5	0.7	2.3	4.8
2.0	0.6	0.8	2.6	5.5
2.5	0.6	0.9	3.0	6.2

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Attachment 2

DOE Lessons Learned (www.eh.doe.gov/ll) was forwarded to you by the ALARA Center. If you have questions about Lessons Learned, please visit the DOE Lessons Learned website.

Title: YELLOW - Don't Let Your Guard Down When Preparing Facilities for Decommissioning and Decontamination

Lesson ID: 2007-CH-BNL-ERP-001 (*Source: User Submitted*)

Originator: Brookhaven National Laboratory Environmental Restoration Projects

Date: 6/4/2007 **Contact:** Dean Atchison, (631) 344-7854, atchison@bnl.gov

Classifier: N/A **Reviewer:** Edward A. Sierra

Statement: - When reducing system operations and building occupancy while preparing facilities for decommissioning and decontamination (D&D), a formal assessment of the need for active systems and their operation should be performed to eliminate unnecessary systems as soon as practical. Prompt de-activation of systems that are no longer needed will reduce the risks from system component failure and minimize surveillance and maintenance needs.

- System operations manuals/procedures should be revised and reissued to reflect the modified functionality of systems remaining in operation to support D&D of a facility. This includes the need for routine system surveillance and functionality checks of alarm annunciation panels.
- Facilities that are being deactivated in preparation for D&D are vulnerable to a loss of continuity in required routine inspections and maintenance. This may occur due to the departure of key personnel previously responsible for implementing surveillance and maintenance or the result of inadequate planning.
- When deactivating facilities in preparation for D&D there is the potential for adverse "system" effects when components are operating in a state of disrepair. Allowing a system to operate with a component in a state of disrepair (e.g. cooling tower cooling fins) can lead to the failure of a significant component (e.g. pump seal failure from tower debris) within the system.

Discussion: On September 19, 2006, Brookhaven National Laboratory's (BNL) permanently shutdown High Flux Beam Reactor

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(HFBR) experienced extensive flooding within the reactor building due to mechanical failure of an air conditioning unit cooling water pump seal. Approximately 26,000 gallons of water originating from the BNL domestic water system was spilled into the equipment level of the reactor building. Although the source of the spilled water contained no hazardous or radioactive contaminants, analyses of samples removed from the accumulated spilled water within the HFBR indicated elevated tritium concentrations. The clean air conditioning water that was released in the building absorbed residual tritium from within the HFBR. As a result, all 26,000 gallons of spilled water was handled and processed as liquid radioactive waste.

Analysis: A team was commissioned to conduct an independent investigation and causal analysis of this event using the "Barrier Analysis" technique. The causal analysis resulted in the identification of the following list of root causes:

- Supervisory alarms "disabled" eliminating remote alarm function
- HFBR D&D status resulted in reduced maintenance of alarm panel
- HFBR D&D status resulted in reduced maintenance of air conditioning cooling towers
- Inadequate management control for the reductions in Surveillance and Maintenance (S&M) of the remaining systems while preparing the HFBR for near and long-term D&D

Actions: The following recommendations were proposed to prevent recurrence of this event:

- Perform an analysis of the remaining active systems within the HFBR and determine its need and necessity throughout the remainder of the near and long-term D&D activities. Based on the results of the analysis, remove unnecessary systems from service and modify remaining systems to meet the current needs.
- Install a leak detection system in vicinity of remaining liquid systems within the HFBR.
- Revise the HFBR S&M manual to reflect routine scheduled maintenance necessary to ensure the HFBR is maintained in a safe, reliable and compliant condition.

Savings: Avoidance of leaking water into a radiologically controlled area saves approximately \$15/gallon in remediation cost.

Keywords: DECOMMISSIONING AND DECONTAMINATION,

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SURVEILLANCE AND MAINTENANCE, DEACTIVATING

Hazard(s): Environmental Release, Radiological Release

ISM Code(s): Analyze Hazards, Define Work, Develop / Implement Controls

Work Function(s): Decontamination & Decommissioning, Maintenance - Facility

References: Occurrence Report - "HFBR Air Conditioning Water Pump Seal Leak" EM--BHSO-BNL-HFBR-2006-0001

Priority Descriptor: Yellow / Caution

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Attachment 3

Fixative Common Name	Chemical	Typical Use	Hanford MSDS	Notes
Encapsulation Technologies, LLC www.fogging.com E T Glycerin Solution (ETGS)	1,2,3-Propanetriol	Applied as an aerosol to underground pits or rooms. Aerosol deposits a sticky film on all surfaces which covers all removable contamination and prevents spread.	057158	Fixative washes off easily with water or rain. Does not foul operating mechanisms or jumper fasteners in valve pits. Does not contain sugar. Can also be sprayed. Used at Tank Farms and PFP
Encapsulation Technologies, LLC www.fogging.com ETGS Invisible Blue	1,2,3 – Propanetriol UV – Blue Dye	Applied as an aerosol to underground pits or rooms. Aerosol deposits a sticky film on all surfaces which covers all removable contamination and prevents spread.	057802	Fixative washes off easily with water or rain. Does not foul operating mechanisms or jumper fasteners in valve pits. Does not contain sugar. Used Site wide. The invisible blue shows up in black light so coating thickness can be estimated.
Encapsulation Technologies, LLC www.fogging.com Capture Permacoat	Latex flexible impermeable barrier	Sprayed, rolled or brushed for permanent contamination encapsulation	062366	Originally formulated for ocean-going cargo containers. Very durable and very resistant to the elements
Midwest Industrial Supply, Inc. www.midwestinc.com Soil Sement	Polymer Emulsion	Normally sprayed onto surface to seal contamination in place. Has been used inside buildings to capture asbestos, beryllium, and radioactive contamination. It's cheap, easy to apply, and dries to a hard surface. Can be applied with fire hose, which makes it easier to spray large areas.	035321	Fixative does not wash off easily with water or rain. Fouls operating mechanisms or jumper fasteners in valve pits. Not normally used in valve pits. Does not contain sugar. Used at 233-S by Fluor Hanford. Point of contact for details mixing Soil Cement is: Curt Kooiker at: 509-373-3461. WCH mixes at 10:1 ratio of water to Soil Sement for covering soil. Ratio is 4:1 for inside 300 Area buildings.
Sanchem Inc. www.sanchem.com Safeguard 5022-A	Water and Glue	Normally sprayed onto surface. Seals contamination in place.	20641	Fixative does not wash off easily with water or rain. Fouls operating mechanisms or jumper fasteners in valve pits. Not normally used in valve pits. Does not contain sugar. Used at Tank Farms
Bartlett Services, Inc www.Barlettinc.com PBS	Polymeric Barrier System (PBS)	Can be applied by industrial spray equipment, paint rollers, or brushes. Seals contamination in place. Need proper ventilation.	032197	Very hard to remove. Great for long term use inside or outside. Can be diluted with water. Used Site wide. Seals bare lead to keep it from oxidizing. Has been used to "cocoon" large items that have to be left outside.

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<p>Bartlett Services, Inc. www.Barlettinc.com</p> <p>TLC Stripcoat</p>	<p>Temporary Layered Coatings - Strippable Coating</p>	<p>Can be sprayed, rolled, or brushed. Several light coats recommended. Seals contamination in place, peel-off after recommended time frames.</p>	<p>035971 Ammonia free 031937 with Ammonia</p>	<p>Easy removal. Peels up after a recommended time frame. Used Site wide. Drying time depends on temperature, thickness, and ventilation. Both products are non-hazardous after drying. Does not peel up easily if left outside for several days. Product is affected by sun's UV rays.</p>
<p>Rust Doctor www.therustdoctor.com</p>	<p>Water based latex paint.</p>	<p>Can be sprayed, rolled or brushed on. Seals contamination in place when it converts from rust to magnetite.</p>	<p>065590</p>	<p>This unique product chemically converts rusty metal to black magnetite, which is a very hard form of iron oxide. Very hard to remove. Used by BHI at 100N</p>
<p>Specialty Products Inc. www.specialty-products.com</p> <p>(SPI) Polyshield SS-100</p>	<p>Pure Polyurea Elastomer</p>	<p>Sprayed over a broad range of ambient and substrate temperatures. Seals contamination in place.</p>	<p>7629T-599</p>	<p>This system is based on amine-terminated polyether resins, amine chain extenders and MDI prepolymers. It provides a flexible, tough, resilient monolithic membrane. Used at 100N cribs.</p>
<p>Williams Power Co. www.mcnamara@wmsgrpi ntl.com</p> <p>ALARA 1146 Strippable Coating Report DOE/EM-0533</p>	<p>Water-Borne Vinyl Butyl Strippable Coating</p>	<p>Can be sprayed, rolled, brushed, poured or squeegeed onto the surface. Seals contamination in place and peels up.</p>	<p>14254A</p>	<p>Free of solvents and toxic materials. Rapid application/removal. Reduces waste volumes. Easy peel-up features after recommended time frames. Drying times depend on temperature, thickness and ventilation. Read about ALARA 1146 at http://apps.em.doe.gov/ost/ Click on "Reports", then Innovative Technology Reports and scroll to "ALARA 1146". Used Site wide.</p>
<p>Sherwin Williams www.Sherwin-williams.com</p> <p>Polyurea Special Protective Coating (SPI) Formally known as: Envirolastic AR 425</p>	<p>Polyurea Elastomer</p>	<p>Sprayed on over a board range of ambient and substrate temperatures. Seals contamination in place.</p>	<p>054806 054807</p>	<p>It provides a tough, flexible, resilient monolithic membrane. Used at Tank Farms, 222-S and BHI. Tank Farms wrote a Test Report #RPP-7806 on the chemical compatibility and physical characteristics of polyurea. You can find on the RMIS Database at Accession # D8660842.</p>
<p>Instacote Inc. www.instacote.com</p> <p>Instacote SE</p>	<p>Sprayable Polyurea Elastomer</p>	<p>Spray on application. Seals contamination in place. Meets DOT regulations.</p>	<p>056074 056075</p>	<p>Rapid curing. Impervious to moisture during application and immediately following. A very strong penetration-resistant coating.</p>

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Instacote Inc. www.instacote.com Instacote CC Epoxy 609	Two component low viscosity rapid setting epoxy. Epoxy Encapsulation Media, Curing agent	CC Epoxy is a fixative control agent used to effectively grout piping/plumbing closed and will render any contamination within pipe locked down.	060070 060071	Contamination Control Fixative. CC Epoxy 609 is compatible with Beryllium, radiological nucleotides (Plutonium and Uranium) and asbestos. Viscosity similar to water and rapidly cures to a solid.
Instacote Inc. www.instacote.com Instacote CC FIX	High solids latex based product. Vinyl Latex/Modified Poly Acrylate Coating	CC Fix can be brushed, rolled, misted, or spray applied. Seals contamination in place, leaving a hard rugged coating.	062744	Contamination Control Fixative. Designed to encapsulate and fix contaminates. Great for walls, floors, etc. allowing work to progress, by leaving a hard rugged coating. Is similar to latex paint
Instacote Inc. www.instacote.com Instacote CC Strip	Vinyl Acrylic Latex Strippable Coating.	CC Strip is water based and can be sprayed or brushed on. Seals contamination in place and peels up easily.	Not Available	Loose contamination is encapsulated in the CC Strip and is removed when it is peeled off. Highly effective in reducing contaminated areas.
Instacote Inc. www.instacote.com Instacote CC WET	Water based Anti-dusting Media	Spray applied. Controls contamination from spreading. Adheres contaminates in place and never dries out.	062550	Helps prevent airborne areas from occurring. Great for beryllium and asbestos abatement projects. Seems to be similar to glycerin and water.
Instacote Inc www.instacote.com Instacote SE Cured Plastic			062801	
Instacote Inc www.instacote.com CC T207	Made from water, glycerin, propylene glycol		063058	
Soil Conditioner: AgriGator Terra Bond www.pildyshtech.com/terra-bond.htm http://www.agrigator.com/LABELS&MSDS/GatorLabel.pdf www.agrigator.com	Water based anti-dusting media Company will mix additives to lower cure temperature, prevent freezing, and make more pliable.	Spray applied. Effectively controls visible dust emissions & potential spread of contamination.	060804	Has been used at 100N by WCH. Product comes in liquid form and is easier to dilute than Soil Cement in dry form, and results in more consistent mixtures. Much cheaper than other fixatives. Used for general dust suppression
D&D Emulsions www.ddemulsionsinc.com 419-525-4988 D&D Emulsions (419) 522-9440 Dust Bond	Dust control product that is formulated using a virgin adhesive petroleum resin suspended in a stable emulsion.	Contact ALARA Center for a report that compares Roadmaster, Dust Bond, Durasoil, and Guar Tackifier Sprayed. It penetrates, saturates, and bonds surface dust for a dust-free resilient surface	064971	Used for heavy-duty dust suppression by BHI in 100 areas. It is diluted with water for spraying. The cohesive resins penetrate the soil surface and attach themselves to the dusty fine particles, clustering them into particles that are too large to become airborne. The clustering of the particles aids in binding loose contamination and stabilizing the soil for easier excavation.

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<p>Dumond Chemicals Inc. www.dumondchemicals.com</p> <p>Certane 1000 Topcoat Certane 2000 Overcoat</p>	<p>Fixative Latex Based</p>	<p>They are a unique, versatile penetrating encapsulants for porous sprayed on asbestos/soil.</p> <p>Certane 1000 is sprayed to encapsulate and bind fibers after asbestos removal. Certane 2000 seal-coats sprayed on insulation.</p>	<p>Certane 1000 is 014786</p> <p>Certane 2000 is 014787</p>	<p>Rapidly saturates loose or friable asbestos fibers, curing to a tough coating.</p> <p>Another product is Certane 2050 that will penetrate the soil and cure to a tough, yet resilient coating.</p> <p>Dumond Chemicals also sell paint removers called Peel Away. See MSDS #033465 & #062829</p>
<p>Spraylat Corporation</p> <p>http://www.spraylat.com/gentextlong.asp?miKey=44</p>	<p>Peelable and protective coatings</p>	<p>Sprayed on products to provide a protective barrier.</p>	<p>023975 044659 061011 14047 16384 16624</p>	<p>Has been used as a protective coating for complex items that have to be shipped over public roads. Often sprayed over new boats to eliminate damage from the elements during shipment to dealers and for storing the boats outside.</p>
<p>Serpiflex Shield SSC06</p> <p>http://www.na.graceconstruction.com/custom/firestops/downloads/abatement/AB-310A.pdf</p>	<p>Aerosol Can with water-based vinyl acrylic chemicals</p>	<p>Sprayed from aerosol can onto asbestos to restrict airborne fibers.</p>	<p>016024</p>	<p>Used by insulators to seal asbestos lagging after core sampling. Can be used as a removal and post-removal encapsulant with glove bag operations. Will seal radioactive contamination too.</p>
<p>Serpiflex Shield SSA12</p>	<p>Concentrated water-based vinyl acrylic with flame-retardant fillers</p>	<p>Used to encapsulate asbestos fibers. It is nontoxic, non-combustible and doesn't contain any solvents or silicates.</p>	<p>016025B</p>	<p>Has been tested and found to be effective for at least 20 years.</p>
<p>Fiberlock Technologies, Inc Lag-Cote (6424) and Lag-Cote II (6420)</p> <p>http://www.fiberlock.com/gr/aec.htm</p>	<p>High solids encapsulant for insulation</p>	<p>Used to seal insulation fibers and cover fibers on steel, wood, masonry, and other sound surfaces.</p>	<p>027199</p>	<p>See www.fiberlock.com Dries in 1-2 hours. One gallon covers ~150 ft² with paint brush or 600 ft² with air-less sprayer</p>

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<p>FEVDI Contamination Fixatives LP3 and LP4</p>	<p>Water-borne acrylic copolymers, soluble in water in any proportion. Non-hazardous and non-flammable</p>	<p>Can be used as a temporary or permanent fixative. Can be sprayed, rolled or brushed. They contain no carcinogens.</p>	<p>LP3 is 063600 LP4 is 063601 Alcatum is 063602</p>	<p>Both LP3 and LP4 can be easily removed from a surface (even after months or years) by first spraying with a small amount of ALCATUM manufactured by FEVDI, and then, after 3-5 minutes, by rinsing with high pressure water. Made in France-Cost is \$45-\$90/gal shipped to Hanford</p>
<p>Acrylic Paint</p>	<p>Exterior paint can be a good fixative if there is a way to apply it.</p>	<p>Sprayed, rolled or brushed.</p>	<p>Various</p>	<p>Often, the best fixative is exterior acrylic paint. It's cheap and painters are familiar with how to apply it.</p>
<p>Pre Prime 167 Rust Penetrating Sealer sold by Devoe High Performance Coatings at 1-888-424-2847 Option 1. http://www.duspec.com/datasheet/datasheet.pdf?documentFormat=pdf&systemSetId=13&productCode=167&documentType=datasheet&submit=Get+Document</p>	<p>100%Solids Epoxy Sealer for masonry surfaces and penetrates metal rust. Do not thin.</p>	<p>May need respirators to apply. Penetrates up to 5 millimeters into concrete. This company sell many other paints and sealers. Recommend checking the Website.</p>	<p>058425</p>	<p>5 fixatives were compared to paint. Ekor was too expensive. Safe-Seal had 2 carcinogens. 3 remaining fixatives were tested and Pre-Prime applied easily, had good coverage, and fixed itself to concrete. It also penetrated into the concrete. Covers 25 sq metres per liter with 40 micron thickness. 30 hour dry time. This sealer is a two component product supplied in 4 gallon and 1 gallon kits. Pour together slowly and use within 4 hours. We also purchase Devran 201 Universal Epoxy Primer from this company (MSDS 058426)</p>
<p>A-B-C Asbestos Binding Compound Made by Fiberlock Technologies http://www.fiberlock.com/pr/6421.htm</p>	<p>High solids encapsulant, non-flammable; can be diluted with up to 4 parts water, similar to latex paint</p>	<p>Fixative for loose removable contamination.</p>	<p>064434</p>	<p>PFP (Stubbs) tested the product on concrete and it reacted similar to PBS. Looks like a good fixative that isn't easily removed WCH has used it on radioactive and Beryllium contamination</p>
<p>WT-HS13 High Strength Spray Adhesive Made in Port Orchard, WA http://www.ok2spray.com/HS13.pdf</p>	<p>Similar to spray contact cement</p>		<p>062721</p>	

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<p>Polo Dustcon</p> <p>Sold by Ondeo Nalco Co www.senior.com/au/dustcon.htm</p>	<p>Developed by mining industry to control dust.</p>		<p>062367</p>	<p>A dust suppressant similar to Soil Sement or Terra-Bond</p>
<p>SoilTac</p> <p>Made by Soil Works LLC, at (800) 545-5420 or www.soiltac.com</p>	<p>Polymer emulsion similar to Soil Sement, only cheaper.</p>		<p>064689</p>	<p>A dust suppressant similar to Soil Sement or Terra Bond. Applied with a fire hose to debris piles during D&D.</p>
<p>Roadmaster Liquid Calcium Chloride</p> <p>http://www.tetrachemicals.com/Products/Calcium_Chloride/Liquid_Calcium_Chloride/ROADMASTER.aqf</p>	<p>Liquid Calcium Chloride. Recommended application rate is</p>	<p>Surface dust control, soil stabilization on unpaved roads, road shoulders, embankments, stockpiles and construction sites.</p>		<p>Contact ALARA Center for a report that compares Roadmaster, Dust Bond, Durasoil, and Guar Tackifier</p>
<p>Durasoil</p> <p>http://www.durasoil.com/index.php</p>	<p>Recommended Application Rates are at: http://www.durasoil.com/apprates.php</p>	<p>Ultra-pure synthetic organic fluid</p>	<p>063794</p>	<p>Can be applied, regardless of weather conditions. Contact ALARA Center for a report that compares Roadmaster, Dust Bond, Durasoil, and Guar Tackifier</p>
<p>Guar Tackifier</p> <p>http://www.southwestenvironment.com/tackifiers.asp</p>	<p>Usage per acre - apply at a rate of 30 lbs of ENVIRO-TAK with 150 lbs of fiber mulch in 800 gallons of water and apply as an overspray.</p>			<p>Contact ALARA Center for a report that compares Roadmaster, Dust Bond, Durasoil, and Guar Tackifier</p>

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Attachment 4

Guidelines for Decontaminating a Spill Area that Can't be Released within a Few Days

Sometimes radioactive material is spread when a spill occurs. If the spill is in a small area, it can usually be cleaned up quickly and the area released from radiological controls. Some spills are much larger and occur on complex surfaces that contain crevices or surfaces that absorb the contamination, i.e., soil. The following guidelines may be useful in establishing a disciplined process to contain the spill and then attack the cleanup and release of the spill area.

1. Ensure the spill has stopped and actions have been taken to keep the spill from spreading. This may require covering the spill area with a tarp, painting all surfaces with a strippable decon paint, spreading absorbent in the spill area, or some other technique.
2. Take surveys, especially air samples in the downwind direction if the spill is outside a radiological work facility. Establish a perimeter around the spill and post with Radcon Warning Signs.
3. Assign someone to be in charge of the decontamination effort. That person needs to immediately determine how many resources are available and obtain a charge code to pay for the cleanup. If the spill is in a radiation area, a current radiation survey should be taken and a dose estimate prepared. Establish a "command center" near the spill area and prepare detailed maps that can be used to show what areas are being controlled and the current contamination levels.
4. If the spill occurred on the ground or inside a building it is desirable to layout gridlines to track contamination levels and document which areas have been decontaminated. Record these lines on the maps at the command center and on the Radcon Survey Forms. Identify these gridlines with letters and numbers so that each grid square can be tracked. For Example: If letters are assigned to each vertical line and numbers to each horizontal line the upper left corner of each grid square will have a unique identifying number. The gridlines can usually be marked with tape, rope, stakes or landmarks.
5. Determine whether the spill has to be cleaned up, can be covered and posted as a Fixed Contamination Area, or can be contained until D&D activities begin later. Decide "How Clean is Clean". Note this decision may change after several attempts to decontaminate the area have failed. Other factors that affect this decision include whether the area was contaminated before the spill occurred, radiation levels in the spill area, weather conditions (if outside) and available resources.
6. Determine the best strategy to accomplish the decontamination. Normally, spills are cleaned from the lowest levels and work towards the higher levels. If you don't have a detailed survey of the work area you will have to base your strategy on what you know. You may decide to wipe down the entire area before attacking each individual grid square. Look for patterns of contamination spread from the source. If the spill occurred outside, assess what's in the spill area. In the past, spill areas have included vehicles, buildings, tools, equipment and materials. If inclement weather is a factor, concentrate initial efforts on keeping the contamination from spreading. If the wind is blowing, set up a windbreak and clean from the upwind side in the downwind direction.

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7. If the spill occurred in a radiological work facility the floor tiles may be made from asbestos. Sometimes the floors have more than one layer of tiles and the lower layers may be asbestos. Asbestos removal will complicate the cleanup. You may want to consider wiping up the accessible contamination and paint the floor to fix the contamination remaining in crevices. Then post it as a "Fixed Contamination Area" and leave the tile removal to a D&D contractor.
8. Hold a planning conference to organize the different groups and coordinate the decontamination efforts. If technical work documents are required, have them prepared and approved. Determine what is to be done with the waste. Stage the required protective clothing and materials.
9. When all preparations are complete, hold a pre-job briefing and layout the plan and what is to be done that shift. Hold a Plan-of-the-Day meeting each day to provide status and identify what assistance is needed from support organizations. Document the results of the POD so Managers do not have to keep giving verbal status to everyone. Distribute the POD to key managers that have a "need-to-know".
10. Begin the decontamination and take surveys as you go. Release grid squares as you go and when appropriate, move the perimeter posting in to reduce the size of the spill area. If the decontamination is going to take several days, recommend a dedicated team of personnel be assigned so there is consistency and no question about where surveys were taken. If dose rates are high enough to require rotation of personnel to lower their dose, try and keep lead personnel to maintain consistency.
11. Interview workers and RCTs performing the work to obtain recommendations on improvements. Modify the plans, as necessary. Start each shift with a pre-job briefing and emphasize what has been accomplished, what problems exist, and what actions are required.
12. Take enough surveys in each grid square to be representative of what's there. These surveys may include smears, large area wipes and samples of paint, concrete, soil, etc. When you're satisfied that the grid square has been decontaminated and you have the surveys to prove it, recommend inviting another person not involved in the project to review the surveys and concur that each grid square has been decontaminated and can be released.
13. At the control center, update the detailed maps to show the status of the decontamination. Each time a grid square is released, mark it off.
14. Continue to move the perimeter in as the size of the controlled area shrinks. Once the entire area is released from radiological controls hold a debriefing to document lessons learned. Assign actions with due dates as appropriate. Follow-up later to ensure all actions were completed.
15. Prepare a package of the survey data, reports, and photos for historical purposes.