PROJECT MANGEMENT PLAN EXAMPLES

Safety Integration - Hazard Identification and Characterization Examples

Example 13

2.02.04 Hazard Baseline Documentation

The following is a listing of the hazard baseline documentation for the facility:

- DPSTSA-300-3A, Addendum 1, Revision 1.a, *Justification for Continued Operation*, April 1997.
- Procedure 322-M of Manual 2Q2-4-M, *322-M Fire Control Preplan*, April 30, 1995.
- SSD-ALW-94-0609*, Depleted Uranium Holdup in MBA M22*, September 30, 1994.
- RRD-RMT-940037, Final Report - Nuclear De-Inventory of 300-M Area Laboratories, October 31, 1994.
- IOM C. J. Bearden to R. H. Ross, *Building 322-M Exhaust Duct Inspection*, July 11, 1990.
- NMP-RMT-920299, Revision 0, *Investigation of Uranium in M-Area Process Sewer*, December 30, 1992.

6.01.01 Characterization and Hazards Identification

Accountable Nuclear Material

The inventory of nuclear material (i.e., enriched and depleted uranium) stored in the 322-M Metallurgical Laboratory has been removed (Reference #11). However, the book value for the 322-M Metallurgical Laboratory Material Balance Area (MBA) shows 36 kg of depleted uranium.

A radiological survey of the ductwork in the Process Exhaust Systems indicated a worse case accumulation of less than 15 grams of U-235 and 4.3 kilograms of U-238 (Reference #12). A radiological survey and video inspection of the Process Drain Lines detected deposits of depleted and 0.939% enriched uranium (Reference #13). Analyses from discrete sections of the lines were extrapolated to the entire drain system and indicated a worst case accumulation of 10.4 kilogram of U-238. The data obtained from these surveys demonstrates the absence of fissionable amounts of U-235 and therefore the deposits in the ducts and drains have no potential for producing a nuclear criticality event (Reference #14).

Based on the two inspections, 14.7 kg of the U-238 identified as being in the MBA is believed to exist in the Process Exhaust Systems and the Process Drain Lines. The balance is attributed to the accumulations of normal operating losses and measurement errors over the 34 years of operation of the facility (Reference #14).

Also, there is a low potential for a release of the U-238 in the Process Exhaust Systems and the Process Drain Lines to the environment. The 322-M Metallurgical Laboratory Process Drain Lines empty into the M-Area Process Sewer System and then flows to 341-M, the Dilute Effluent Treatment Facility (DETF), for processing. The majority of contamination in the Laboratory Process Exhaust System is in the ducts internal to the building and the high molecular weight of the contamination precludes its easy dispersion.

The following discussion of the 322-M Metallurgical Laboratory contaminated areas is based on Radiological Survey Log Sheets (RSLS) prepared at the time of the shutdown of the facility.

Exterior Radioactive Contamination Areas

Nine CAs exist on the exterior of the 322-M Metallurgical Laboratory. These nine CAs originally had transferable contamination ranging from 1600 to 120,000 dpm/100 cm^2 alpha and 4,000 to 300,000 dpm/100 cm^2 beta-gamma. Eight of the CAs are on the East side of the facility immediately adjacent to various Process Exhaust System blowers and HEPA filter housings. The other CA is on a building footing at the South end of the West side immediately outside of Room 127.

Of the eight CAs on the East side, all but one are associated with the footings and supports for the Process Exhaust System blowers and HEPA filter housings. The only exception is the CA that was caused by a leak in one of the two overhead lines that carry contaminated Process Waste and Process Coolant from 322-M to 340-M. The leak may also have contaminated approximately 10 ft. by 3 ft. area of soil immediately adjacent to the building.

After limited decontamination, the exterior CAs were painted with two coats of paint during FY95, with the base coat being a magenta color and the surfaces were then posted as fixed contamination areas.

In addition to these fixed contamination areas, all the HEPA filter housings and the duct that runs into the building are posted as having internal contamination. These postings are based on readings taken of the HEPA filters when the blowers were shutdown and the HEPA filters removed. These readings ranged from 400 to 6,000 dpm/100 cm^2 alpha and 4,000 to 300,000 dpm/100 cm^2 beta-gamma.

Interior Radioactive Contamination Areas & RBAs

There are three Radiological Buffer Areas (RBAs) in the facility:

- The first RBA is comprised of Rooms 131, 132, 133, 134, 136, 137 & 138 where high enriched uranium samples were prepared for examination. Room 131 contains two hoods, a cutoff saw with a glove box and a Mott Filter System, and most of the room is posted as a CA.
- The second RBA is comprised of the Rooms 107, 108 & 109 where depleted uranium samples were prepared for examination. The Southeast corner of Room 109 contains two saws, two grinders, a lathe and miscellaneous tools, and is posted as a CA. Room 108 has a 2-ft. by 2 ft. fixed contamination area located on the counter top between the two hoods.
- The third RBA is the Contaminated Metal Preparation Area (Rooms 123, 124 & 125).
- In addition to the three RBAs with their CAs, two other contaminated areas exist within the 322-M facility:
- A trench approximately 6 in. wide and 6 in. deep along the entire West wall and part of the North and South walls of Room 128 is posted for internal contamination.
- A 2-ft. by 2 ft. fixed contamination area is located on the North side of Room 112.

Though not the case recently, at one time or another radioactive material was handled in most of the laboratory rooms of the original 1956 section of 322-M. Over the years these rooms were "rolled back" to clean areas. For this reason, it is prudent to assume that the sub-flooring and walls behind the baseboards of these rooms may be contaminated. Therefore, the appropriate ESH&QA precautions should be taken when activities are initiated in these rooms that disturb the sub-flooring and the wall behind the baseboards.

Laboratory Hoods

There are twenty-three laboratory hoods and two glove boxes in the 322-M Metallurgical Laboratory. The first RBA, comprised of Rooms 131, 132, 133, 134, 136, 137 & 138, has seven hoods and one glovebox. The second RBA, comprised of Rooms 107, 108 & 109, has three hoods. The third RBA, comprised of Rooms 123, 124 & 125, has six hoods and one glovebox. Outside of the RBAs there are two hoods in Room 112, four hoods in Room 127 and one hood in Room 128. With the exception of one of the four hoods in Room 127 (the Chemical Milling and Micro Etching Laboratory) which is not contaminated, all have been sealed and labeled as contaminated.

Radiological surveys determined that twelve of the hoods had contamination levels originally from 400 to 200,000 dpm/100 cm^2 alpha and 10,000 to 1,500,000 dpm/100 cm^2 beta-gamma. Most of the transferable contamination in these hoods was removed, the internal surfaces double-painted, and the inside posted as having internal/fixed contamination. These hoods were then closed, sealed, and posted on the outside for known internal contamination.

The remaining ten hoods with a radiological history were sealed and posted on the outside as having internal contamination as a conservative measure in the event that with the passage of time contamination in the hood ducting might migrate down into the hood. The sealing of all laboratory hoods makes the migration of hood residual contamination out of the facility and into the environment a remote possibility.

Excluding the hoods in Room 125 (the hot cell room), hoods with flexible hoses for ducting have been disconnected from the Process Exhaust System and the ends of the ducts sealed with tape. Hoods with metal ducting (Room 112 and Room 127) have been isolated by closing their dampers. For minimal long-term care, the taped ends of the exhaust ducts will need to be replaced with a more robust closure since the tape may eventually come loose in the environment of the closed facility.

Glove Boxes

The two glove boxes in the facility are connected to equipment. One glove box is in Room 125 and is a pass-through glove box connected to the East side of the Hot Cell. The other glove box was used in conjunction with the cutoff saw in Room 131. Based on the operational history of these glove boxes, both are posted as having internal contamination.

Room 109 High Contaminated Area

Located immediately inside door to Room 109 to the South is a LeBlond Dual Drive metal lathe (EP 10714) with contamination levels of ND dpm/100 cm^2 alpha and 750,000 dpm/100 cm^2 beta-gamma. It is posted as a High Contamination Area (HCA).

Room 125 Hot Cell

The Hot Cell in Room 125 is also an HCA with contamination levels of 1000 dpm/100cm^2 alpha and 20 mrad/100 cm^2 beta-gamma. This level of radioactivity could result in a contact extremity dose rate of 1155 mrem/hr at 5 cm, a wholebody dose rate of 5 mrem/hour at 30 cm and a skin dose rate of 69 mrem/hour at 30 cm. Cell contents such as broken saw blades, plastic & paper trash, pieces of bar stock, hand tools and fines from the top of the cell table were removed in FY95 to the extent practical without a major D&D effort. The cell cask and vacuum cleaner were left in place with their lids removed to facilitate future visual surveillance. The inner cell door, the inlet ventilation duct, the manipulator penetrations, the glove box access and all interior seams were sealed. The exterior cell door was tack welded shut.

Room 125 Radioactive Material Area

Located in the Southeast corner of Room 125 is a small RMA with miscellaneous equipment and supplies collected from the RBA comprised of Rooms 123, 124 and 125.

Hazardous Energy

Chilled water, process water, domestic water and plant air (100 psi) are isolated exterior to the facility. The steam supply has been double isolated from the facility; at the main line to the facility and on the two steam manifolds for the facility. Electrical power continues to be supplied to the facility. This electrical power is fed into the facility via two major load centers (Rooms 121 & 147) located in the Northwest corner of the facility.

Fire

Metal fines from grinding and lathe operations were a Class D fire concern during operations, but are no longer present in significant quantities which makes a Class D fire an incredible event. All readily removable paper, wood and oil were removed during FY95. Wood studs and ceiling rafters in the 1956 and 1961 sections still remain and are covered by sheet rock on the interior which minimizes the potential for a fire in an interior room to spread to the wooden structures in the attic. However, as long as power is fed to the load centers in 322-M for lighting and general purpose 120 volt AC the possibility of a Class A fire still exists, primarily in the attic where the wood is exposed.

FDD applies a graded approach to fire protection in the inactive facilities it manages. The *FDD Fire Protection Plan* (Reference #15) describes how FDD implements its graded approach while remaining in compliance with the WSRC Procedure Manual 2Q, *Fire Protection Program*. Due to it's non-occupied and non-operational state with no current or future mission, a Fire Hazard Analysis is not required for 322-M. The *322-M Fire Control Preplan* (Reference #16) delineates the information available to the WSRC Emergency Response personnel in responding to a fire. When deactivation of 322-M is complete, the *322-M Fire Control Preplan* will be revised to reflect the post-deactivation status of the facility.

Structural

The steel frame structure and exterior transite panels and steel panels are structurally sound. The roof shows no obvious signs of roofing failure. All exterior doors to the facility are intact and locked.

Asbestos

- Transite paneling was used for exterior sheathing on the original section of 322-M Metallurgical Laboratory and the 1961 addition. Duct and pipe insulation in the facility has been inspected for asbestos and has been properly labeled.
- There is no identified friable asbestos in 322-M. Other potential sources of asbestos containing material (ACM) in 322-M include:
- Floor tile
- Steam line insulation
- Mastics
- Equipment gaskets
- Water heater insulation
- Some installed piping
- Waste characterization during the final decommissioning phase will identify whether any of these materials are ACM.

Fluorescent Light Bulbs

All fluorescent light bulbs in 322-M remain installed.

Polychlorinated Biphenyl (PCB)

PCB is an EPA-regulated substance under the Toxic Substance Control Act (TSCA). The major liquid sources of PCB (transformers, lube oil, etc.) were removed from 322-M in the mid-eighties as part of a site-wide PCB clean-up program. PCB may still be present in the fluorescent light ballasts, in residual oil films on equipment, and in the paint applied to equipment or components prior to 1982.

Equipment and other material from the facility will need to be surveyed and sampled prior to removal for disposal to verify that a concentration of PCB over the EPA limit does not exist. This verification is necessary since no low level radioactive waste disposal site will accept items that exceed the EPA PCB limit. Disposal sites are available, however, for solid waste contaminated with PCB that is not also a radioactive waste.

Lead

Lead patches were used to seal some openings in the Transite paneling and lead-headed screws were used to fasten the Transite to the steel beams. The word " lead " has been painted on the patches. In addition, poured lead was used in the Sanitary Sewer line joints.

Batteries

Nickel-Cadmium (Ni-Cd) batteries discovered during de-inventory were removed and managed as hazardous waste. Lead batteries discovered during de-inventory were also removed from service and managed appropriately when the related equipment was no longer needed.

Mercury Vapor Light Bulbs

All mercury vapor light bulbs in 322-M remain installed.

Other Hazardous Materials

The only other known hazardous materials used in 322-M were laboratory chemicals that have already been removed from the facility.

Freon®

Freon was purged from all major HVAC equipment and collected for recycling. With the exception of three window air conditioning units, no Freon exists in refrigeration equipment in 322-M. The three window air conditioning units remaining in the facility are likely to be removed for reuse (with the Freon intact) before deactivation is completed.

Tritium

There are no process sources of tritium remaining in the facility. There are some exits signs containing tritium sources still in place.

Miscellaneous Controlled Materials

Oils and coolants were drained, to the extent practicable, from process equipment remaining in the facility and disposed of in accordance with SOP 300-263, *Used Oil Management* . Therefore, only residual amounts of hydraulic oil, lubricating oils, saw coolants, and grease should remain in or on equipment.

Example 14

4.4 Characterization Approach

The 771/774 Closure Project requires that the physical, chemical and radiological condition of each workset be assessed. Characterization is the process of identifying what physical, chemical, biological and radiological hazards are associated with a workset and/or facility. The hazard may be contained (e.g., acid in a tank) or loose (e.g., radioactive material on a floor). The hazard may be potential (e.g. pressurized steam line) or immediate (e.g., a leaking pipe that contains radioactive material). Characterization is achieved through a combination of facility walkdowns (physical walkdowns), review of historical records, information from similar buildings, interviews of personnel familiar with building operations, direct measurement, non destructive assay and sample collection for laboratory analysis. The characterization data will be utilized for assessing actual and potential hazards as a basis for the development of the technical approach to work activities, and to support the proper disposal of property and waste.

This section discusses the types and phases of characterization that have been and will be completed for the 771/774 Closure Project. The Data Quality Objectives (DOO) process will be utilized for the characterization activities as discussed below. Additionally, the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) will be adapted for the final surveys for this project. The Site's Decontamination and Decommissioning Characterization Protocols are being developed and are scheduled for implementation in December 1998. These Protocols, which include guidance on both the DOO process and MARSSIM, provide a consistent sampling and analysis process for characterization activities.

Scoping Characterization

The Scoping Characterization phase is the process of gathering information about facilities' hazards from existing sources. The main sources of this information are historical records, routine survey records, facility walkdowns and interviews with facility personnel and former facility personnel. Note that no additional sampling or surveys are necessary in this characterization phase. The compilation of this information is used as the basis for preliminary evaluations of proposed decommissioning activities. The Scoping Characterization phase feeds information into the Reconnaissance Characterization phase.

The 771/774 Closure Project's Scoping Characterization phase is complete. The documents that were reviewed in gathering this information are identified in the project files.

Reconnaissance Level Characterization

The Reconnaissance Level Characterization phase establishes a definitive baseline of information about the facility's hazards. The Reconnaissance Level Characterization Report (RLCR) describes the presence of materials and isotopes that will impact the closure of the 771/774 cluster. The importance of the presence of these items is based on both worker safety and waste disposal/regulatory concerns.

Each of the isotopes or materials has been identified through investigation of facility-related documents, walkdowns of the facility, a review of historical data and process knowledge. The RLCR may be used, as a basis to define the required sampling needed to support facility deactivation, decontamination and structural demolition. Additionally, the RLCR provides information to support ALARA (As Low As Reasonably Achievable) planning for the protection of the workers and environment. The RLCR also provides preliminary characterization data to be used for the preparation of work procedures. As discussed below, additional detailed characterization may be required. This RLCR for Building 771/774 was submitted on August 8, 1998.

Building 790 was recently added to the 771/774 cluster; the decommissioning work scope will be part of this project (added as workset 82). A RLCR has not been completed for the Type 1 and 2 buildings associated with this cluster, no decommissioning work will commence in these buildings before a RLCR is completed and submitted to the LRA.

In-Process Characterization

To supplement the Reconnaissance Characterization, additional radiological, chemical samples and safety surveys will be completed as necessary, to prepare appropriate work authorization documents such as Radiation Work Permits (RWP), a Job Hazard Analysis (JHA), and the Integrated Work Control Package. (See section 4.8) These job-planning surveys are performed in accordance with existing site procedures. If conditions have changed, reviews will be performed as appropriate to determine if other actions/controls are necessary. The Decontamination and Decommissioning Characterization Protocols do not cover these job-planning activities.

After all work sets are completed in an area and hazards are removed, further characterization may be performed to verify the effectiveness of the decommissioning work efforts. This continued sampling and surveying is called In-Process Characterization. This characterization will be conducted in accordance with the Decontamination and Decommissioning Characterization Protocols.

Final Building Survey

The Decommissioning Program Plan (DPP) requires that "at the end of the decommissioning, site personnel will confirm that their activities have achieved the- release standard for buildings destined for reuse or the completion of building disposition for buildings that are demolished such that only environmental restoration activities remain."

Accordingly, the Final Building Survey is conducted to demonstrate that the radiological and industrial contaminants within the facility have been reduced to levels that comply with the established release, criteria. If unable to reach free-release criteria (see para 4.7.1), the building will be disposed of as LLW. A Sampling and Analysis plan, to be approved by the LRA, will be developed in accordance with the Decontamination and Decommissioning Characterization Protocols, it is intended to be utilized to execute the characterization of the remaining hazards on or below the slab. The plan will be included with the DPP revision for building demolition (see section 2). The Final Building Survey report will be included as part of the project's administrative record and turned over to the Contractor's Environmental Remediation Department for final site remediation.

Slab/Under Building Characteristics

This sampling and analysis will be conducted to characterize and rank the remaining building slab and under building contamination. The results of this survey will be used to prepare for environmental monitoring and remediation.

Independent Review of Final Building Survey

In order to verify that the facility meets established release criteria, an independent company will conduct a review of the Final Building Survey. DOE will approve the selection of the independent company. This independent review will not be conducted for material being released as LLW. The independent review provides an independent evaluation of the Final Building Survey methodology, survey data, field sampling and laboratory methods and results. All discrepancies and anomalies identified will be addressed.

Physical Characterization

Full physical walkdowns of the facility are being conducted to obtain the physical characterization of the facility. This includes dimensional data as well as physical details such as the amount of lead shielding, Benelex, number of High Efficiency Particulate Air (HEPA) filters, etc. It will also gather data concerning physical items contained within the equipment such as tools, pumps, vessels, etc.

4.4.1 Radiological/SNM Characterization

4.4.1.1 Radiological Contamination/Penetrating Radiation Characterization

The radiological characterization of the facility and equipment will make use of the existing operational radiation protection surveys supplemented by additional surveys to determine the presence and/or level of radiological contamination. The radiological monitoring of radiation exposure levels, contamination and airborne radioactivity will comply with the requirements of 10 CFR 835, RFETS Radiological Control Manual, NUREG 5849, 'Manual for Conducting Surveys in Support of License Termination, Decommissioning Characterization Protocols' and the site Radiological Control Manual and it's applicable procedures (i.e. Radiological Safety Practices). Trained and qualified personnel using instruments that are property calibrated and routinely tested for operability will perform the characterization surveys. Training requirements are specified in the Training Users Manual. The results of radiological surveys will typically be documented on a diagram. The documentation will contain sufficient detail to permit identification of original survey and sampling locations.

Using the facility operations and radiological history, sampling locations will be selected to quantify, radioactivity based on suspected or known contamination at a given location. Examples include horizontal surfaces such as the tops of gloveboxes and piping in overhead areas. Other random locations of unaffected areas mail be selected to confirm no radiological concerns exist. Examples of these include office areas and areas where radioactivity is not expected.

It is not intended to consider this characterization the final assessment by which worker protection and safety decisions will be made. Additional characterizations will be performed as required to prepare work authorization documents. This type of characterization will typically be performed shortly before work is initiated to ensure conditions have not changed and to more accurately assess those hazards. This characterization will be used to determine appropriate personal protective equipment to ensure worker health and safety.

4.4.1.2 SNM Holdup

Holdup is defined as the amount of nuclear material remaining in process equipment (e.g. gloveboxes, ventilation ducts) and facilities after the in-process material, stored materials and product are removed. Holdup has been found in Building 771 as oxides (Safeguards and Security attractiveness type C) or low- grade materials (type D).

To ensure the accuracy of the measurements determining the amount of remaining holdup, all background radiation sources (e.g. waste drums) will be removed from the area being measured. All packaged fissile material will be removed from the gloveboxes and a radiological survey conducted prior to the measurements. All measurement sites must be free of external radiological contamination to insure that measurement equipment is not contaminated and remains usable. Measurements are conducted in accordance with the approved site holdup measurement plan 4-81232-97-PLAN-HOLDUP-001, Revision 1 that will determine the types and quantities of isotopes present.

4.4.2 Chemical Characterization

The chemical characterization of the facility will make use of existing process knowledge supplemented by sample analysis. The characterization activities will:

- evaluate the chemical characteristics of hazardous material contamination
- assess the environmental parameters that affect potential human exposure from existing or residual chemical contamination
- support the preparation of work plans to enhance safety of the worker
- allow for estimation and compliant management of generated wastes
- ensure worker and public safety
- ensure compliant management of chemicals.

4.4.2.1 Asbestos Characterization

The objective of the asbestos material characterization is to determine the type, quantity and location of asbestos containing building material (ACM). The characterization of the building will be conducted in several phases. These phases will correspond to the work areas identified by the overall building closure schedule. Work areas will be characterized prior to the disruption or removal of suspect materials.

Asbestos material characterization includes a review of documents detailing facility history, facility construction drawings, facility walkdowns, sample collection and analysis and evaluation and documentation of results and conclusions. The asbestos characterization survey will be designed and managed by a qualified individual per the requirements of 29 CFR 1926.1101. Samples will be collected at locations identified during the review of facility drawings and walkdowns. Surveys will be performed by trained individuals following written procedures. All samples will be tracked from sample collection, transport and analysis and all samples will be analyzed at a certified laboratory. Data will be recorded in an orderly and verifiable manner and will be reviewed by a qualified Building Inspector for accuracy and consistency. A report will be prepared summarizing laboratory results including sample location, sample description, asbestos type and percentage, non-asbestos fiber types, matrix types and sample color.

4.4.2.2 Beryllium Characterization

Work areas and equipment where beryllium is known or suspected of being present will be surveyed prior to disruption or removal of such items or surfaces. Beryllium smears will be collected and analyzed from various equipment and equipment surfaces within the facility. Individuals trained in accordance with the RFETS Beryllium Control Program will conduct sampling plans and analysis.

4.4.2.3 Lead Characterization

Lead shielding and lead-based paint are known to be present in the facility. Accordingly all painted surfaces are presumed lead bearing unless proven otherwise. This approach will minimize characterization costs and ensure worker protection. Known lead will be disposed of appropriately and suspect lead will be sampled. Selected lead sampling will be conducted by collecting media samples for analysis and/or with portable lead detection equipment. Trained individuals using written procedures will conduct the sampling and analysis.

4.4.2.4 Polychlorinated Biphenyls (PCBs) Characterization

Polychlorinated biphenyl, also referred to as PCB, is a term given to a series of chemical compounds produced industrially by the chlorination of biphenyl with anhydrous chlorine and iron filings or ferric chloride as a catalyst. PCBs have been linked to liver damage and to a lesser degree, kidney damage. OSHA regulates human exposure levels to PCBS. OSHA guidelines will be implemented as appropriate to minimize worker exposure to PCBs. The primary occupational hazard associated with PCB's is skin exposure. Building 771/774 Industrial Hygiene and Safety will ensure that workers at risk of contact with PCB's will be adequately protected through engineering controls, administrative controls and personal protective equipment including PCB resistant gloves (example. Nitrile, Butyl, Viton). Other than the potential for PCBs in oil (contained in equipment or resulting from spills from equipment maintenance), adhesives and paints (in high temperature areas) and lighting ballasts, no additional contamination is suspected. In any event, OSHA guidelines will be implemented where PCBs are identified and the appropriate personal protective equipment (PPE) will be donned by workers. The 771/774 Closure Project will manage all materials <50ppm PCBs as non-Toxic Substance Control Act (TSCA) regulated.