Project Name: NV-RMAD FACILITY (CAU 113)-D&D-R

Project Name (Expanded): Nevada ARRA RMAD Building D&D [D&D of a medium size test laboratory with significant fission product contamination]

Project Type: Building / Facility D&D Project Type

Building Type: B Typ 2

Project Type Detail: Generic Radiological Facility(ies)-Extensive Loose Contamination

Supplementary Reference Documents:
- NSTec RMAD Combined Cost Proposal (RMAD IGE Estimate)
- RMAD Fact Sheet
- Corrective Action Plan for Corrective Action Unit 254: Area 25 R-MAD Decontamination Facility, Nevada Test Site, Nevada
- Addendum to the Closure Report for Corrective Action Unit 113: Area 25 R-MAD Facility, Nevada National Security Site, Nevada

Site Context:
All ARRA Projects are specific EM projects developed and executed between 2008 and 2011 in response to the American Reinvestment and Recovery Act. These projects included 18 projects at the Nevada National Security Site (NNSS, formerly the Nevada Test Site) at a total cost of over $50M. The projects exist within larger ongoing site operations, depend on those larger elements for site services and support, and typically include costs for those services as indirect costs.

The historical NNSS mission was to test nuclear explosives, initially above ground and later in below-ground test shots. The 1,375 square mile site also provided an ideal location for this and numerous other testing programs, such as the nuclear rocket program or experimental reactors. With the moratorium on nuclear testing in 1992 site diversified into many other programs such as hazardous chemical spill testing, emergency response training, conventional weapons testing, and waste management and environmental technology studies. It is a major location for disposal of LLW from DOE sites throughout the country. Much of the site work is the responsibility of the M&O contractor (currently NSTech), with Navarro-Intessa providing DOE support and environmental services.

ECAS Level 4/Parent Project Context:
The ARRA projects grouping constitutes the Parent Project grouping, since the NNSS is not a closure project. NNSS EM projects that are not part of the ARRA program are not included.

The NNSA ARRA projects are as follows:
- NV-CAU 465 SAFER PLAN-ER-R
- NV-AREA 25 AND 26 RAILROAD TRACKS (CAU 539)-ER-R
- NV-BANE BERRY (CAU 365)-ER-R
- NV-BOMBLET TARGET AREA (CAU 408)-ER-R
- NV-BUGGY (CAU 375)-ER-R
- NV-FRENCHMAN FLAT ATMOSPHERIC (CAU 106)-ER-R
- NV-FRENCHMAN FLAT UNDERGROUND (CAU 098)-ER-R
- NV-MISCELLANEOUS CONTAMINATED WASTE SITES (CAU 547)-ER-R
- NV-NEPTUNE (CAU 574)-ER-R
- NV-PLUTO DISASSEMBLY FACILITY (CAU 117)-D&D-R
- NV-PLUTONIUM VALLEY (CAU 366)-ER-R
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- NV-RMAD FACILITY (CAU 113)-D&D-R
- NV-SCHOONER (CAU 374)-ER-R
- NV-SEDAN (CAU 367)-ER-R
- NV-TEST CELL C FACILITY (CAU 116)-D&D-R
- NV-WESTERN PAHUTE MESA (CAU 102)-ER-R

D&D Facility Data:
Facilities:

<table>
<thead>
<tr>
<th>Building</th>
<th>Title</th>
<th>Area (SF)</th>
<th>In-Service Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>3110</td>
<td>RMAD Facility</td>
<td>49,000</td>
<td>1961</td>
</tr>
</tbody>
</table>

Construction Details:
The main portion of the R-MAD Building (3110) was a structural steel frame with aluminum siding and roof structure along with a two story concrete block structure were added. In addition to the office and assembly bay construction, two separate construction cycles resulted in the creation of the seven postmortem hot cells (cast in place concrete). The R-MAD Building was utilized during testing for Project Rover between 1959 and 1970 to assemble and remotely disassemble various reactors.

The R-MAD Building consists of a basement, and four floors with approximately 80 rooms. The various room types include: offices, two assembly bays, a disassembly bay, disassembly bay mezzanine, control room, seven postmortem cells, a photography room, operating and viewing galleries, equipment and storage rooms, mechanical rooms, and restroom and shower facilities. Total floor space is estimated to be 49,000 square feet [GSF]). There are three independent HEPA filtration systems that serviced the various portions of the building used for “hot” work activities.

Additional facilities structures revoked as part of the project were a stack located on the facility and an adjacent water tower (not included in the square feet of facility). An adjacent warehouse (3111) and a test and storage facility structure remain.

Facility Use:
The R-MAD Building was constructed between 1958 and 1961 and was used to support the Nuclear Rocket Development Station (NRDS) program. The R-MAD Building was used to assemble and disassemble reactor rockets associated with the Nerva, Kiwi, and two Phoebus reactor series. The assembly high bays were used to load the reactor rockets on rail cars for transfer to the test facilities. After the tests were completed, the reactor rockets were transferred back to the R-MAD disassembly high bay hot cell. The reactor rocket was removed from the rail car and large scale disassembly activities performed. The reactor sections were transferred to the smaller postmortem hot cells for detailed inspection and dissection. The fuel associated with the reactor was removed and subsequently transferred to the Idaho National Engineering & Environmental Laboratory in 1975 for reprocessing.

The R-MAD Building was placed into long-term mothball status in 1970. Reactor assembly and disassembly operations were transferred to the Engine Maintenance, Assembly, and Disassembly (E-MAD) Building. Once operations were stopped in 1970, no scheduled maintenance was conducted on the facility. After the NRDS project was deactivated in 1973, extensive demarcation
and decontamination activities were conducted. After half of the R-MAD Building was released for occupancy in 1984, the building was used to support the MX Missile Project and storage/training for the Mine Rescue Service. Since January 1999, access to the R-MAD Building has been restricted through the NTS Deactivation & Decommissioning (D&D) Surveillance & Maintenance (S&M) activity.

Processes causing contamination:
See above.

Contaminants of concern (including extent of contamination by major contaminant):

<table>
<thead>
<tr>
<th>Building</th>
<th>Chemical Hazard</th>
<th>Location/Extent</th>
<th>Radiological Hazard</th>
<th>Location/Extent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building 3110</td>
<td>Asbestos, Lead, Cadmium, hydraulic oils</td>
<td>Multiple, including roofing material, and insulation for piping elbows and a furnace; oils and other liquids in piping</td>
<td>Substantial contamination, principally fission products</td>
<td>External area</td>
</tr>
</tbody>
</table>

Asbestos was present as a building material (small amounts of transite) and in piping insulation. Hydraulic fluid containing PCBs was present in hydraulic door actuators. The paint also contained PCBs such that the bulk of the demolition waste was considered radioactive PCB product waste. Radioactive hazardous constituents include lead-filled shield doors, lead bricks, and lead plates under frames of previously-removed lead-glass observation windows.

Radiological constituents posed contamination risk to workers and the environment, with beta-gamma contamination levels over 1M dpm over significant areas of the hot cells and decontamination bays, but dose rates were low enough that they were not a significant consideration during demolition (the bulk of the work did not require hands-on equipment removal or decontamination in these areas.

D&D Project Execution

Site WBS Organization within the ECAS Project Scope:
This project included the deactivation and demolition of Building 3110; and the filling the basement with concrete to provide institutional control of the residual contamination remaining in those areas. The scope includes work planning, site setup, asbestos and hazardous materials removal, demolition, waste hauling/disposal, and regulatory reporting. It was organized with the project management, waste management, characterization, equipment removal, and dismantlement performed by NS Tech, with demolition subcontracted.

Methods of execution:
Management: The scope was planned, managed, and executed as a single element. Management included technical and project oversight, planning, project controls, and quality assurance.

Regulatory: The project was performed in accordance with the requirements of the Federal Facility Agreement for NNSS; the SAFER Plan for CAU 113 was approved in 2001, and all of the closure activities covered under this project. Some closure activities were documented in the Addendum to the Closure Report, which was submitted February, 2011.

Physical Approach: The project activities were as follows:
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- Asbestos containing materials, hydraulic fluid (and other liquids in piping), lead, and cadmium foil were removed from Building 3110.
- The stack and water tower were removed by explosive demolition.
- The initial portions of Building 3110, including the hot cell areas, were demolished using excavators with shears, buckets with thumbs, and hydraulic hammers.
- The high bay areas were demolished using explosive demolition.
- The debris was packaged in burrito bags and disposed at the Area 5 Radioactive Waste Management Site (RWMS). The building debris was size reduced to pieces no larger than 3 feet in diameter and staged on the concrete reactor pad. Demolition debris was considered radioactive PCB bulk product waste as a result of legacy dried paint containing PCBs at concentrations greater than 50 parts per million and residual radiological contamination in the building. A portion of the radioactive and PCB-impacted debris was placed in the basements. Remaining debris was packaged and disposed. Concrete demolition debris, decontamination waste, and PPE were packaged in lined intermodal containers.
- The top foot of the basement openings in the slab were filled with concrete to create a useable surface if area is needed for future work scope at the NNSS.
- Equipment was decontaminated to NSTec release standards. Decontamination activities were limited to the heavy equipment used during the field activities.
- After demolition activities were complete and all waste was removed from the area, radiological surveys were performed to document final site conditions and establish appropriate radiological controls.

**Technologies:** Hand disassembly in lift trucks was used for the piping and equipment; explosive demolition was used for the high bay area, stack and water tower; and conventional use of excavators was used for demolishing the building.

**Activities self-performed:**
- All management and key technical positions along with a portion of the technical staff
- Waste management and disposal
- Used significant professional services contracted (i.e., seconded) labor inter-mixed with prime contractor staff

**Activities subcontracted:**
- Explosive and conventional demolition

**Issues that impacted the project:**
- A spill of hydraulic fluid from an excavator required remediation and regulatory reporting.

**Scope Growth:**
No identified scope growth

**Notes Regarding Use of Data**
- None