Appendix D Safety Accomplishments and Activities at Major Defense Nuclear Sites

The discussion of safety accomplishments and activities at the defense nuclear sites in this appendix is organized by mission sponsor—Energy and Science or the National Nuclear Security Administration (NNSA)—and then by the responsible Department of Energy (DOE) field element as follows. Within the Energy and Science category, the Office of Environmental Management (EM) has responsibility for most of the relevant field elements, sites, and activities. However, the Office of Nuclear Energy is the lead program secretarial officer for Idaho Operations Office activities, and the Office of Science is the lead program secretarial officer for Oak Ridge Office activities.

Environmental Management Field Elements

i. Carlsbad Field Office
ii. Idaho Operations Office
iii. Oak Ridge Office
iv. Office of River Protection
v. Richland Operations Office
vi. Savannah River Operations Office

NNSA Field Elements

vii. Livermore Site Office
viii. Los Alamos Site Office
ix. Nevada Site Office
x. Pantex Site Office
xi. Sandia Site Office
xii. Savannah River Site Office
xiii. Y-12 Site Office
xiv. Office of Fissile Materials Disposition, Office of Site Engineering and Construction Management

For the Savannah River Site, NNSA and EM have primary management responsibilities for certain aspects of operations. Most site operations at the Savannah River Site, including cleanup efforts, are overseen by the Savannah River Operations Office under the auspices of EM. Tritium facility operations are overseen by the Savannah River Site Office under the auspices of NNSA.

A. Environmental Management Sites

i. Carlsbad Field Office

The Carlsbad Field Office (CBFO) manages the DOE National Transuranic (TRU) Waste Program Office and, the Waste Isolation Pilot Plant (WIPP) facility operations, and serves as an international center for the study of waste management. The CBFO coordinates the program for the permanent disposal of TRU radioactive waste at Department sites, national laboratories, and other participants.

WIPP, located in the desert of southeastern New Mexico, is a non-reactor nuclear facility providing safe and permanent disposal of defense TRU and TRU-mixed waste in subterranean salt beds 2,150 feet underground. Since its first opening in 1999 for TRU waste disposal, WIPP has played a crucial Departmental role by helping to meet its commitments to environmental cleanup around the nation. The demonstrated success of WIPP has resulted from the integration of safety into the entire programmatic mission: safe characterization, transportation, and permanent disposal of TRU waste.

1. Operational and Safety Accomplishments at the Waste Isolation Pilot Plant

WIPP continues to be a significant contributor to the Department's progress toward completing cleanup throughout the EM complex. WIPP has received more than 7,000 shipments and disposed of over 57,000 cubic meters of TRU waste since opening. Significant efforts were made by management and line workers at all levels, resulting in the following operational and safety accomplishments during 2008:

- As of mid-November 2008, WIPP is on a pace to receive and dispose of over 5,000 cubic meters (approximately 700 shipments) of TRU waste in this calendar year.
- WIPP received its 7,000th shipment of TRU waste on October 29, 2007, accounting for over 16 million miles traveled by TRU waste transporters without a radiation-related incident.
- WIPP has safely disposed of over 190 canisters of remote-handled (RH) TRU waste. This effort involved close coordination of characterization, transportation, safety, quality assurance (QA), security, waste handling, and engineering operations.
- WIPP achieved the phenomenally low Total Recordable Case (TRC) rate of 0.17, which included all participant organizations. WIPP also achieved a 0.09 case rate for Days Away, Restricted, and Transferred (DART) - (2,292,581 exposure hours since the last injury causing days away from work.).
- In 2008, WIPP completed the first-in-the-DOE-complex comprehensive Documented Safety Analysis (DSA) and Technical Safety Requirement (TSR) development in compliance with DOE-STD-5506 and DOE-STD-3009. Full implementation began in 2008 and will be completed early 2009.
- Deployment of mobile characterization systems at Oak Ridge National Laboratory and Argonne National Laboratory was completed in 2008, and shipments from both new sites were initiated.
- The vast majority of the high activity TRU waste (over 50,000 curies) at Los Alamos National Laboratory that the Defense Nuclear Facilities Safety Board (DNFSB or Board) recognized as presenting the highest risk was shipped and emplaced in WIPP.
- In 2008, WIPP recognized the inefficiency of RH TRU waste operations at WIPP and at the generator sites and devised and successfully tested a shielded container for the transport and disposal of RH TRU waste as contact handled.
- WIPP developed a Supplemental Analysis under the National Environmental Policy Act and reached a record of decision for consolidation of 9 small quantity sites' TRU waste at Idaho and worked with the sites to prioritize the implementation. The first shipments from the small quantity sites will be shipped to Idaho National Laboratory (INL) for characterization for disposal in 2009.
- WIPP developed a packaging instruction for contact handled TRU waste and introduced it across the DOE complex. These packaging instructions will

standardize TRU waste operations at all sites, thereby allowing sites to package and repackage today before receiving WIPP certification and thereby minimize the need for repackaging in the future. RH packaging instructions are under final review and will be provided in the next few weeks.

- WIPP implemented a new carrier contract in late 2007, yet still maintained the TRU transportation fleet in excess of 95 percent availability throughout 2008.
- WIPP conducted 16 certification audits, 8 oversight audits, 25 surveillances, 6 management assessments, and supported 5 Environmental Protection Agency (EPA) inspections.
- TRU waste cleanup was completed at the Framatome site near Richland, WA, the 14th site to be cleaned up.
- WIPP has maintained the Mine Operator of the Year Award for more than two decades. In September 2008, at the New Mexico Mining Association conference, WIPP was again named Mine Operator of the Year by the New Mexico Mining Association in conjunction with the New Mexico State Mine Inspector's Office (22 years in a row).

Activities Related to Implementation of Board Recommendations

The WIPP is committed to implementing Board recommendations. As of December 2008, the WIPP has no overdue Board-related commitments or actions.

ii. Idaho National Laboratory

DOE Policy 450.4, *Safety Management System Policy*, defines the expectation that DOE facilities will be operated in accordance with an integrated safety management system (ISMS). INL is operated by Battelle Energy Alliance, which successfully implemented integrated safety management (ISM) in October 2007. In 2008, the INL demonstrated continuous improvement of its safety management system by focusing on increased employee involvement. Management emphasis and worker-to-worker observations have proven effective in identifying and correcting unsafe work practices and changing behaviors. The Laboratory's total recordable rate has demonstrated the effectiveness of this effort and is the lowest achieved in over 30 years; more significantly, the severity of injuries has also been reduced.

Advanced Mixed Waste Treatment Plant

The Advanced Mixed Waste Treatment Project (AMWTP) is a performance cornerstone to DOE's commitment for complex wide TRU waste cleanup. Managed by Bechtel BWXT Idaho, LLC (BBWI), safety and compliance are paramount to operations at the AMWTP. Summarized below are the 2008 safety initiatives and accomplishments for the AMWTP, first by Board Recommendations applicable to AMWTP, and then by Related Safety Initiatives.

Integral to this certification effort and maintaining the workforce safety culture are: AMWTP's empowered Employee Safety and Improvement Team, employee involvement processes including Keep Everyone and Yourself Safe (KEYS) program, vigilance with the Contractor Assurance System, improvement in Work Control, and continued Conduct of Operations enhancements. .

Vigilance concerning issues management represents one of AMWTP's greatest opportunities to enhance health and safety programs and, to improve the exemplary safety record. The issues management program encompasses corrective action management, issue tracking and monitoring, and lessons-learned dissemination and application. The program has the potential to reduce the number of accidents and events, and promotes a work environment that values identification of safety issues by all employees - one where management is responsive in determining causes and ensuring effective issue resolution.

Conduct of Operations enhancements in 2008 were due primarily to applying Advanced Self Training for Reliable Operations (ASTRO) training and maintaining the Conduct of Operations mentoring processes, including Senior Supervisory Watch, the Operations oversight focused at the line supervisor/worker interface, and the improved command and control process. In addition, AMWTP has:

- Formed a full-time task team to re-write procedures to be consistent with the requirements and expectations of the Conduct of Operations program, since nearly all were written when there were very different requirements in effect.

- Began implementation of a computer log-keeping system (eSOMS) that is currently used by nuclear utilities and the U.S. Navy.

- Took measures to improve the quality and quantity of Conduct of Operations metrics data being collected to find and correct errors earlier.

- Revised the Conduct of Operations Council to promote more worker involvement in improving Conduct of Operations.

Improvements in Work Control involve the Lockout/Tagout process (Senior Supervisory Watch) and enhancements to the job specific, real-time hazard identification methodology (job hazards analyses). The KEYS observations (employee feedback mechanism) and process inclusion activities of Lessons Learned are two important "leading indicators" for minimizing and preventing safety incidences as documented in the Safety Performance Objectives Measures and Commitments report to employees, DOE, and the community.

Related Safety Initiatives

2. Risk Reduction through Stabilization of Excess Nuclear Materials and Waste

A primary mission of DOE is safe risk reduction and cleanup of the environmental legacy. Currently over 24,250m^3 of an estimated 65,000m^3 waste has been safely shipped from Idaho. AMWTP's 2008 accomplishments in this risk reduction arena are related to TRU and mixed low-level waste (MLLW) programs as follows.

- Shipment of over 4,624m^3 TRU waste to WIPP; this equates to over 393 shipments

- Shipment of over 1,726m^3 MLLW to the Perma-Fix (Nevada Test Site for disposal) and Energy Solutions of Utah

- Over 7.6 million man-hours (nearly five years) without a lost time accident; no milestone or schedule is worth an employee safety incident – BBWI is striving for zero accidents.

- Worker Protection Initiatives and Improvements – BBWI's Human Performance Improvement (HPI) program shared with other DOE Complex sites their coherent strategic approach to improving human performance in project operations.

- Actions related to HPI include:
  - To date, ninety-five percent of the BBWI workforce (~860 personnel) have received training to recognize the manageable elements of human performance. The effect is a stronger cultural incorporation of the "what if" attitude.

  - Promotion of organizational improvement by eliminating conditions that encourage human error (e.g., latent organization weaknesses, flawed defenses) and by reinforcing these defenses/values/processes via Fact Finding Event Analysis, Six Sigma improvements, employee KEYS observations, company feedback sessions, etc.

Safety Directives

With respect to DOE Standards, AMWTP fully incorporated/complied with DOE-STD-5506, *Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities*, in the recent approved revision to RPT-DSA-02 (the DSA) and the TSRs (RPT-TSR-03); this standard was in direct response to the DNFSB to standardize and provide consistency in how to perform safety analysis throughout the DOE Complex for TRU processes. Appropriate utilization of DOE-STD-1189, *Integration of Safety into the Design Process*, is anticipated in 2009; this standard addresses the hazard prevention and mitigation process in the design of DOE hazard category 1, 2, and 3 nuclear facilities regarding both radiological and chemical hazards.

Miscellaneous Related Safety Initiatives and Actions

The suite of environmental permits involved two treatment program modifications, three storage program modifications, and the submittal to Idaho for the consolidation of the two existing permits into one permit allowing for consistency in environmental and waste management controls and efficiencies. The expected result is for more effective and safe operations both to personnel and the environment.

Idaho Cleanup Project (ICP) Safety Initiatives

The ICP, managed by CH2M-WG, LLC, Idaho (CWI) at INL, has made improvements in worker safety, environmental cleanup and protection, and reduction of future risks to employees, the public, and the environment. There were two visits by DNFSB members and three additional visits by DNFSB Staff in 2008 including a comprehensive review of ISM implementation in Work Planning and Work Control. Achievements in the areas of interest to the Board are outlined below:

3. Risk Reduction

- A total of 536 fuel handling units were transferred from pool storage at the Idaho Nuclear Technology and Engineering Center (INTEC) to dry storage at INTEC.
- Over one year ahead of schedule, CWI completed the disposition of all special nuclear material identified in their contract (692 items)
- CWI loaded and shipped a total of 5 large cell casks containing Navy fuel from storage at INTEC to the Naval Reactors Facility at the INL.
- By the end of December, a total of 184 RH-TRU waste shipments were made to WIPP from CPP-659 at INTEC.
- Foreign research reactor fuels were transferred from off-site storage facilities to INTEC for safe storage.
- Completed all Voluntary Consent Order (VCO) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) activities at INL Test Area North (TAN) four years ahead of the regulatory commitments.
- Completed the decontamination, decommissioning, and demolition of the Power Burst Facility (PBF) Complex. This included removal of the PBF Reactor and placement into the Idaho CERCLA Disposal Facility (ICDF) Landfill.
- ICP reduced the risk to employees and the environment by reaching agreement with the state of Idaho that the INTEC CPP-640 and CPP-601 facilities would be grouted in place.
- Completed grouting seven 300,000 gallon High Level Waste (HLW) tanks and 7 miles of associated piping systems. The remaining three tanks and one spare will be grouted after the sodium bearing liquid waste has been processed through the Integrated Waste Treatment Unit (IWTU).
- A major cleanup milestone was reached in September, with the signing of the Record of Decision for Radioactive Waste Management Complex Operable Unit 7-13/14 being signed and issued by DOE, EPA, and the state of Idaho on September 25, 2008.

4. Safety Performance

- ICP, for the second year in a row, experienced greater than a 20 percent reduction in the total number of recordable injuries. During fiscal year (FY) 2008, the total recordable cases were 27 compared to 35 cases in 2007. The final recordable case rate was 1.29, below the DOE FY 2008 contractual goal of 1.33.
- The ICP successfully passed the independent ISO 14001 re-registration of the Environmental Management System in October 2008.
- To address a series of conduct of operations events in fuel handling execution, INTEC Operations developed and executed a Conduct of Operations improvement plan. Senior level management was assigned to each operating shift to provide oversight and coaching to the shift supervision on disciplined operations and establishing consistent expectations. A mentoring program was established to ensure continued improvements.

5. Sodium-Bearing Waste Treatment Project

- In 2008, the ICP Sodium Bearing Waste Treatment Project and the DNFSB staff reached agreement on the resolution of several technical issues, including incorporation of safety-significant process controls, conservatism in source terms

for waste to be treated in the plant, and implementation of design features identified during pilot plant testing. .

- During 2008, the DNFSB completed its review of the Performance Category (PC)-3 seismic design of the IWTU and issued a letter stating that the project had satisfactorily addressed their concerns.
- Successfully resolved issues discovered with welding thick sections of the Haynes 556 alloy used for two high temperature vessels in the steam reforming process. Detailed analyses were completed, an appropriate nondestructive evaluation inspection technique was developed, and conservative acceptance criteria have been applied allowing fabrication to proceed.
- Completed Sodium-Bearing Waste Treatment Project rebaselining with construction now scheduled to be completed in March 2010 and Start of Hot Operations scheduled by July 2011.

6. Deactivation and Decommissioning

- Completed the demolition of 18 facilities inside INTEC.
- Completed the final demolition of the TAN-607 Hot Shop and hot cells, using innovative techniques such as explosives, de-lamination and remote high-radiation piping removal.
- Completed decontamination, decommissioning, and demolition of the INTEC Coal Fired Generation plant.
- Completed characterization of the INTEC CPP-601/640 facilities. Grouting operations were initiated in CPP-640.
- Disposed of 272,500 m3 of CERCLA waste from decontamination and decommissioning (D&D) and cleanup activities in the ICDF.

7. Environmental Cleanup Activities

- Completed closure on 5 VCO systems (58 total to date under CWI).
- Completed environmental restoration of 25 release sites (91 total to date under CWI).
- Safely abandoned 93 monitoring wells (292 total to date under CWI).
- The first phase of the Accelerated Retrieval Project (ARP- I) was completed in April. Over 12,350 cubic yards of targeted waste was retrieved from a one half acre section of Pit 4 in the Subsurface Disposal Area at the Radioactive Waste Management Complex (RWMC).
- Completed construction, testing, a contractor readiness assessment (CRA), and received authorization from DOE to implement the ARP III Startup Plan. Waste exhumation in Pit 6 began in December.
- Began construction activities for the waste exhumation facility in Pit 5 (ARP IV) at RWMC.
- A drum packaging correction process was developed and placed in service to remove the tray liner from the previously packaged drums and add absorbent. This packaging correction project has completed startup authorization and is currently in-process, utilizing the CPP-653 facility at INTEC, with 817 of 1690 drums re-packaged to date.
- Successfully started up the RH-TRU drum repackaging facility in CPP-659 at INTEC, with 19 drums repackaged to date.

- Completed waste drum side punch operations in CPP-1634 at INTEC which remotely vented 104 drums in preparation for their shipment to WIPP.
- Completed recovery and relocation of 30 containers of Hot Fuel Examination Facility waste from the RWMC to INTEC.

Oak Ridge Operations Office

The U.S. Department of Energy's Oak Ridge Office (OR) is responsible for major DOE science, technology, and environmental management programs. OR is responsible for activities at Oak Ridge National Laboratory (ORNL), the East Tennessee Technology Park (ETTP), and other areas of the Oak Ridge Reservation. Safety accomplishments and activities at Oak Ridge projects and facilities are provided in the following sections.

8. Uranium-233 Project

The DOE Uranium - 233 (U-233) Project, which will prepare surplus U-233 for disposition utilizing existing Building 3019A, received the final shipment of Molten Salt Reactor Experiment (MSRE) Facility sodium fluoride traps for storage and eventual processing. This allowed for the safe shutdown of the MSRE Project. In May 2008, OR approved the Isotek Worker Safety and Health Program and the Nuclear Criticality Safety Program Description. The U-233 Project conducted a 30 percent Design Review of the drying and packaging design portion of the facility in July. Concerns regarding the ability of a portion of Building 3019A to withstand the stress of the required shielding have led to OR authorizing Isotek to move forward with a design that will relocate construction of this portion of the operations exterior to Building 3019A. A Technology Readiness Assessment was conducted concurrent with the 30 percent Design Review and identified technologies proposed for U-233 processing that require further performance evaluation. Isotek has developed a test plan and will create mock-ups of these operations utilizing identical equipment prior to final design completion. In August 2008, OR approved:

- Revision 2 of the DSA and TSR, allowing for surveillance and maintenance operations for the 3019 complex.
- Isotek's procedure for unreviewed safety question determinations.
- The authorization agreement for the 3019 complex, which incorporates all of the up-to-date safety documents.

To further enhance the safety posture of the project, DOE directed the contractor to implement the Department's new standard on integrating safety into design and approved Isotek's safety design strategy in October 2008, as part of that process. This document will allow the U-233 Project to ensure safety is integrated into design as we move toward 60 percent design.

Transuranic Waste Preparation and Reduction at ORNL

EnergX, manages the Transuranic Waste Processing Center,(TWPC) for DOE. The TWPC's mission is to receive legacy and newly-generated TRU waste and high alpha radiation-emitting waste from the ORNL and other sites as directed by DOE. Waste is characterized and processed inside protective containments in the TWPC. The repackaged and characterized waste is sent for disposal at WIPP, the Nevada Test Site, or other facilities as appropriate for its classification.

Currently two waste streams—CH and RH solid/debris wastes— are being processed at the TWPC. In 2004, the TWPC completed processing liquid supernate waste, previously stored in underground storage tanks, which was disposed of at the Nevada Test Site as low-level radioactive waste. Future major scope tasks include processing the RH sludge waste.

TWPC Metrics and Safety Performance Highlights
The TWPC experienced no lost time or restricted work day injuries or illnesses during 2008; thus, the TWPC's record was extended to more than 1.5 million hours (2374 days) since the last such case.

Voluntary Protection Program/Safety Record Recognition
EnergX was awarded DOE Voluntary Protection Program (VPP) "Merit" status in May. In addition, the TWPC received its fifth consecutive National Safety Council Perfect Record Award. The TWPC also received a Safety Leadership Award from the National Safety Council for its lengthy safety record and an Occupational Excellence Award for its outstanding safety record relative to similar industries.

Safety Program Improvements
The project conducted a Safety Conscious Work Environment survey and held a day-long safety stand-down to get feedback from the workforce and proactively address nonreportable incidents. As a result of the survey and other factors, the contractor established an Executive Work Safe Council, and other Safety Program improvements have been planned and/or initiated.

Contact-Handled Waste Operations
TWPC met or exceeded the Tennessee Department of Environment and Conservation Site Treatment Plan milestones for FY 2008. In cooperation with the Central Characterization Program, the TWPC exceeded the plan goal of 307 cubic meters for CH waste processing by processing 313 cubic meters of CH material (cumulative). Also, the Central Characterization Program, in cooperation with the TWPC, achieved certification for waste shipments to WIPP. Two TRUPACT II shipments to WIPP were completed in FY 2008.

Remote-Handled Waste Operations
The TWPC completed build-out construction for the RH hot cell and installation of remote handling and monitoring equipment (including a redesigned cask lift and upgraded fire detection system); completed the operational readiness reviews for processing RH solids/debris; completed an EPA and WIPP certification audit for RH debris processing; completed specialized operator training; and began RH operations in May. In 2008, seven RH casks have been received, and four have been processed in the hot cell. TWPC is awaiting final RH waste certification from WIPP.

Environmental Management System
The TWPC Environmental Management System received International Standards Organization 14001-2004 certification in May. The certification was earned via an independent examination of the TWPC programs to address environmental issues. The TWPC evaluation is the first of more than 400 performed by the independent evaluation team that did not identify any findings or observations.

Contractual/Administrative Changes
DOE novated the contract for operation of the TWPC in January 2008 from Foster Wheeler Environmental Corporation to EnergX. The current contract with EnergX expires in May 2009; procurement activities are underway for a new contract to operate the TWPC.

Other Facility Construction Activities

- TWPC completed construction of a Drum Venting Building and installation of the Drum Venting System. The Drum Venting System readiness preparation activities, such as procedure revisions, design document revisions, and air-handling equipment testing were begun in support of a revision to the documented safety analysis/technical safety requirements. Startup of the Drum Venting System is expected in the spring of 2009, after completion of appropriate readiness reviews.
- TWPC completed construction and commissioning of a 1200-drum capacity CH Marshalling Building. The facility will be used to stage waste drums prior to entry into the waste processing operation, as well as staging drummed waste after processing until shipment is made to WIPP or other disposal site

East Tennessee Technology Park
ETTP is a major environmental cleanup project managed by the Bechtel Jacobs Company, LLC on the Oak Ridge Reservation. In December Oak Ridge noted the beginning of demolition of the 40-acre K-25 gaseous diffusion building constructed in 1945. These D&D activities are nominally not under DNFSB review.

iv. Office of River Protection (ORP)

The DOE Office of River Protection (ORP) is responsible for retrieving, and treating for disposal, the 53 million gallons of chemically complex radioactive waste stored in 177 underground tanks on the Hanford Site. Working together with prime contractors Bechtel National, Inc., and Washington River Protection Solutions LLC, (WRPS), the mission is to remove the waste from the tanks, design and construct the Waste Treatment and Immobilization Plant (WTP) to vitrify the waste (turn it into a stable glass waste form) for long-term storage and ultimate disposal, and close the tank farms.

Waste Treatment and Immobilization Plant Project

9. WTP Project Status of Construction

Through September 2008, approximately 178,500 cubic yards of concrete, 12,261 tons of structural steel, 444 tons of heating, ventilation, and air conditioning ducting, 44 miles of piping, 50 miles of conduit, and 40 miles of cable and wire had been installed. Engineering design is approximately 75 percent complete and construction is approximately 39 percent complete (based on millions of dollars).

In FY 2008, the WTP Project faced technical, quality, and administrative challenges. Although there were many issues, resolution efforts were aided by the addition of over 15 new Federal staff who bring increased oversight, ideas, and problem solving to the project. Construction progress is almost 40 percent complete compared to 30 percent at the end of FY 2007. Over 7,000 cubic yards of concrete, 1,300 tons of structural steel, and 23,000 linear feet of pipe were installed at the construction site in FY 2008.

Of the 55 engineering and construction gatepost milestones targeted for completion during FY 2008, 41 were completed. Significant milestones include resumption of construction (after successful resolution of seismic issues) of the HLW and Pretreatment (PT) facilities, certification of the site contractor earned value management system, completion of Title II engineering design activities for the Low Activity Waste and Analytical Laboratory, placement (LAB) of 11 of 13 silos for the glass former facility and the LAB stack, and installation and initiation of testing of the Pretreatment Engineering Platform (PEP). The first equipment turnover from construction to start-up also took place in FY 2008, along with release of numerous drawings and award of procurements.

Table D-1 displays the project design, procurement, and construction status of each of the five WTP facilities at the end of FY 2008.

Table D-1. Status of WTP Completion by Facility though End of Fiscal Year 2008

Facilities	Total Facility (Dollars)	Design (Dollars)	Procurement (Dollars)	Construction (Dollars)
Low-Activity Waste	70%	94%	75%	62%
Analytical Lab	42%	90%	62%	52%
Balance of Facilities	50%	74%	39%	64%
High-Level Waste	42%	85%	51%	21%
Pretreatment	39%	67%	33%	25%

NOTE: Percent completion based on earned dollars.

10. WTP Project Occupational Safety Record

WTP is the government's largest construction project in the United States, and continues to exceed industry safety records. Through December 2008, the WTP achieved 12 consecutive months without a day-away-from-work injury, for a cumulative rate for calendar year (CY) 2008 of 0.00. The CY 2008 cumulative total recordable injury case rate through December is 1.22, compared to a rate of 1.62 for the same period in 2007. In December 2008, the on-site WTP construction project achieved over 3.4 million hours without a day lost to accident or injury. The overall project (construction site, material lay-down yard, administration support) worked over 7.2 million hours safely without a day lost to accident or injury.

11. WTP Project Voluntary Protection Program Site Assessment

The DOE Office of Worker Safety and Health Assistance completed an onsite DOE VPP certification review of the WTP. The team will recommend Merit status.

12. Project Completion Status

As of September 30, 2008, the WTP project is 46 percent complete, with engineering 75 percent complete, procurement 46 percent complete, and construction 39 percent complete.

13. WTP Technical Issues

The status and progress for various technical issues at WTP are as follows:

- WTP Structural Issues. Summary Structural Reports (SSR) are being finalized for the PT and HLW Facilities to summarize the calculation methodologies for the structural design based on the revised ground motion criteria. The original SSRs were updated to incorporate the modified design methodology and were submitted to the DNFSB in January 2008 for review and comment. The reports were updated with Board's staff review comments and were subsequently resubmitted in June 2008 for final review. DOE is expecting final comments from the DNFSB by December 2008 and anticipates closure of the issue.
- External Flowsheet Review Team Issue Resolution Activities. During the External Flowsheet Review, completed in March 2006, several plant waste processing issues and concerns were evaluated. The team identified 31 issues of which 19 were considered major (issues that would likely prevent satisfaction of contractual treatment rates). As of October 2008, 23 issues have been resolved and closed. Three issues were planned for closure before December 2008. Two of these have been closed and the basis for the closure of the third issue is under review. The remaining five issues related to process stream sampling, pulse jet mixing, the HLW sludge leaching process, and ultrafiltration system design will not be closed until the end of 2009.

To aide in resolving the remaining technical issues, significant resources have been allocated to conduct scaled and prototypic testing to increase the project's confidence in the selected technical resolutions. For example, the project designed and constructed the PEP to represent a near quarter-scale ultra filtration system that will test treatment technologies and capacities using simulated tank wastes. The PEP began water-based shakedown testing in October 2008 and simulated waste testing in December 2008. Closures of the related technical issues are critically linked to the completion of this series of testing.

- Hydrogen in Piping and Ancillary Vessels (HPAV). The project continues its review of the design in order to identify locations in which combustible mixtures of flammable gas (principally hydrogen) and oxygen could accumulate and potentially detonate. Engineered safety features and controls have been identified to address these concerns. These include new and revised design features and administrative controls to prevent the accumulation of hydrogen concentrations that could cause events large enough to deform the piping or ancillary vessels. An HPAV database was also developed that serves as an electronic filing system and a design tool to document final system designs and evaluate proposed systems changes to ensure the proposed design meets the safety criteria. A significant outstanding technical concern is designing the associated pipe hangers and supports to withstand the associated reaction loads from these events. Because there is little experimental data regarding such loads, ORP contracted with the California Institute of Technology to conduct experiments to measure prototypical detonation loads on pipe hangers and supports. In addition, Southwest Research Institute initiated run-up length testing in July 2008. BNI will use the test data and evaluate any impacts (e.g., reduction in classification of systems, structures or components) on the safety analysis and design. ORP is requesting a HPAV Assessment Team to evaluate current HPAV

analysis and design, and to identify and list conservatisms applied throughout the design and analysis efforts, including the current 0.2 percent plastic strain limit as employed in HPAV structural design criteria. The HPAV Assessment Team will make recommendations to DOE on alternative risk assessments and probabilistic analyses methods to reduce or eliminate conservatisms, including increasing the strain limit to allow for additional energy absorption capability.

- Projected Increased Sodium Additions in WTP. ORP issued a report, Sodium Issue Management Plan for the River Protection Project, in October 2008 to address concerns identified in recent studies that indicate that up to an additional 34,000 metric tons of sodium hydroxide may be required to prepare Hanford tank waste for vitrification. The plan will be used to identify and select specific strategies and technologies to minimize the amount of sodium hydroxide needed to process tank waste in the WTP. The initial set of strategies will be identified and selected before September 2009. The second detailed assessment phase, scheduled for completion in September 2011, will include in-depth evaluations of technology readiness, flowsheet effectiveness, facility system impacts, and risk-cost-benefit analysis. The assessment will lead to the recommendation of specific strategies and technologies for further development and demonstration by the River Protection Project (RPP).

14. U.S. Nuclear Regulatory Commission Review

The conference report accompanying the Omnibus Appropriations Bill for Fiscal Year 2008 required that the U.S. Nuclear Regulatory Commission (NRC) review the Hanford WTP regulatory process and that the NRC report its assessment and recommendations to the Secretary of Energy and the House and Senate Committees on Appropriations. The review, conducted in 2008, addressed management measures, QA, configuration management, maintenance, training and qualifications, construction inspection, incident investigation, Price-Anderson Amendments Act reporting, records management, audits and assessments, and procedures.

The final report concluded in part, “The regulations and requirements that DOE has in place, in most cases, are similar to the NRC’s. Despite the issues identified in the report, the NRC believes that the DOE program, if properly implemented, is adequate to ensure protection of public health and safety.”

15. Structural Steel Fire Protection Coatings

DOE and the contractor have proposed providing fireproof coatings on primary structural steel members that are necessary to prevent loss of confinement or structural collapse, and eliminating fireproofing on secondary members that are not required for stability or confinement. DOE and the contractor prepared documentation to demonstrate structural integrity to the DNFSB. Ongoing discussions with the DNFSB resulted in an agreed path forward that included three aspects: 1) demonstrate capability of the structural frame primary members (excluding the structural characteristics of the secondary members) to resist all prescribed loads per structural design criteria (SDC); 2) demonstrate acceptability of the floor slab to maintain integrity to resist all SDC derived loads when the support of the secondary members is neglected ; and 3) demonstrate that structural frame primary members can resist loads resulting from the uncoated secondary members subjected to the effects of fire, in accordance with SDC

requirements. Items 1 and 2 were completed in 2007 and reviewed and accepted by the DNFSB staff. Item 3 was resolved through consideration of nuclear safety consequences from structural failure stemming from a fire and the inherent fire protection capabilities of the HLW and Pretreatment facilities.

16. Fire Protection of WTP Confinement Ventilation

The WTP authorization basis invokes DOE-STD-1066, *Fire Protection Design Criteria*, which includes requirements in Section 14 for fire protection features within nuclear facility ventilation systems to protect high-efficiency particulate air (HEPA) filters from damage during a facility fire. WTP ventilation systems utilize a radial flow HEPA filter configuration not envisioned during the development of DOE-STD-1066 Section 14.

ORP and the contractor previously proposed and presented to the DNFSB a resolution strategy based upon equivalent fire protection features to the prescriptive requirements of DOE STD-1066 Section 14. At 2008 year end the analysis portion of this effort was nearly complete for the first facility (LAB), with analysis of the other three facilities and confirmatory testing to follow.

However, ORP is now re-evaluating this path forward, and studying the feasibility of a risk-based approach that would address the objectives of DOE Order 420.1B. Preliminary analysis indicates there may not be a nuclear safety driver for application of Section 14 of DOE-STD-1066 to WTP ventilation systems.

DOE is working with the WTP contractor, Bechtel National, Inc. (BNI), to establish a revised path forward. It is estimated that the work scope will be defined and a new level IV schedule established by March 15, 2009.

17. Authorization Basis Changes (Design and Standards Change Approvals)

The Safety Requirements Document (SRD) was prepared when the WTP was envisioned to be a privatized facility and provides the nuclear safety regulatory requirements for the WTP. Five significant changes to the SRD were approved in FY 2008. These included:

18. Addition of NQA-1-2004, Quality Assurance Requirements for Nuclear Facility Applications, for the commercial grade dedication of equipment and services;

19. Incorporation of Electric Power Research Institute guidance

20. Clarification of the requirements for the functional classification of support structure, systems, and components

21. Tailoring of the ACI-349, Code Requirements for Nuclear Safety-Related Concrete Structures and Commentary, requirements on embedments and pryout strength design

22. Incorporation of the WTP site-specific ground motion spectra into the SRD for selected use.

DOE approved 27 changes to the Preliminary Documented Safety Analysis (PDSA) in FY 2008. Significant among these changes were the implementation of controls for

HPAV within the HLW and PT facilities, implementation of control strategies to protect against steam hazards in HLW and PT facility areas housing vital equipment, and revised controls for a boiling liquid expanding vapor explosion in the ammonia reagent system.

23. Assessments of WTP Contractor Activities

In 2008, ORP initiated several QA assessments of the BNI QA Program, application of QA program grading, corrective action management system, procurement of items important-to-safety and commercial material, commercial grade dedication, and supplier inspections of BNI vendors. Assessment and inspection activities have identified the need for improvements in BNI's procurement and Corrective Action Management program implementation. As a result, BNI is strengthening its overall application of graded approach and standard NQA-1 to the complete suite of nuclear related procurements. Significant quality issues include:

- Black Cell Piping – BNI identified that approximately 14,000 "black cell" (cells where access will not be available after completion of construction) and hard to reach pipe spools had been procured without proper material history documentation and the specified radiographic examination as required. BNI has initiated actions to evaluate the approximate 14,000 spools to determine if proper documentation is available to accept the spools or if rework will be required. Initial results indicate that some level of re-inspection is required for about 66 percent of the CM and 15 percent of the Q spools that have completed the evaluation process. The DOE Office of Enforcement conducted an investigation of this concern and issued a Preliminary Notice of Investigation with a proposed penalty but noted the contractor's performance of a comprehensive causal analysis, an extent-of-condition review that included a Common Cause Review, and vulnerability management assessments.
- Broad Based Review (BBR) – As part of the corrective actions and extent of condition determination for the "black cell" piping spool issue, BNI assembled a team of engineers to review five specific component engineering and procurement activities and five program activities that have crosscutting engineering and procurement impacts. The scope of the BBR is to examine upper-tier requirements from the Design Criteria Database, such as contract and Authorization Basis requirements, and verify they have cascaded down to lower-level procurement documents and construction drawings. The review examined seven systems and four component classes in vertical and horizontal slices respectively. The review phase of the BBR is complete. All identified issues have either been vetted through BNI engineering and determined to be non-issues or entered into the Contractor Corrective Action Program for tracking to final resolution. The final BBR report was issued December 31, 2008.
- Corrective Action Management System – BNI has taken action to upgrade the preparation and documentation of completed actions. ORP is in the process of reviewing the Noncompliance Tracking System (NTS) closure package for black cell piping spools that was prepared and submitted within the enhanced process and the closure package for Nuclear Safety Quality Initiative. ORP has also raised this issue for non-NTS related corrective actions as well. Actions similar to those being taken for the NTS related closure packages are also being implemented for these types of corrective actions.

24. Tank Farms Project

The chemical and radioactive waste is currently stored in 177 large underground tanks. Hanford's tank farms contain 53 million gallons of residual radioactive and chemical waste that resulted from more than three decades of plutonium production. ORP and its Tank Operations Contractor, WRPS, are retrieving and transferring this waste from the older 149 single-shell tanks (SSTs) to the newer 28 double-shell tanks (DSTs) for ultimate treatment to reduce the environmental risk posed by the older tanks.

25. Tank Operations Contract Award and Transition

On May 29, 2008, ORP awarded the Tank Operations Contract to WRPS. The contract is a cost-plus award-fee contract for up to ten years (a five-year base period with options to extend it for up to five years). WRPS is a limited liability company composed of Washington Group International, Inc and Energy Solutions Federal Services, Inc. The team also includes Areva as a major subcontractor. CH2M HILL Hanford Group (CH2M HILL) ended their nine year Tank Farm contract September 30, 2008.

The Hanford Tank Operations Contract is part of the Department's Hanford Central Plateau acquisition strategy, which called for three new cleanup contracts in 2008 at the Hanford Site covering mission support, tank farm operations and closure, and waste and facility disposition on the Central Plateau. The scope of the Tank Operations Contract includes base operations of the tanks, analytical laboratory support, SST retrieval and closure, WTP support, and supplemental treatment. The contractor also will manage the pension and welfare plans for incumbent and legacy tank farms employees.

WRPS began their 90-day transition on July 3, 2008 and successfully completed transition on September 30, 2008. At the direction of ORP, WRPS developed a strong project management focus on transition tasks, delivered 37 formal transition deliverables, and completed 155 transition work packages with over 1,600 activities.

ORP implemented a Transition Management Plan (developed between ORP and DOE-Richland Operations Office) and created a Transition Safety Oversight Plan to emphasize both increased field oversight of tank farm activities during the transition as well as continued focus on safe WRPS field work during the first year as WRPS pursues verification of ISMS implementation.

26. SST Waste Retrieval and Technology Development Activities

ORP suspended tank waste retrieval activities following the Tank S-102 waste spill event in July 2007 pending completion of corrective actions (discussed later in this report). By the time of the suspension, Tanks C-108 and C-109 retrieval efforts had reached the limits of sluicing technology. Each tank had between 8,000 and 9,000 gallons of hard solids remaining, primarily at the furthest portions of the tanks from the sluicers. CH2M HILL (the previous tank contractor) successfully tested a new Mobile Retrieval Tool (MRT), called the Fold Track™, at the Hanford Cold Test Facility (a full-size mock-up tank) and deployed the tool in Tank C-109, beginning operations in June 2008. The MRT failed unexpectedly by losing one of its tracks, and then later by developing a hydraulic leak, but showed promise in moving the solids, although the chunks of hard heel waste remained too large to be pumped to a DST. For 2008, the retrieval status

remains as follows: Tank C-108 is 88 percent complete, C-109 is 85 percent complete, and S-102 is 92 percent complete.

CH2M HILL successfully started retrieval activities in Tank C-110, sluicing 29 percent of the tank sludge (51,600 gallons) to DST AN-106 in just three days. Restart of Tank C-110 retrieval by WRPS is scheduled to begin in January 2009. WRPS plans to complete construction on the Tank C-104 retrieval equipment and commence sluicing in 2009.

27. Occupational Safety

The Tank Operations Project worker accident/injury performance continues to be excellent. The tank farm contractor incurred 15 TRCs in FY 2008, compared to 14 in FY 2007. From the first to the fourth quarter of FY 2008, the DART case rate significantly decreased 25 percent.

28. Low-Activity Waste

As construction of the WTP moves forward, ORP is planning ahead for operations, investing in the necessary tools and developing an approach to ensure availability of waste feed from the tank farms to the WTP when it begins operations.

The House Appropriations Committee report accompanying the House Energy and Water Development Appropriations Bill, 2008, requested that DOE provide a report to Congress presenting a defined strategy for liquid low-level (low-activity) waste at Hanford, including a reassessment of the need for the demonstration bulk vitrification project. To accomplish this, DOE commissioned an independent External Technical Review associated with low-activity waste (LAW) processing at Hanford, particularly focusing on the supplemental treatment methods for the remaining 50 percent of the LAW not being processed by the WTP. The External Technical Review is complete and the results have been transmitted to Congress. Specifically, the review evaluated: the present system planning efforts at ORP (including the Demonstration Bulk Vitrification system project); the path forward for LAW disposition; viability of starting LAW melter operations ahead of WTP full commissioning (Interim Pretreatment System); and options associated with increased LAW melter capacity.

DOE has not yet selected a definitive immobilization process to supplement its Hanford LAW facility. The Department will make that decision in accordance with its project management orders, and in compliance with the National Environmental Policy Act of 1969. DOE is currently preparing a draft Environmental Impact Statement (EIS) that is planned to be completed in 2009 and issued for public comment. A performance assessment of the planned disposal facility for treated LAW will provide important input to the necessary characteristics of the treated alternative waste forms for disposal.

29. Interim Pretreatment System

The Interim Pretreatment System is a proposed tank farm based pretreatment system intended to supply LAW feed to the WTP or other supplemental treatment processes. The Interim Pretreatment System will allow earlier operation of the WTP LAW treatment facility by providing an early feed supply. CH2M HILL was chartered by ORP to assess several viable solids separation and cesium separation technologies for the Interim Pretreatment System, and begin further project pre-conceptual effort on the selected

technologies. The candidate technologies for entrained solids removal were cross-flow filtration and rotary micro-filtration. The candidate technologies for cesium separations were fractional crystallization, caustic-side solvent extraction, and ion exchange using spherical resorcinol-formaldehyde resin. In addition, ORP requested CH2M HILL to assess the feasibility and risk for usage of the Savannah River Site small column ion exchange in-tank design at the Hanford tank farms for pretreatment.

30. Evaporator Activities

During FY 2008, the 242-A Evaporator performed one cold run for maintaining operator proficiencies, operational testing of Heating and Ventilation System and Monitoring and Control System upgrades, and maintenance activity testing. No waste volume reduction campaigns were run in the FY 2008 period. Two 242-A Evaporator campaigns are scheduled for FY 2009.

31. Integrated Safety Management System

The ORP ISMS Description approved October 31, 2008 is the cornerstone document that describes how the RPP implements environment, safety, health, and quality requirements on the project. The positive safety system and culture at ORP provides the foundation for successful project completion and ongoing improvement. The ORP Manager has approved aggressive and challenging FY 2009 ORP Performance Objectives, Measures, and Commitments focusing on improving the following areas: industrial hygiene program, QA, corrective action management, work planning and control, and training and qualification.

ORP performed ISM oversight activities of the Tank Farm contractor throughout the year but because the Tank Farm contractor changed on October 1, 2008, ORP did not perform the annual ISM assessment to support ISMS declaration. ORP performed oversight of the contract transition and will continue to perform focused oversight until the contractor completes a Phase II ISM review to ensure that competencies are commensurate with responsibilities.

ORP has conducted extensive oversight of the work planning, work execution, and radiological controls associated with the S-102 spill recovery and ensured that all issues were resolved. Corrective actions from the Type A Accident Investigation of the S-102 spill were completed December 15, 2008. An effectiveness assessment will be performed in FY 2009 to verify that the corrective actions have effectively corrected the deficiencies in contractor engineering programs, conduct of operations, and emergency response identified by the Type A Accident Investigation team.

32. Tank Farm RCRA Corrective Action Project

ORP has completed the initial vadose zone characterization for major past releases in the tank farms to estimate future environmental and human impacts and mitigate past releases as required by the Tri-Party Agreement. The Resource Conservation and Recovery Act (RCRA) Facility Investigation Report for Hanford Single-Shell Tank Waste Management Areas, which summarizes the first ten years of the Tank Farm RCRA Corrective Action Project, was sent to the Washington State Department of Ecology and released to the public in January 2008 in accordance with Tri-Party Agreement Milestone M-45-55. In addition to previous interim measures to eliminate water run on

and water line leaks in the tank farms, an interim surface barrier was installed in 241-T farm to prevent precipitation from further driving the vadose zone plume from a previous Tank T-106 release.

33. DST Integrity Accomplishments for FY 2008

The Hanford Tank Integrity Program focuses on controls and inspections for the 28 Hanford DSTs that were constructed from 1967 to 1986. The DSTs consist of a primary and secondary carbon steel tank within an outer reinforced concrete structure. These tanks have a nominal capacity of approximately one million gallons each. Because some of these tanks are beyond their original design life, and will be needed to support tank waste through the life of the WTP, additional testing, inspection, and monitoring is performed to assess and monitor the condition of these tanks as required by DOE Order 435.1, *Waste Management*. Specific accomplishments include:

- Completion of the chemistry optimization test program for DST interstitial liquids. This testing has been guided by an Expert Panel Oversight Committee and showed that the use of nitrite as a corrosion inhibitor provided a more robust and stable program than hydroxide to prevent stress corrosion cracking in the DST interstitial liquids. The Committee made recommendations for additional testing that would allow similar changes to be made to the DST supernatant chemical controls.
- Installation of a sixth generation corrosion probe into Tank 241 AN 102 that incorporates the Expert Panel Oversight Committee's recommendations for the probe configuration to align it with the committee's finding from the chemistry optimization program. Lessons learned from this probe and earlier designs have been incorporated into the design of the next probe scheduled to go into Tank 241-AY-102 in FY 2009.
- The engineering evaluation of the DST structural integrity was updated to reflect comments by independent reviewers. This work completed the analysis of the concrete-to-metal connections in the DSTs and evaluated increased stresses from solids present in the tanks.
- The Independent Qualified Registered Professional Engineer (IQRPE) released RPP 28538, Double-Shell Tank Integrity Report, Rev. 5. This version of the document incorporated comments, updated integrity information, and aligned the document to the structural evaluation. The recommendations from this report will support the preparation of the RCRA Part B Dangerous Waste Permit for the DST system.
- The DST Integrity Program completed ultrasonic testing of three more second-round DSTs: 241-AP-107, 241-AP-108, and 241-AN-102. This brings the number to nine of DSTs that have had two rounds of ultrasonic testing. The program is scheduled to complete three to four such measurements per year to allow for the examination of all DSTs every eight to ten years. Ultrasonic testing examinations are a key element the DST leak integrity program.
- The initial assessment of the evaporator was conducted ten years ago. The second 242-A Evaporator integrity assessment was successfully completed in April 2008; this assessment covered all of the main elements of the evaporator and associated piping, and was reported in RPP-RPT-33306, IQRPE Integrity Assessment Report for the 242-A Evaporator Tank System.

34. SST Integrity Assessment Accomplishment for FY 2008

There are 149 SSTs on the Hanford Site, which were built from 1943 to 1964 to hold radioactive waste created by the production and separation of plutonium and other radionuclides. The SSTs are underground, reinforced-concrete structures (i.e., a concrete tank with a concrete dome) with a carbon steel liner covering the concrete base and walls. Of the 149 SSTs, 133 are large-capacity tanks with nominal capacities ranging from 530,000 to 1,000,000 gallons each and 16 are smaller tanks with a 55,000 gallon capacity each. Specific accomplishments include:

- At the request of ORP, the WRPS established a Single-Shell Tank Integrity Panel. The panel consists of nine nationally-recognized members from industry and academia in the areas of structural integrity, non-destructive evaluations, corrosion, nuclear waste chemistry, soils and vadose zone, and material properties. The panel was chartered to evaluate SST conditions and provide recommendations for the best technical approach to maintain SST structural integrity and leak integrity. They will review background information about the history, construction, and operation of the SSTs and will identify information gaps and topics for discussion at its first meeting to be held in late January 2009. They will meet again in the summer of 2009 to finalize their evaluation and develop a recommendation report. WRPS and ORP will use this report in the development of SST Integrity and Oversight Programs.
- Three leak assessments were conducted in FY 2008: Tanks 241-SX-104, 241-C-110, and 241-C-111. An unexpected drop in the reference interstitial liquid level in 241-SX-104 occurred following operations to install a liquid observation well in the tank. After a review of the data, an evaluation team found that the waste properties were masking the real interstitial liquid level and that no active leaking was occurring. The evaluation of Tanks 241-C-110 and 241-C-111 showed that these two assumed leakers were, in fact, sound and could be sluiced for retrieval of the waste from the tanks.
- Dome surveys were conducted on a number the SSTs. These surveys monitor the height of known reference markers. Any change in the elevation of these markers could be an indication of the loss of structural integrity in a tank. None of the surveys showed any change from previous readings.

35. Environmental Impact Statement

In February 2003 a Notice of Intent for the Retrieval, Treatment and Disposal of Tank Waste and Closure of Single-Shell Tanks EIS was issued. At the same time, the Hanford Solid Waste EIS was in preparation. Washington State Department of Ecology entered into litigation with DOE regarding the Hanford Solid Waste EIS. A decision was made to combine the scope of the Hanford Solid Waste EIS with the scope of the Retrieval, Treatment and Disposal of Tank Waste and Closure of Single-Shell Tanks EIS and the scope of the Fast Flux Test Facility EIS as a result of a court settlement agreement related to errors in the Hanford Solid Waste EIS. This new EIS, the Tank Closure & Waste Management EIS, is examining new approaches for completing the groundwater analysis and enhancing the scope of the document to include a more quantitative cumulative impact analysis. The draft Tank Closure & Waste Management EIS is scheduled to be completed in 2nd Quarter FY 2009. The EIS is required to support future tank waste treatment, storage, and disposal; disposition of waste

generated at Hanford and waste to be potentially shipped to Hanford from other DOE sites; and the final disposition of the Fast Flux Test Facility.

36. Assessments of Tank Farm Contractor Activities

In FY 2008, ORP conducted several assessments of the tank farms contractor. ORP completed an Occupational Safety and Health Administration (OSHA) injury/illness reporting assessment which did not identify any findings. ORP also completed assessments of the radiological control program. ORP found that the previous Tank Farm Contractor met 10 CFR 835, *Occupational Radiation Safety*, requirements. ORP also conducted an assessment of the tank farms contractor Software Quality Assurance Program, focusing on the implementation of the new DOE Order 414.1C *Safety Software Requirements*. The assessment identified weaknesses in implementing the new classification requirements for safety software, configuration management, and the application of the graded approach to software engineering activities.

37. DOE Voluntary Protection Program

The DOE Office of Health, Safety and Security conducted three VPP reviews for Tank Farms in FY 2008. As a result of those reviews, CH2M HILL Analytical Technical Services retained continued recognition at the Star level; Advanced Technologies and Laboratories International, Inc. (ATL) at the 222-S Laboratory and Intermech, Inc. at the WTP Project were awarded recognition at the Star level. The team noted that the ATL review revealed only a single opportunity for improvement; this is a level of performance rarely achieved during a DOE-VPP onsite assessment. ATL is the first small business prime contractor in the DOE complex to earn this recognition. Intermech, Inc. is the first construction contractor in the DOE complex to be awarded Star status.

v. Richland Operations Office

The DOE – Richland Operations Office (RL) made significant cleanup progress in 2008, demonstrating commitment and dedication to safely cleaning up the legacy of the Hanford site. As Hanford closes in on a vision of shrinking the active cleanup footprint from 586 square miles to 75 square miles, cleanup progress is becoming more visible. Numerous buildings have been demolished in the 300 Area closest to the city of Richland. Over the past few years, five of the nine reactors have been placed into interim Safe Storage. This year, B Reactor was designated as a National Historical Landmark.

RL awarded two new contracts in 2008, the Plateau Remediation Contract (PRC) in June and the Mission Support Contract (MSC) in September as part of the Department's Central Plateau acquisition strategy. Transition from Fluor Hanford to CH2M HILL Plateau Remediation Company LLC (CHPRC) was completed on October 1, 2008. The CHPRC will advance the cleanup of the central portion of the Hanford site. The MSC contract award was protested and is being reviewed by the Government Accountability Office. The MSC for Hanford will provide cost-effective infrastructure and site services integral and necessary to accomplish the Hanford Site's environmental cleanup mission at Hanford.

Risk Reduction

38. Plutonium Finishing Plant (PFP)

- Deinventory of plutonium bearing materials began and is now over 50 percent complete, paving the way for the PFP to be demolished by Hanford's vision of 2015. This deinventory eliminates the need for continued safe, secure, and long-term storage of surplus special nuclear materials at PFP and represents a significant safety and security cost savings for Hanford.

39. K Basin Closure (KBC) Sludge Retrieval and Disposition

- Completed K West Basin final pass vacuuming four weeks ahead of the Tri Party Agreement milestone date of January 31, 2008.

- Completed processing and shipment of all found fuel and fuel scrap from the K West Basin. In September 2008, the K Basin Project loaded the last portions of known found fuel and fuel scrap in K West Basin into a multicanister overpack, which was dried, and transferred to the Canister Storage Building with the other K Basin fuel and fuel scrap for dry, safe, underground storage.

- The K-East superstructure (above grade) demolition was completed and substructure (below grade) demolition started. Following substructure removal, the next step will be to commence soil remediation under the K-East Basin.

- Sludge Treatment Project established a robust testing capability at the Maintenance and Storage Facility for sludge treatment.

- Completed Alternative Analysis Down Select for the K-Basin sludge treatment process in December 2008.

- Implemented DOE Order 413.3A and DOE-STD-1189, for the sludge treatment activity, to ensure early integration of safety into the design from the beginning of the project.

40. <u>Waste Treatment and Disposal Project</u>

- Treated 1,117 cubic meters of mixed low-level waste and disposed of the resulting waste (over 7,000 cubic meters cumulative).

- Shipped over 541 cubic meters of TRU waste to WIPP (64 shipments). A total of 3,326 cubic meters have been certified as of September 30, 2008.

- Retrieved more than 3,000 cubic meters (14,423 drum equivalents) for a cumulative total of 9,768 cubic meters (46,962 drum equivalents) of radioactive waste from Hanford's burial grounds located in the Central Plateau meeting a Tri-Party Agreement milestone ahead of the scheduled December 31, 2008 due date.

- Disposed of over 616,000 tons of remediation waste at the Environmental Restoration Disposal Facility.

- Continued construction of new disposal Cells 7 and 8 to provide needed capacity at the Environmental Restoration Disposal Facility.

41. Groundwater Project

- Continued to operate groundwater remedial actions in the 100-H, 100-K, 100-D, 100-NR-2 200-UP-1 and 200-ZP-1 areas. At ZP-1, expanded Pump and Treat capacity from 250 to 500 gpm and from 300 to 900 gpm at 100-K area.

- Obtained Final Record of Decision for ZP-1, which includes expansion of system to approximately 2000 gpm with flow control and long term natural attenuation as selected remedy.

- Continued implementation of new and innovative technologies to further reduce groundwater contamination.

- Continued field treatability tests for chromium, strontium, and uranium contaminated groundwater plumes that are adjacent to the Columbia River.

- Conducted Remedial Process Optimization study for 100-D area ground water remediation and developed path forward for implementation of in situ remediation technologies to augment pump and treat and reduce overall cost and time to remediate.

- Decommissioned 100 older no longer used groundwater wells.

42. 200 Area Remediation Project

- Continued to retrieve suspect transuranic waste from Hanford's burial grounds located in the Central Plateau.

43. River Corridor Closure Project

- Completed deactivation, decontamination, decommissioning, and demolition of 31 industrial buildings and 3 radiological buildings (including 2 former high risk radiochemistry laboratories) located near the Columbia River.

- Completed remediation of 20 waste sites and burial grounds along the Columbia River Corridor.

44. DNFSB Recommendations and Safety Issues for 2008

- RL completed recommended actions in response to DNFSB's observation to install a raised noncombustible cover over the electrical equipment cabinet in building 251-E at the A-6 electrical substation to prevent the entry of fire suppression water into the cabinet.

- DNFSB Commitment L07-508 "Complete Final Pass Vacuuming & Fuel Processing, Removal of Found Fuel and Fuel Scrap from K West Basin" was completed on September 25, 2008.

- RL is supporting DOE's response to the Board's letter (SL08-008) dated March 17, 2008 which states DNFSB's concerns over the high rejection rates of HEPA

filters. RL's subject matter expert is providing support in developing and implementing the HSS Action Plan.

45. Open DNFSB Commitments

- SL08-017 Commitment to respond to the Board's electrical safety concerns at the Plutonium Finishing Plant. A briefing to the Board on Hanford's response to the Board's concerns is scheduled for December 4, 2008

- R00-01 120W Containerized sludge in the K West Basin will be removed and treated to meet the applicable waste acceptance criteria. The Board was verbally notified by RL in May 2008 that the November 2009 due date would not be met. RL advised the Board that a new date would be established once RL attains an approved CD-2 certified baseline.

46. Contractor Oversight

RL oversight is based on an evaluation of hazards, the importance of activities to the site mission, performance indicators, past performance, and input from DOE oversight, including RL Federal Project Directors, subject matter experts, safety system oversight, and Facility Representatives. RL conducted 97 formal and 492 informal planned oversight activities in the last 12 months consistent with DOE Order 226.1a, *Implementation of DOE Oversight Policy*. During the last year, RL improved the percentage of completed versus planned oversight by 11 percent. In addition to the formal planned oversight, RL uses an Operational Awareness database in which the RL staff compiles daily contractor operational awareness and planned oversight. This system allows for the collection of a wide range of information at a summary level, thereby giving RL an additional tool to evaluate and communicate contractors' ISM performance. This system was improved in 2008 to enhance functionality and allow for use by ORP. Each month and each quarter, Operational Awareness data is analyzed for trends and new areas are identified for future oversight. RL generated 4,886 Operational Awareness entries against the contractors' performance of work over the last year. From these entries, 1,118 issues (6 Concerns, 414 Findings, and 698 Observations) and 78 Good Practices were identified and communicated to the contractors.

During November 2007, RL performed a Phase II verification of the river corridor contractor, Washington Closure Hanford LLC (WCH) and found ISM to be in place and appropriately implemented.

RL awarded the PRC in September 2008. Extensive oversight was performed to support the October 1, 2008, transition from Fluor Hanford to CHPRC for the Central Plateau contract.

RL has also completed the listed major safety initiatives and successes in 2008:

- RL performed oversight of WCH completion of corrective actions associated with the Phase II verification to confirm effectiveness and monitor continued maturity of WCH management systems.

- In late FY 2008, RL performed systematic oversight of the transition to the PRC which was successfully completed on October 1, 2008. RL recognizes the significant challenges that exist while the CHPRC ISMS is established and will continue to provide focused oversight of CHPRC throughout FY 2009.

- On October 1, 2008, CHPRC assumed a workforce with a strong safety culture and previously approved ISMS processes and mechanisms. CHPRC developed a 120-day Safety Assurance Plan to ensure continuity of safety through the transition period. The CHPRC adopted, as planned, the existing ISMS System Description (HNF-MP-003) and associated documents to ensure consistency and compliance with 48 CFR 970.5204-2 as a transition commitment. This enabled the CHPRC to commence operations with safe and environmentally sound contract execution of work scope.

- RL also continues to effectively implement QA as an integral partner to ISM. To improve the interface between safety and QA, RL has named an RL QA Manager reporting to the Assistant Manager for Safety and Environment, with dotted line reporting to the Office of the Manager. In addition, RL has recently assigned specific QA staff to each of the seven Integrated Project Teams. Finally, Facility Representitives has been trained in NQA-1 lead auditor principles.

- RL and its contractors continue with the HPI Initiative, launched in February 2006, to improve safety performance, reduce events, and provide a structure for addressing human behavior-based issues during the performance and execution of the ISMS. The previous contractor recognized that even with a well managed, robust ISMS, unwanted events still occur due to deviations and departures from the plan, procedure or process. The HPI initiative complements and reinvigorates the ISMS by addressing the human elements that influence the use of and adherence to ISM and promoting a culture in which hazards, error-provoking situations, and flawed defenses are recognized, communicated, mitigated, and resolved before work proceeds.

- WCH has been successful in achieving improvement in their ISMS through the successful completion of all 2008 Performance Objectives, Measures and Commitments. WCH's TRC rate has been cut in half in the last year, and the DART rate is near zero.

- Within the WCH contract, new construction and major facility modifications occurred at the Environmental Restoration Disposal Facility (Cells 7 and 8) and the 618-7 burial ground. Through an integrated team approach, hazard analyses were conducted early in the design process to allow full optimization and proper selection of hazard mitigation/prevention measures. After construction, a Project Startup Review was conducted that assessed the effectiveness of hazard controls and ensured that adequate protection for the public, workers, and the environment was provided by both design features and by the proposed operating practices. The end result was that the projects were designed and constructed within the ISM framework, ensuring a solid foundation for operations under the mantle of the ISMS core functions and guiding principles.

- WCH continued with two major safety awareness campaigns (ISMS Awareness and VPP Awareness). Employees were encouraged to participate in these campaigns and were rewarded with incentive awards for their efforts. The ISMS Awareness campaign included employees participating in the ISMS Jeopardy tournaments where they were provided different safety-related awards. This activity traveled around the Hanford Site to WCH work locations and actively engaged the workforce in ISMS Awareness. WCH has submitted an application requesting VPP evaluation in FY 2009.

- RL and its contractors (WCH and CHPRC) worked collaboratively with ORP and their contractors to establish a site-wide lockout/tagout program to drive consistency and improve control of hazardous energy across the Hanford Site. CHPRC and WCH have completed implementation of the process.

- RL performed self-assessments and implemented technical qualification program (TQP) improvements to support overall RL technical staff qualifications and to strengthen RL TQP implementation.

- A new system and process for maintenance of the Tri-Party Agreement Administrative Record to improve access and retrievability of information was developed and implemented in FY2008. External access to the Administrative Record was also improved to make it easier for the public to access information in the Administrative Record.

- RL has assigned team members to support the DOE revision of key safety directives including Conduct of Operations and Startup and Restart.

- RL verified Emergency Preparedness program corrective actions associated with the FY-102 tank spill accident investigation.

- RL performed oversight and safe performance of work for multiple startup/restart activities including: startup and completion of 618-7 burial ground remediation, startup and completion of 105-KE basin control density fill and superstructure demolition, startup and completion of legacy fuel Multi-Canister Overpack operations, and K-East basin demolition.

47. Radiochemical Processing Laboratory

The Radiochemical Processing Laboratory (RPL or 325, Building 325), has a mission to create and implement innovative processes for environmental cleanup and the beneficial use of radioactive materials. This includes:

- Processes to advance the cleanup of radiological and hazardous wastes
- Processing and disposal of nuclear fuels
- Production and delivery of medical isotopes.

The RPL is the only Hazard Category II Nuclear Facility that offers this type of capability. The RPL is located in the 300 Area on the Hanford Site, Richland, WA.

Although the 325 Building has not had any direct Board-related actions, the following actions were accomplished:

- Pacific Northwest Site Office (PNSO) completed all actions related to the transition of the nuclear safety oversight program from the EM to the Office of Science (SC) for the Pacific Northwest National Laboratory nuclear facility. All nuclear safety related documents have now been transitioned from EM to SC approvals.

- PNSO completed the Safety System Oversight assessments for all Vital Safety Systems associated with the 325 Building (RPL). The assessors were qualified Safety System Oversight Engineers per DOE Manual 426.1-1A.

- PNSO maintained a Facility Representative program in CY 2008 at full staffing for the 325 Building (RPL).

- PNSO conducted an assessment of its internal procedures, including those related to nuclear safety, against the SC Management System Subject Area procedures and validated that the subject area procedures were valid for PNSO use.

vi. Savannah River Operations Office

The Savannah River Site (SRS) performs activities for both EM and NNSA. Washington Savannah River Company (WSRC) was the prime contractor until August 1 for both NNSA and EM scopes of work. On August 1 Savannah River Nuclear Solutions, LLC (SRNS) assumed responsibility for the NNSA Savannah River National Laboratory (SRNL) and EM nuclear materials stewardship and environmental stewardship. WSRC retained responsibility for the liquid waste activities which includes the Defense Waste Processing Facility (DWPF) and HLW Tank farms. Parsons is the prime contractor for the ongoing Salt Waste Processing Facility construction activities. Major activities and accomplishments in 2008 for the site and specific facilities/projects at SRS are summarized below.

48. Sitewide

Safety & Security 2008: The Department is continuing to implement many initiatives to improve performance in ensuring public health and safety at the SRS including the following:

- In the areas of nuclear safety and safeguards/security, SRNS worked collaboratively with DOE and Washington Safety Management Solutions to re-establish core competencies in Criticality & Nuclear Safety and Security Vulnerability Analyses.
- SRS (including the DOE Savannah River Operations Office and all contractors and subcontractors) achieved the lowest TRC rate among all large DOE sites, with a TRC rate of 0.55 versus the DOE average of 1.41.
- SRS construction forces achieved a record milestone for hours worked without a DART/days-away injury (now in excess of 22,000,000 hours) exceeding ten years in June.
- SRS completed its second consecutive year without a finding in any of the environmental external regulatory agency audits and assessments.
- WSRC also received the Legacy of Stars award for the second time. The Legacy Award is earned by achieving the Star of Excellence for three consecutive years. These are the highest VPP awards given by DOE, and WSRC is the only DOE contractor to accomplish this.

- SRNS worked with the DOE Savannah River Operations Office and other SRS prime contractors to formally issue an Integrated Safety Management System Declaration.

49. Area Completion Project

The Area Completion Project (ACP) entails soils, groundwater and surface water remediation and D&D of inactive, excess SRS facilities to support the SRS Area Completion Strategy.

In 2008, the ACP completed closure of the General Separations Area Consolidation Unit by constructing a 76-acre engineered cover over the Old Radioactive Waste Burial Ground, the highest risk waste unit in the ACP. Integrating soil and groundwater cleanup with D&D resulted in successful closure of the first industrial area (T) in 2007. As a followup to this successful closure, ACP currently is working to close four additional industrial areas: M, D, P and R Areas. ACP has worked closely with the EPA and South Carolina Department of Health & Environmental Control, as well as the public and the SRS Citizens Advisory Board, to determine that closing the reactor facilities in P and R Areas in-situ provides both short- and long-term protection of human health and the public. Additionally, ACP continued operating groundwater remediation systems, with 27 active, enhanced and passive systems in place. One of the more successful groundwater remediation systems includes the Dynamic Underground Stripping System in M Area, which has removed approximately 425,000 pounds of solvents from the subsurface.

50. Solid Waste

In FY 2008, SRS maintained its accelerated TRU waste shipment program, dispositioning 800 cubic meters of legacy TRU waste and successfully completing 123 shipments to WIPP comprising 3136 drums. SRS completed the removal of all wastes from TRU Storage Pads 7-13. SRS has continued to work closely with DOE Headquarters and WIPP to complete the installation and testing of the large container nondestructive examination equipment (LCNDE). Final calibration activities were completed on the large container nondestructive assay equipment (LCNDA) with expected WIPP certification in FY 2009. Additionally, all legacy PUREX solvent has been treated and returned to SRS for storage until shipment to NTS.

51. F Area Transuranic Waste Operations

The F-Area Closure Project completed the repackaging of 1983 TRU drums in 221-F Canyon. The TRU repackaging enclosures were brought to a standby configuration at the end of September pending identification of additional funding and evaluation of potential remediation options for the remaining legacy TRU containers.

52. F Area

F-Canyon, FB-Line, and 235-F remained in the shutdown and de-inventoried state. A portion of F-Canyon was used to provide a TRU waste remediation capability in CY 2006 and CY2007. During CY2008 the campaign was completed and the remediated gloveboxes were laid up for potential future re-use. During the campaign, nearly 3000 drums were repackaged. Deactivation of F-Canyon systems continued, including the capping of 211-F cells and passive vents for the cells containing the underground tanks

known as the “800 series tanks” in accordance with the Engineering Evaluation/Cost Analysis. Hazards at the site were reduced by shipping more than 9000 drums of depleted uranium oxide for disposal to either Nevada Test Site or Energy Solutions in Clive, UT. Plans are being put in place to further deactivate F-Canyon to minimize operating cost. Plans are being developed to reduce risk at the 235-F facility, including reducing the stack height for an abandoned stack adjacent to the facility and reducing the hazard associated with the Pu-238 legacy hold-up in the building. The F/H Lab remains in operation supporting customers across the SRS. The laboratory received or renewed many certifications during the year and replaced/upgraded the high activity drain tank system.

53. H Area Projects

H Canyon blended down highly-enriched uranium (HEU) to low-enriched uranium (LEU) solution and shipped about 25,000 kgs of the LEU to Tennessee to be converted into materials suitable for use in Tennessee Valley Authority (TVA) commercial power reactors per a DOE and TVA InterAgency Agreement. This 25,000 kg quantity satisfied the total InterAgency Agreement of 254,000 kgs of LEU solution. Discussions are ongoing to expand this program to other legacy DOE materials beginning in FY 2009. This total amount shipped provides enough energy to power every home in the United States for 55 days. In addition, H-Canyon continued to support DOE-complex National Nonproliferation mission as follows:

- Processed 149 containers of Super-Kukla material to support de-inventory of the Oak Ridge Y-12 Facility. The balance (175 containers) is scheduled to be processed in2009.
- Completed post-DNFSB Recommendation 94-1 neptunium processing in HB Line convert neptunium solution to oxide. Fifty-seven (57) kgs of neptunium oxide was processed in FY 2008.
- Received and processed 10.3 kg of HEU oxide from Los Alamos National Laboratory.
- Processed 25 containers of HEU metal from K-Area inventory.
- Received and processed 47.8 kgs of HEU material from Lawrence Livermore National Laboratory. The balance (18.2 kg) is scheduled to be processed in FY 2009.
- Processed 26 non-MOXable Plutonium-Beryllium (PuBe) containers. The material was combined with other non-MOXable Plutonium solutions and a total of 80 kg was dispositioned to DWPF sludge batch #5.

H Canyon packaged and removed seven large boxes of legacy failed equipment from the process cell areas to accommodate future missions. The boxes were shipped to Solid Waste for disposal.

H-Canyon was awarded the DOE Pollution Prevention & Waste Reduction Award for significant improvements in liquid waste processing. The award acknowledged development and implementation of an ammonium destruction process, acid stripping of waste streams, flowsheet changes to segregate LAW streams, and an optimized processing sequence. All of these contribute to reducing the overall amount of HLW generated by approximately 350,000 gallons per year and an annual cost avoidance of $20M. Furthermore, it protects the currently limited amount of space available in the H-Tank Farm HLW tanks.

Floor space totaling 16,500 sq ft was decontaminated, allowing reclassification from contamination areas to radiological buffer areas.

Several infrastructure upgrade milestones were completed:
- Designed and procured one H Canyon 8x8 vessel
- Completed mock-up of one spare H-Canyon evaporator
- Replaced the 6.1D dissolver
- Developed the H Canyon Sump Insert report

Nuclear Materials Management

54. K-Area Complex

The K-Area Complex continues to effectively and safely manage on-going and new mission elements as SRS's only Category I facility. It has been more than 11 ½ years since the last lost workday case and over 8 years since the last personal contamination in the K-Area Complex. Key accomplishments for 2008 included:

- Full and timely compliance with the requirements established in the 2004/2005 Design Basis Threat guidance. The project introduced additional safeguards and security enhancements to the K-Area Complex.

- Safe receipts of surplus, non-pit consolidation from the DOE complex continue. Over 55 percent of the containers have been received since the September 2007 announcement of the campaign.

- Successful receipt and lag storage of HEU materials. Receipts began in December 2007 and over 59 percent of the containers have been received to date.

- Targeted K Area Interim Surveillance activities were completed ahead of schedule to complete 44 non-destructive and 17 destructive examinations in FY 2008. Early initiation of the FY 2009 campaign began in September 2008. Surveillance results are satisfactory and provide valuable supporting data on the long-term storage capabilities of 3013 containers.

- Continuation of plutonium and plutonium-enriched uranium de-inventory campaigns. Numerous shipments from K Area Complex to H Area were made throughout the year without incident.

- Obtained approval of Plutonium Preparation Critical Decision 1B, selection of modified preferred alternative.

- Numerous inspections by the International Atomic Energy Agency were supported, as well as the annual Russian inspection for the Plutonium Production Reactor Agreement. No significant issues were identified during the inspections.

55. L-Area Complex

Spent nuclear fuel is received and stored on site in the L-Area Basin. The L-Area Complex safely performed work with no lost workdays in 2008, extending their record to

over 16 years without a lost workday case and over 5 years since the last personal contamination. Other risk reduction activities have included:

- Successful receipt and processing of 16 casks from foreign research reactors, containing 525 spent fuel assemblies, into the L Area spent nuclear fuel inventory during FY 2008.
- Successful receipt and processing of 16 casks from domestic research reactors, containing 68 spent fuel assemblies, into the L Area spent nuclear fuel inventory during FY 2008.
- In preparation for the receipt of Knolls Atomic Power Laboratory (KAPL) / Thermal Test Reactor (TTR) Fuel from the INL, a legacy material storage room was converted into a slug vault. Subsequently, 16 type 6-M drums of the KAPL TTR fuel were received and stored in the new vault.
- Prepared and shipped an excess cask for beneficial reuse by the Australian Nuclear Science and Technology Organization in extracting nuclear material from Cambodia.
- Completed the Heavy Water Treatment and Disposal Study, which included analysis of several alternatives for treatment and disposal of contaminated heavy water and provided information that can be used for long term planning regarding the final disposition of the SRS inventory of heavy water.
- Held the second Heavy Water Users Group meeting that focused on NNSA needs for heavy water and how SRS can support NNSA needs using the SRS inventory.
- Developed a rigorous Underwater Fuel Handling Tool Program to increase reliability of fuel handling operations. Several improved tools were designed and procured.
- Completed the Service Clarified Water to Domestic Water Conversion Project as a long-term infrastructure improvement.

56. Savannah River National Laboratory (SRNL)

- In 2008, SRNL continued to be a recognized leader in safety performance excellence, achieving “best in class” OSHA injury rates.

- Characterization and qualification, including process demonstration, of a supernate solution for use in the Actinide Removal Process and Modular Caustic Side Solvent Extraction Unit (MCU) was completed by SRNL. This will ensure that these processes have an adequate feed stream in the near future that will reduce inventory in the Tank Farm by ~300,000 gallons.

- SRNL completed work on 17 sets of gas cylinders sent from K-area to meet the FY 2008 headspace gas analysis and reporting requirements for the 3013 Destructive Examination program. In addition, SRNL conducted thermal analyses of both the 3013 storage configuration and the 9975 package to ensure the structural integrity of these packages under various thermal/fire scenarios.

- Structural and materials experts from SRNL working with Projects, Design, & Construction and SFP Engineering concluded that the L-Basin concrete structure is expected to contain water to provide a safe storage facility for spent nuclear fuel for an additional 50 year period.

- SRNL completed the E-Area Performance Assessment Revision. It was approved by DOE and a Disposal Authorization Statement was issued, which allows continued low level waste disposal at SRS.

High-Level Waste

In 2008, the Savannah River Operations Office and its Liquid Waste Operations contractor, WSRC, demonstrated significant progress in safely treating and dispositioning high-level wastes and reducing risk. Examples include:

- The Saltstone Processing Facility (SPF) met the following milestone commitments.
  - DNFSB Commitment 2.9 for DNFSB Recommendation 2001-1: Demonstrate the Viability of Deliquification, Dissolution, and Adjustment (DDA) through the disposition of 100,000 gallons of salt solutions in SPF in February 2008. This was accomplished through the disposition of 100,000 gallons of DDA material in February 2008.
  - SPF met a major milestone commitment to DOE in March 2008 through the disposal of one million gallons of dissolved salt solution. The total for the campaign was approximately 1,350,000 gallons.
- • The DWPF experienced benchmark performance.
  - Produced 225 canisters of vitrified HLW glass and safely stored them for eventual disposal in the Federal Repository.
  - Tied the previous highest monthly production during Melter 2 operation by pouring and leak-checking 26 canisters in August 2008.
  - Achieved its highest average monthly waste throughput of 58.6 lbs/hr during the month of December 2007.
- • The Modular Caustic Solvent Side Extraction Unit /Actinide Removal Process project in H-Tank Farm and DWPF completed two major milestone commitments in related to DNFSB Recommendation 2001-1.
  - Commitment 2.10: *Demonstrate the viability of the Actinide Removal Process in May 2008*. This commitment was met in April 2008 by processing the first batch of material through this process.
  - Commitment 2.13: *Begin MCU radiological operations in May 2008*. This commitment was met in May 2008 when radioactive material was introduced into the MCU process.

- H-Tank Farm processed 143,000 gallons of waste from Tank 49 through the Integrated Salt Disposition Process, completing the first salt feed batch, consistent with the SRS Life Cycle Liquid Waste Disposition System Plan basis.

- F-Tank Farm closure made significant progress toward completion of Federal Facilities Agreement (FFA) milestones for waste removal and tank closure.

  - Conducted mechanical cleaning of Tank 5, oxalic acid chemical cleaning of Tanks 5 and 6, and oxalic acid spray washing of Tanks 5 and 6.

  - Completed design, fabrication, and testing of Tanks 18 and 19 mechanical cleaning equipment and installed a product grinder in Tank 7, the above ground transfer line between Tanks 18/19 and Tank 7, and the mechanical cleaning equipment in Tank 19. This is in preparation for initiation of additional waste removal activities (leading to closure of these tanks by the September 2012 FFA milestone).

57. Salt Waste Processing Facility (SWPF)

The SWPF is managed by Parsons under a separate contract with DOE. The SWPF Project received Critical Decision 2/3A approval in September 2007, establishing a cost/schedule authorizing initiation of limited site preparation/early construction activities. The project received Critical Decision 3B approval in September 2008, which authorized basemat and limited concrete wall construction. The design activities will complete in December 2008, and authorization of full construction activities (Critical Decision 3) was verbally approved in December 2008.

Parsons and DOE brought in expert consultants to review the structural analysis models and dynamic analysis approach, evaluate the load path, and provide recommendations for final design. The consultants concluded that the Finite Element Model and the Soils Structure Interaction (SSI) calculations are adequate. Interactions continue with the Board as final design completes. In response to a DNFSB request, the project will provide the Summary Structure Report in January 2009.

Reviews were conducted with the Board's staff on safety basis, fire protection, electrical, instrumentation and control, and control of flammable gases. The Board identified the contribution of thermolysis to flammable gas generation as a concern. DOE commissioned SRNL and INL to irradiate solvent to test for thermolysis. Testing and evaluation showed that these phenomena should not occur for SWPF.

B. NNSA Sites

vii. Livermore Site Office

The Livermore Site Office (LSO) oversees Lawrence Livermore National Laboratory (LLNL) in Livermore, California. LLNS is managed and operated by Lawrence Livermore National Security, LLC (LLNS). LLNS is supported by its parent companies: Bechtel National, University of California, BWX Technologies, Washington Group International, and Battelle. Safety accomplishments and activities at LLNL in 2007 are summarized in the following sections.

1. LLNL Plutonium Facility

Throughout the hazard and accident analysis process, various safety enhancement projects were proposed for the LLNL Plutonium Facility (Building 332). The following facility projects were completed in FY2008: 1) upgrading the building paging system to meet the National Fire Protection Association criteria for monitored speakers; 2) removal and disposition of two contaminated gloveboxes, one contaminated with plutonium-238. The following projects are planned pending the availability of funding: 1) installing a fire sprinkler system in the equipment room located on the roof above the Salt Preparation Laboratory; 2) reconfiguring the firewater tanks to be self-sufficient and installing regulators as necessary on the firewater supply that serves the final HEPA filters for the Room Ventilation System and the Glovebox Exhaust System to control the water flow rate; 3) upgrading the stack Contamination Air Monitors. Upgrades of the confinement ventilation system are discussed in the next section.

2. Confinement Ventilation System Evaluation

The LLNL Plutonium Facility (Building 332) was evaluated against the criteria established in Deliverables 8.5.4 and 8.7 of the January 2006 U.S. Department of Energy Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 2004-2, *Ventilation System Evaluation Guidance for Safety-Related and Non-Safety-Related Systems* (the Guide). Building 332 is a hazard category 2 facility with a safety-class building structure, safety-class and safety-significant active ventilation systems with final stage HEPA filtration, and a safety-class emergency power system for containment control and worker protection.

While no new gaps were identified with this evaluation, two existing safety enhancements were previously identified and noted in the DSA for Building 332. The first was a proposed installation of pressure differential switches across the first stage HEPA filters allowing automatic shutdown of the exhaust fans. However, after further consultation with DNFSB staff and DOE/NNSA technical reviewers, a modified system that included remote monitoring with manual shutdown of ventilation exhaust fans was adopted. Another enhancement was identified to resolve the potential for a single-point failure resulting from the co-location of Emergency Power Transformer T410/Switchgear and Motor Control Center E410A3. The issue was addressed with the completion of a $4.7M institutionally funded project completed in September 2008. This project relocated the T410 transformer and associated switchgear away from the MCC E410A3 (basement of Increment 3), to the Superblock Yard.

Based on this evaluation, B332 Confinement Ventilation Systems comply with the Safety Class criteria given by the Guide.

3. Significant Maintenance Measures

The LLNL Plutonium Facility (Building 332) has replaced the Safety-Class Room Ventilation System Exhaust Fans: Increment 1, FHE-1000/2000 and Increment 3, FFE-1000/2000. In addition, Emergency Power Safety-Class Transformer T410 and Switchgear was relocated and replaced. During the transformer replacement project new starter coils and contacts, terminal board lugs, etc., were installed and/or refurbished.

The Category 3 Nuclear Facilities – the Radiography Facility, the Tritium Facility, and the Hardened Engineering Test Facility – each had their main power transformers replaced. Each of these transformers was more than 30 years old and exhibited significant signs of aging.

4. Implementation of Actions Associated with Nuclear Criticality Safety

LLNL, with the support of LSO, conducts approximately eight to ten hands on criticality safety courses per year in support of criticality safety programs throughout the complex. Members of the DNFSB participated in a hands-on criticality safety class this year (see supplied pictures).

5. Nuclear Material Packaging

In 2007, NNSA/LSO transmitted LLNL's resource-loaded schedule and funding plan for implementation of the Draft DOE Manual 441.1-1 (written to address Recommendation

2005-1 to NNSA Headquarters). Three packaging configurations were considered; however, the only packaging configuration that met the draft requirements was the 3013 can. Since then, DOE Manual 441.1-1 has been approved and placed into the LLNL contract. LLNL has provided LSO with an impact analysis for implementation of DOE Manual 441.1-1 and a commitment to provide the Technical Baseline document to LSO for review and approval in January 2009.

6. Tritium Facility Modernization

LLNL's Tritium Facility (Building 331) is undergoing renovation to enhance its capability to fill tritium-containing targets for the National Ignition Facility (NIF) and other potential applications. Walls between three existing rooms have been opened to produce a large open room for new tritium and deuterium filling stations. A new, single-room structure has been constructed, adjacent to the large open room, to serve as a docking station for vehicles that will transport targets to the NIF. Three new tritium glovebox workstations, a tritium inspection station, and a deuterium user station are all being fabricated. An amendment to the safety basis has been prepared by LLNL and reviewed by LSO, with LSO approval expected by the end of November 2008. The readiness review is planned for 2009, with start of operations scheduled for late in 2009.

7. Specific Administrative Controls

In FY07, DOE-STD-1186-2004, *Specific Administrative Controls*, had been incorporated into two of the site's seven DSAs and TSRs. For 2008, an incentive fee was added to the contract Performance Evaluation Plan to incorporate the standard into the remaining five DSAs and TSRs. By the close of FY2008, the remaining five DSAs and TSRs were successfully amended in compliance with DOE-STD-1186-2004.

viii. Los Alamos Site Office

The Los Alamos Site Office (LASO) oversees the Los Alamos National Laboratory (LANL), a multi-discipline National Laboratory with 18 nuclear facilities (10 of which are Nuclear Environmental Sites). Los Alamos National Security, LLC (LANS) manages LANL under contract with DOE. Safety accomplishments and ongoing actions during 2008 are discussed below.

8. Nuclear Criticality Safety

In September 2007, while pursuing a DNFSB staff line of inquiry, LANL determined that the margin of safety for vault operations in the Plutonium Facility (TA-55) was not fully understood. Therefore, LANL curtailed TA-55 fissile material movements except those involving waste transfers and shipping and receiving. NNSA and LANL then conducted a systematic review of the bases and the implementation of the criticality safety limits for several hundred unit operations. Each operation resumed only after it had been reviewed and the criticality safety limits were determined to be appropriate and to be properly implemented.

9. Nuclear Material Stabilization and Packaging

LANL has been stabilizing and repackaging nuclear materials in response to Board Recommendations 94-1, 00-1, and 05-1. The Plutonium Facility nuclear material inventory has been evaluated and each item risked-ranked. By LANL metrics, the risk associated with non-standard packaging has decreased by about 40 percent since September 2003, primarily by repackaging materials into more robust containers. Recent progress on items requiring chemical stabilization has been slow due to the curtailment of fissile material movements to improve criticality safety, and due to aqueous processing limitations associated with material condition of the Radioactive Liquid Waste Treatment Facility. The inability to terminate stringent safeguards for material containing less than 10 percent special nuclear material (i.e., Attractiveness Level D) has also impacted progress.

LANL is currently revising the program plan for this effort to establish a new risk reduction baseline. A procurement specification for a new generation standard nuclear material container has been issued. About half the remaining radiological risk associated with the LANL Plutonium Facility is due to about two dozen plutonium-238 items that are scheduled for repackaging early in 2009. TRU liquid waste operations in the Radioactive Liquid Waste Treatment Facility are also expected to resume in early 2009. NNSA and LANL are currently reevaluating restoration of a prior variance that would permit disposal of some LANL Attractiveness Level D materials. These efforts will improve the safety posture for LANL nuclear operations.

10. Oversight of Complex, High Hazard Nuclear Operations

Both federal and contractor oversight improved in 2008. In March 2008, LASO issued a revitalization plan that analyzed the barriers hindering effective federal oversight. Subsequently, NNSA took actions based on that plan that augmented technical staffing, as well as addressed training and organizational span-of-control deficiencies. A major contractor focus area is the Formality of Operations initiative, discussed below.

11. Active Confinement Systems

LANL has completed an analysis of the ventilation system at TA-55. This study supports the implementation of Board Recommendation 2004-2 and provides comprehensive input to the development of DOE ventilation system standards for existing and future nuclear facilities. In 2008, LANL developed an integrated priority list for multi-year improvements to the TA-55 nuclear safety posture, including improvements in the reliability of active ventilation confinement. LANL has begun to implement these improvements.

12. Formality of Operations

LANL has established and is implementing a Formality of Operations program that addresses past issues in conduct of operations, engineering, maintenance, and training. In 2008, NNSA and LANL developed and agreed upon implementation criteria (i.e., scope) and schedule for this effort, and also took actions to increase management visibility to key metrics. LANL also improved system design descriptions and began to assess vital safety systems, particularly whether they can reliably perform their credited safety functions. This effort will continue in 2009.

13. Transuranic Waste Operations.

During 2008, LANL completed a campaign to disposition about 200 drums of high-activity TRU waste by repackaging, certifying, and shipping it to WIPP.

NNSA continued to focus attention on removing the highest material at risk radioactive waste at LANL in FY 2008. The Los Alamos TRU Throughput Improvement Project initiated by NNSA in FY 2007 brought focused attention to significant risk reduction through offsite disposition of highest activity containing drums presently stored above-grade at the site. This project was aided greatly with implementation of safety upgrades in early FY 2008 at the Waste Characterization, Reduction, and Repackaging facility, and the Radioassay and Nondestructive Test facility. The project has proceeded with no safety related incidents, and has made significant progress removing material-at-risk from Area G at LANL:

- About 50,000 PE Ci have been shipped offsite;
- more Transuranic waste activity was disposed of in FY 2008 (26,344 PE Ci) than in the previous two years combined;
- and for the first time in six years, the Area G Material-at-Risk in above-grade storage is below 100,000 PE Ci (Area G limit was 150,000 PE Ci before the project began).

14. Project Management

The Chemistry and Metallurgy Research Building Replacement Project (CMRR) is preparing to enter final design in mid-2009. The PDSA is a key element in defining the safety requirements for this facility. LANL is scheduled to submit a draft PDSA for Federal review in late 2008, which NNSA has targeted to have reviewed by mid-February 2009. In addition, a technical independent project review is scheduled for January 2009. This schedule supports the DNFSB and the NNSA Administrator certifying to Congress that the various design components for the CMRR nuclear facility are converging to a design that will support safe operation.

ix. Nevada Site Office

The NNSA Nevada Site Office maintains the capability at the Nevada Test Site and other facilities and sites to implement DOE initiatives in stockpile stewardship, crisis management, waste management, environmental management, non-defense research and development, and work for others, as well as supporting other DOE programs. Major Nevada Test Site facilities include the Device Assembly Facility (DAF), the U1A Complex, the Criticality Experiments Facility (CEF), and the Joint Actinide Shock Physics Experimental Research (JASPER) facility.

Citing a shift over the years to "authorization basis-driven activities" and the need for a consistent application of safety basis requirements and potentially more efficient uses of resources, the NNSA Principal Assistant Deputy Administrator for Operations, issued a directive that required National Security Technologies, LLC (NSTec) to assume full responsibility and accountability for managing and operating all facilities at the Nevada Test Site. Accordingly, the transition of NTS facilities to the management and operational responsibility of NSTec was completed on time and under budget in September 2008. Activities and accomplishments at Nevada Test Site facilities and projects are discussed below.

Environmental Management Activities

The Low-Level Waste (LLW)/Mixed Low-Level Waste (MLLW) sub-projects provide disposal services and facilities for DOE and U.S. Department of Defense generators at the Nevada Test Site and across the United States. During FY 2008, the sub-projects safely accepted and disposed of 1,088,148 cubic feet of LLW in 1212 shipments and 44,297 cubic feet of MLLW in 101 shipments at the Nevada Test Site Area 5 Radioactive Waste Management Complex (RWMC).

The TRU Waste sub-project is responsible for the disposition of legacy TRU waste stored at the Area 5 RWMC. During FY 2008, major modifications to the existing Visual Examination and Repackaging Building (VERB) in Area 5 were completed. Subsequent readiness reviews were successfully executed and VERB startup occurred in August 2008. Throughout the year, three amendments were made to the safety basis via page changes with appropriate reviews. These changes were made to accommodate modifications to safety systems and waste processing activities.

Of the existing 58 oversized waste boxes, nine were radio-assayed as MLLW and disposed of at the Nevada Test Site. Of the remaining 49 boxes, 25 were sorted, reclassified, and repackaged by close of the fiscal year. Approximately one-third of the total volume was characterized as TRU waste. Using a variety of technologies, the other two-thirds of the waste was determined to be low-level and mixed low-level that can be safely disposed of at the Nevada Test Site, resulting in significant cost savings. Characterization and repackaging of the remaining boxes was completed in December 2008, and the remaining TRU waste is expected to be shipped off the Nevada Test Site in April 2009.

Oversize waste box processing inside the VERB.

Oversize waste box processing inside the VERB.

Device Assembly Facility

The DAF supported NNSA and Work for Others missions throughout the year. One of the buildings within the DAF was dedicated to glovebox operations necessary for preparation of target assemblies used at the JASPER Facility. Another building within the DAF was dedicated to perform nuclear material handling and measurements, including assembly of Radiation Test Objects. Activities within this building supported detector development and national criticality safety programmatic activities.

Construction activities continued at the DAF to prepare several of its buildings for installation of four critical assembly machines that were previously located at LANL Technical Area (TA)-18. All of the special nuclear material supporting this mission has been received, as well as the four critical assembly machines necessary to support future experiments. The DAF continues to address open issues identified by self-

assessments, NNSA, and external reviews. Other safety-related projects currently ongoing at the DAF include the Fire Suppression System Reliability Project (FSSRP) and preparations to support nuclear explosives operations capability at the Nevada Test Site. These projects encompass activities necessary to enhance the current readiness level of specific DAF buildings to better support nuclear explosives operations in the future.

NNSA/NSO is addressing DNFSB concerns related to the existing DAF Fire Suppression System (FSS) by investigating the impacts of all known issues affecting system availability and reliability. The DAF FSS is being treated as an individual project with a resource-loaded schedule and specific deliverables necessary to evaluate the current physical condition and the overall reliability of the system. During FY 2008, the following FSSRP tasks were completed:

- Estimated remaining coal tar in the FSS
- Performed FSS hydraulic calculations
- Performed flow tests to validate hydraulic calculations
- Evaluated known system vulnerabilities to establish a reliability baseline
- Analyzed the coal tar release mechanisms from the FSS lead-in lines as well as the physical, chemical and time-phased characteristics of these mechanisms
- Performed seismic analysis of the DAF FSS water tank and distribution lines
- Evaluated the FSS water tank and distribution lines.

A significant issue related to concrete strength at the DAF was resolved during FY 2008. Based on tests that measured the strength of concrete walls at the DAF, NNSA concluded there is no difference between areas with cracks and areas without cracks. The "Rebound Hammer Tests" were performed after the NNSA had already signed off on the integrity of the structure and concluded that the cracks did not affect its operability, and the latest tests reaffirm these previous conclusions. The statistical analysis of the test results clearly demonstrate that there is no difference in strength when hammer tests on cracked locations were compared with tests on un-cracked locations.

Critical Experiments Facility (CEF)

The CEF project is a $149,000,000 Line Item project that includes modification of a dedicated portion of the existing DAF at the Nevada Test Site to accommodate the installation of four critical assembly machines and operations infrastructure so that the previous LANL TA-18 mission can be relocated to the Nevada Test Site. The scope of the project also includes modifications of the critical assembly machines and their associated control and safety systems. The four critical assembly machines being relocated as part of the CEF project are Comet, Planet, Flattop, and Godiva IV. Completion of the project is currently scheduled for FY 2010.

The assembly and testing of all four critical assembly machines was completed at LANL in 2008. Substantial progress was made on the physical modifications to the DAF, including completion of construction efforts in both assembly cells and the control rooms. The installation of all of the mechanical equipment was completed, and startup testing is under way. The design and fabrication of the special nuclear material storage racks was completed. The mezzanine structures and storage racks were installed in the storage vaults, and the remaining construction was completed. The acceptance testing of the

pre-action fire suppression systems was also successfully completed for the assembly cells and control rooms. As a result, all four critical assembly machines were relocated from Los Alamos to the Nevada Test Site in late October and early November 2008. The installation of the machines and control systems is in process. The remaining conditions of approval associated with the preliminary DSA were completed and approved. In order to support operations, the CEF Addendum to the DAF DSA and associated TSRs were approved by the Nevada Site Office.


Planet Critical Assembly Machine


Godiva Critical Assembly Machine

JASPER Facility

The JASPER Facility enables researchers to acquire high-quality performance data associated with nuclear and surrogate materials. A high-velocity gas gun and

associated diagnostics designed for shock physics experiments provide equation-of-state data to better understand phase change relationships of weapons materials under varying pressures and temperatures.

In April 2008, the JASPER Facility successfully completed an assessment to evaluate contractor readiness to start operations subsequent to its re-categorization as a Hazard Category 3 nuclear facility. Subsequently, nuclear operations were resumed under an approved Justification for Continued Operations (JCO), and the first plutonium shot was executed on April 30, 2008. The JCO serves as an interim safety basis until a rule-compliant safety basis is approved and implemented in 2009.


JASPER Facility gun assembly.

U1a Complex

The U1a Complex provides an underground experiment test bed for the conduct of subcritical experiments using high-explosive and special nuclear material. Although the Ula Complex is not categorized as a nuclear facility, certain subcritical experiments may be considered Hazard Category 2 and 3 nuclear activities. The day-to-day operations that take place at the U1a Complex involve mining and construction, drilling operations, excavation, utilities installation and modification, maintenance, heavy equipment operations, system operations and other underground operations to prepare for and support the fielding and execution of subcritical experiments. Although the U1a complex is not a nuclear facility, it is a “facility of interest” to the DNFSB.

In 2008, a portion of the U1a Complex was modified to accommodate a test bed for the planned Powder Gun experiment series. Associated activities included mining of the U1a.102d drift, reconfiguration of the U1a.102d zero room, and installation of the new U1a.102d drift containment barrier. In the U1a.05 experiment area, the Cygnus refurbishment returned the machine performance to original design specifications. Cygnus radiographic imaging was performed for Sandia National Lab Rod Pinch Diode Research and Development experiments. Cygnus imaging was also conducted on a test object as proof of concept for a future subcritical experiment.


Cygnus radiographic imaging capability at the U1a Complex.

x. Pantex Site Office

NNSA's Pantex Site Office oversees the Pantex Plant, which is America's only nuclear weapons assembly and disassembly facility. Pantex has five primary operational missions: (1) weapons assembly, (2) weapons disassembly, (3) evaluation of the weapons, (4) high explosive production and research and development support, and (5) interim plutonium pit storage. The plant is managed and operated for the DOE by Babcock & Wilcox Technical Services Pantex, LLC (B&W Pantex), (previously called BWX Technologies, Inc. Pantex). Safety accomplishments and activities at Pantex during 2007 are described below.

Safety System Upgrades

B&W Pantex implemented facility system improvements for nuclear explosive operating bays and cells to increase the reliability and operability of safety class systems. Eight ASME NUM 1B-rated hoists were installed to replace standard commercial hoists. The new hoists are rated to sustain a load in a design basis seismic event. Hoist installation will continue in more bays this year. Five statically dissipative floor coverings were installed in bays and cells. The floor coverings, in combination with the use of dissipative shoes and semi-conductive tooling, ensure that electro-static discharge hazards are significantly reduced or eliminated for nuclear explosive operations. Seismically qualified emergency lights, required to ensure safe shut-down of operations involving nuclear explosives containing conventional high explosives, were installed in cell facilities. Additionally, cell facility ceiling appurtenances were modified to meet design basis seismic requirements.

High Reliability Organization/Causal Factors Analysis Process

B&W Pantex has developed a practical guide for avoiding system accidents to help achieve a High Reliability Organization (HRO). The guide presents ideas that are, in the words of Greg Meyer, General Manager, B&W Pantex, "deployable, sustainable and

effective," with the goal to treat safety as a "core value that is integrated into everything the organization does."

In order to help move the company toward their goal of being a HRO, B&W Pantex has developed and validated a causal factors analysis process to identify and better understand organizational issues that can be targeted for improvement. The process fully integrates HPI processes and has been embraced by several organizations within the nuclear weapons complex.

Nuclear Safety Performance Metrics

B&W Pantex, in conjunction with the Pantex Site Office, has instituted a process specifically targeted at identifying underlying issues related to nuclear safety, with the objective of helping to prevent high consequence events by addressing issues that have the potential to compromise barriers before actual failure. The approach involves the use of "stand alone" performance indicators intended to provide a snapshot of various performance elements related to nuclear safety as well as a process to identify and evaluate "precursor events" that may provide clues to systematic issues or significant single events both of which if addressed may prevent larger consequence accidents. The process began in earnest during the last quarter of the year and will mature as the evaluation and analysis of information is adjusted to focus on the objective.

xi. Sandia Site Office

The DOE/NNSA Sandia Site Office (DOE/NNSA/SSO) is the management office providing oversight of the Sandia National Laboratories (SNL). Sandia Corporation (Sandia), a wholly-owned subsidiary of Lockheed Martin Corporation, manages and operates SNL for the DOE/NNSA. Sandia designs all non-nuclear components for the nation's nuclear weapons, performs a wide variety of energy research and development projects, and works on assignments that respond to national security threats. The following sections summarize safety accomplishments, status of nuclear facilities, the removal of material from SNL and significant interface activities with the Board and staff during 2008.

Safety Basis Improvements

Calendar year 2007 marked the completion of the DSA upgrade project. The Sandia nuclear facility safety bases are in a maintenance mode.

Sandia Nuclear Facility Status

Annular Core Research Reactor: Operational. The Annular Core Research Reactor supported a moderate testing schedule of customers in 2008. The DSA annual update was submitted and approved by DOE/NNSA/SSO in 2008.

Gamma Irradiation Facility: Operational. The Gamma Irradiation Facility maintained a modest testing schedule for 2008. The facility received 150,000 Curies of cobalt-60 sources in June of 2008 to expand its irradiation capability to 374,000 Curies.

Auxiliary Hot Cell Facility: Operational as a radiological facility. The Auxiliary Hot Cell Facility initiated operations as a radiological facility in September 2007. Work continues to ultimately authorize the facility to operate as a limited-life Hazard Category III nuclear facility in the 2010 timeframe. A Basis for Interim Operation is being developed and

DOE/NNSA/SSO approval is anticipated in 2009. The planned work is in support of material de-inventory objectives at SNL.

Manzano Nuclear Facilities: Operational. The Manzano Nuclear Facilities provides secure storage for legacy material at SNL. An annual update to the DSA was submitted and approved in 2008.

Sandia Pulsed Reactor Facility: The Sandia Pulsed Reactor is not operating and the fuel is in storage at the Nevada Test Site's DAF. An annual update to the Safety Analysis Report was submitted and approved in 2008. The secure facility was used throughout 2008 to stage and repackage material in support of SNL de-inventory activities. The facility safety basis also governs operation of a zero power critical assembly, which underwent a DOE/NNSA Operational Readiness Review in November 2008.

Removal of Material from Sandia National Laboratories

Sandia, in close coordination with DOE/NNSA/SSO and with significant support from other DOE sites (Savannah River, Y-12, Nevada Test Site, Argonne, Idaho, and Los Alamos), succeeded in removing all Category I and II materials in 2008. This included a shipment of Sodium Debris Bed Material to Idaho in February 2008. The remaining Category I/II items were accessed, repackaged and shipped to Nevada Test Site in the fall of 2008. With completion of the removal of final Category I and II materials, SNL is designated as a "non-possessing" site where security can be reduced to Category III levels for the enduring future.

Significant Interface Activities with the Board and Staff

No Board Members visited DOE/NNSA/SSO or SNL in 2008.

Visits by DNFSB Staff

DOE/NNSA/SSO and Sandia hosted staff members in January, April, and September. The topics of interest for the visits included the status of the Auxiliary Hot Cell Facility, the nuclear material de-inventory status, nuclear material packaging, the status of the Safety Basis Improvement Project, ISM, and SNL support to Pantex. Dr. Thomas Spatz, the new cognizant engineer for the DOE/NNSA/SSA and SNL, was given orientation tours and briefings in April. Dr. Spatz participates via video teleconference in the weekly DOE/NNSA/SSO Operations Meetings. This has proved very beneficial by allowing both DOE/NNSA/SSO and Dr. Spatz to fully understand the status of areas of

Document Requests

DOE/NNSA/SSO and Sandia responded to five document requests from the DNFSB concerning SNL nuclear facilities and support of Pantex.

Cost Estimates

Projected Costs for Open Recommendations for FY 2008 for SSO/SNL	
Recommendation	Estimated Cost
2005-1, Nuclear Material Packaging	$500K
2004-2, Active Confinement Ventilation	$100K plus possible construction costs
2004-1, Oversight of Nuclear Operations	$2,000K
2002-1, Software Quality Assurance	$150K

xii. Savannah River Site Office

The Savannah River Site Office (SRSO), in coordination with the DOE Savannah River Operations Office, oversees Defense Programs-related NNSA activities at SRS. These activities include nuclear weapons stockpile stewardship, operation of the Tritium Facilities, and the preliminary work associated with the Pit Disassembly and Conversion Facility. NNSA activities at SRS are performed by the site contractor (SRNS), which also support activities that are overseen by the Savannah River Operations Office. In addition to the site-wide accomplishments, the activities and safety-related accomplishments in 2008 associated with the NNSA Defense Programs operations included:

- The transition of Management and Operating responsibilities from WSRC to SRNS began in May 2008. SRSO personnel spent a considerable amount of time overseeing and assessing the transition activities associated with the Defense Programs mission. The transition was successfully completed on August 1, 2008.

- Extraction of tritium gas from Tritium Producing Burnable Absorber Rods continued in the Tritium Extraction Facility (TEF), which began full operations in 2007.

- Subsequent to the extraction completed in December 2007, a small increase in radiation dose (10 µrem/hr above background) was observed at a pre-determined survey location on the face of one of the gloveboxes in TEF. Further analysis revealed the presence of zinc-65, a radioactive isotope of natural zinc, within a section of primary process piping associated with the extraction system. The affected process piping was replaced to remove the hazard; additional administrative controls were established for the affected portions of the facility to minimize personnel exposure and the potential for contamination of the process room. In addition, the extraction procedures were revised to minimize the transport of zinc-65 within the process piping.

- SRNS Tritium Programs began a series of coaching tours to enhance the Conduct of Operations posture of the Tritium Facilities. During the coaching tours, teams of senior Defense Programs managers monitor plant operations and maintenance activities, discuss expectations with plant personnel, and provide mentoring support to the plant personnel.

- An outage was successfully completed in the H-Area New Manufacturing (HANM) Facility to replace three Zeolite® beds and the associated piping in one of the glovebox atmosphere stripping systems. This was a major evolution conducted for the first time in HANM since it began operations in 1993. The task required the fabrication and installation of a large temporary radiological containment structure, the breaching of primary and secondary confinement systems, and the hoisting and rigging of replacement components, which weigh approximately 1000 lb. each.

- The FY 2008 annual update to the Tritium Facilities' DSA was approved by SRSO on October 1, 2008. Significant changes to the DSA were driven by the implementation of a new Consolidated Hazard Analysis Process by the former Management and Operating Contractor. Implementation of this process resulted in revised controls for Safety Significant equipment. In addition, new Specific Administrative Controls were identified. The revised DSA will be fully implemented in January 2009; SRSO will perform an independent assessment of this scheduled implementation.

- The second biennial assessment of SRSO by the Chief of Defense Nuclear Safety (CDNS) was completed in March 2008. The CDNS team identified eight findings, five weaknesses, and several opportunities for improvement. The team was complimentary on the significant progress that SRSO made subsequent to the initial assessment, which was performed in July 2005.

- The SRS Tritium Facilities continued supporting the Stockpile Stewardship Program by successfully completing function testing of several gas transfer systems in accordance with Design Agency direction, and providing the resulting data via formal reports to the Design Agencies for their analyses.

- The Tritium Facilities continued providing excellent support of on-time delivery for gas transfer systems to the Department of Defense. This effort also included fielding of a new W76-1 gas transfer system.

- SRS Tritium Programs continues to exhibit a strong safety culture via the Behavioral Based Safety Program. One "days away" event was recorded in April of 2008 when an employee slipped on a recently painted floor.

- Several extensive electrical outages to replace nonconforming 13.8 kV system fuses were completed throughout the Tritium Facilities.

xiii. Y-12 Site Office

Modernization, Infrastructure, and Production

Initiatives in project management, infrastructure support and reduction, and production continue across the Y-12 National Security Complex to support the mission. In the project management area:

Preliminary design on the Uranium Processing Facility (UPF) commenced in August 2007 following CD-1 approval and an independent readiness review. Guided by an Integrated Project team comprised of Federal and contractor employees, the UPF team relocated to consolidated offices at 1099 Commerce Park to take full advantage of its Engineering, Procurement, and Construction structure. Project Engineering and Design (PED) for UPF was 15 percent completed, with approximately $40M in PED funds spent. Basic ordering agreements (BOAs) worth over $85M were awarded to four architectural-engineering firms. Merrick and Associates was awarded a $30M Specialty Mechanical Equipment design BOA in February 2008. Merrick will provide preliminary and detailed design as well as Title III construction support services. BOAs were established with CH2M HILL, Inc., and Jacobs Engineering Group, Inc., to provide facility preliminary and detailed design and Title III construction support services. The final BOA was awarded to

URS, Washington Division for Process Systems and Equipment design valued at $1M. The contractor will provide preliminary and detailed design along with Title III construction support. The team completed a major project milestone by issuing Revision 0 of the UPF design criteria. The team also completed the initial issuance of the process flow diagrams (PFDs) and the SSI analysis, which defined the main building's structural configuration. These documents provided the basis for all the engineering disciplines to proceed with preliminary design. The team issued technology development readiness assessments of the technology insertion strategies and reached consensus on technology selection with the Design Agencies. As the UPF project progresses toward CD-2, it will continue to invest in lessons learned, integration of safety into the design, effective risk management, and a strong quality assurance program. As the design matures, it is imperative that decisions are objective, based on strong technical basis, and support the programmatic requirements for the facility. It is also important that the project duly consider risk potential and apply an appropriate level of conservatism.

Facility construction on the Highly Enriched Uranium Materials Facility project was completed by the August 28, 2008, milestone. Also, the team responded to the DNFSB on project issues and supported several Contractor Assurance System Program-related activities, including project management assessments, independent assessments, external assessments, and surveillances. The project managed 58 active technical and programmatic risks, including labor shortages during construction, delayed turnover of the facility to B&W Y-12 and completion of maintenance analyses, construction subcontractor constructability risks, and installation of the Central Alarm System.

The QE operations were relocated in support of Accelerated Dismantlement and Footprint Reduction initiatives. This project provides improved operational efficiency while significantly reducing security costs, augmenting dismantlement missions, and

improving Y-12's safety posture. Phase II work is approaching completion. The project had to overcome funding uncertainties but was able to maintain a CPI and SPI above 1.0. Transition to Operations is complete.

Other projects underway or completed at the Y-12 NSC to improve infrastructure include:

- The Nuclear Facilities Risk Reduction project was initiated in April 2008 and delivered a complete CD-0 package to NNSA on schedule in July 2008. A Tailored Independent Project Review (IPR) was held in August, and the team received CD-0 approval in October 2008.
- The Steam Plant Life Extension Project that will significantly improve the site's environmental posture and deliver a reliable steam supply for the next 50 years. This project is 58 percent complete and is rated Green with a cumulative CPI of 1.05 and an SPI of 1.03.
- The Potable Water Systems Upgrades Project, improving fire protection systems and potable water has commenced construction.
- The proposed Complex Command Center Project will consolidate Plant Shift Superintendent Operations, the Technical Support Center, and Fire Protection Operations into a new facility at the Y-12 site. The mission need was approved in October 2007, and a tailored CD-1 strategy was approved in December 2007. The CD-1 package was completed in July 2008, and an IPR team evaluated the CD-1 package in August. The IPR team identified several positive observations and one issue (expediting NNSA/Office of Management and Budget approval of the alternate-financed project) and recommended CD-1 approval.

The Infrastructure Projects organization manages the planning and implementation of infrastructure projects across the Y-12 site. The scope includes utility line item projects, as well as building demolition, facility deactivation, fire protection upgrades, roofing, deferred maintenance, recapitalization, utility, and system upgrades, material storage and disposition, and support to NNSA's Small Business Initiative managed by the U.S. Army Corps of Engineers. Between FY 2002 and FY 2008, the Infrastructure Reduction Program demolished over 270 aging facilities totaling 1,257,000 square feet with no lost-time injuries. The Y-12 site contributed more than one-third of NNSA's overall 3 million square foot reduction across the NWC, a goal that was accomplished one year ahead of schedule. Because of its large contribution, Y-12 was selected to host a celebration of this accomplishment during an August visit by Bill Ostendorff, NNSA Principal Deputy Administrator.

Ongoing production activities to support the mission include:

- As a result of realized efficiencies, the B61 Life Extension Program (LEP) completed a significant portion of close-out activities planned for FY 2009 while making funds available to support FY 2009 W76 LEP requirements over target.
- FY 2008 dismantlement and disposition scope was completed on schedule and within budget targets. Y-12 aggressively pursued activities to resolve technical issues in support of delivering the W76 First Production Unit. The Y-12 Throughput Improvement Plan (YTIP) is being executed, which has resulted in measurable efficiencies in production and supporting processes. All commitments for delivery of HEU to Naval Reactors and to NNSA down-blending processors were met. Requirements for the delivery of enriched uranium to foreign research reactors and HEU removals from foreign locations were met.

Environment, Safety, and Health

A number of improvement initiatives were implemented in the Chronic Beryllium Disease Prevention Program. The revised Chronic Beryllium Disease Prevention Program (CBDPP), annual beryllium exposure reduction and minimization reports and quarterly performance feedback reports were issued to YSO. Strong performance validates the effectiveness of the hazard analysis process and documents that occupational exposures to beryllium are being properly anticipated, evaluated, and controlled. Ninety-six percent of all personal air sample results for beryllium were less than detectable. There were seven sample results (0.3 percent) exceeding the administrative action level and in each instance the appropriate respiratory protection was worn. There were no sample results exceeding the Permissible Exposure Limit. There were a number of significant improvement initiatives implemented in the B&W Y-12 CBDPP. These initiatives include a new beryllium awareness training video for workers and supervisors, and a supplemental beryllium information training pamphlet and frequently asked questions sheet. Improvements in the management of legacy beryllium surface contamination included an expanded sampling program in areas where workers with chronic beryllium disease or beryllium sensitivity are housed, an enhanced beryllium boundary sampling and mapping program, an automated system to track and trend beryllium lymphocyte proliferation test results, disposition of legacy sampling results above 0.2 µg/100 cm^2, and improvements in posting of beryllium-related areas. All actions associated with the DOE Office of Inspector General Audit of Beryllium Surface Contamination were addressed.

B&W Y-12 reduced hazardous material through the dispositioning of excess chemicals. Approximately 572 chemical containers were removed from the facilities and approximately 111 lab packs/drums were generated. As part of the overall Unneeded Chemicals and Material (UMC) disposition process, the Y-12 Complex continued to work with ORNL and will transition several of the UMC chemicals to the ORNL for reuse. This exchange of chemicals has the benefit of reducing the amount of virgin products and raw materials that must be purchased to support the overall mission of DOE activities. B&W Y-12 continued an aggressive program to replace hazardous material with less hazardous substitutes. Y-12 eliminated yearly chlorofluorocarbon (CFC) emissions beginning in FY 2008 through a recent change in a manufacturing process. Y-12 Manufacturing completed the project to replace Freon 113 with a new, more environmentally friendly, and safer product, Vertrel. The switch to Vertrel beats the deadline for Y-12's Environmental Management System objective to eliminate use of Freon 113 in chip cleaning by more than 2 years and supports the goal to eliminate use of Class I ozone-depleting substances by 2010.

By converting to digital radiography equipment, Occupational Health Services eliminated the generation of approximately 38 gal (144 kg) per year of RCRA hazardous waste containing silver and resulted in a cost avoidance of at least $17,700 per year. It also had the added benefits of eliminating a RCRA satellite accumulation area, eliminating the purchase and use of hazardous chemicals and X-ray film containing silver bromide crystals, and improving patient services with shorter wait times and more comfort while taking images. The Y-12 Complex developed the Y-12 Product Exchange database that allows employees to search for hazardous and non-hazardous surplus chemicals and arrange for transfers or exchanges of material among Y-12 organizations. More than 2,800 items were advertised on the internal website, Y-12 Product Exchange, since it became operational in April 2007. Most of the items listed were from the UMC listing

and were slated for ultimate removal from the site unless a viable use could be identified. Additionally, anyone can list excess chemicals for reuse on the Product Exchange website as well as view items that are available.

The site achieved 3.2 million hours without a lost-time accident. Construction worked 2.3 million hours without a lost-time accident.

Y-12 continued to provide information and support for the Integrated Facility Disposition Project that will secure funding for key Y-12 decontamination and dismantlement activities.

The Environmental and Waste Management Program was managed and implemented in accordance with applicable environmental laws and regulations. All compliance monitoring reports were completed and submitted on time. In addition to the traditional inspections by regulators, DOE's Office of Health and Safety conducted a 2-week inspection, and a review of Y-12 Environmental Management System (EMS) was conducted by staff from the Tennessee Department of Environment and Conservation (TDEC) as part of Y-12's voluntary initiative for recognition at the Performer Level as member of the Tennessee Pollution Prevention Partnership. Results from this type of inspection were excellent. Support of ongoing operations and transformation initiatives resulted in a number of actions in 2008:

- The application for renewal of the Y-12 Complex National Pollutant Discharge Elimination System permit was submitted to the TDEC on July 1, 2008. This culminated 1 year of sampling, site reviews, and data preparation.
- The Project Execution Plan for 9201-5/5E and 9204-4 Facility Deactivation Performance Based Incentive II.H(S), Y/PFD-317 was issued March 2008. The plan describes a 3-year project for material relocation and disposal projects.
- Through permitting actions and compliance planning support, a number of projects were advanced, including UPF, the new and more environmentally favorable replacement Steam Plant, development of the CD-1 submittal for the Complex Command Center, and development of the CD-1 submittal for the Integrated Facilities Disposition Project.
- Unused nitrogen oxide air emission credits from the Steam Plant operations were sold, generating over $60,000 in revenues that were returned to the Y-12 Complex. The unused emission credits are generated through a "cleaner" operation of the Steam Plant, and the revenues returned to Y-12 were used to off set the purchase of more environmentally friendly natural gas, rather than coal.
- Surveillance of 53 LLW accumulation areas assessed the inventory of LLW containers, identified gaps in inventory, and made recommendations for improvement, where appropriate. Results indicated there is a high degree of accuracy in the container inventory.

A B&W Y-12 cross-functional team was established to facilitate the implementation of sustainable environmental stewardship practices and develop an implementation plan for Executive Order 13423. The Energy Savings Performance Contract Initial Proposal Approval Request for Delivery Order 1 at the Y-12 Complex was presented to the DOE Headquarters Review Board. The recommended project list includes five energy conservation measures with significant environmental benefits and energy savings. UPF team members and others involved in transformation projects are participating in educational opportunities regarding high performance sustainable building requirements and leadership in energy and environmental design certification requirements.

B&W Y-12 awarded a new subcontract for liquid waste work to URS-Washington Division in October 2007 and completed the transition of liquid waste management work from Bechtel Jacobs Company, LLC, (BJC) to B&W Y-12. Along with numerous logistical details, this transition involved mobilization of WSMS, standing up an operations management system for B&W Waste Management department, and transfer of several employees from BJC and its liquid waste subcontractor to B&W. The overall transition of the liquid waste work was seamless and transparent to the Y-12 waste generators.

Risk Reduction

The facility risk reviews for Buildings 9212, 9204-2E, and 9215 were completed. The results of these reviews were summarized and actions were prioritized in the Project Plan for the 9212, 9204-2E and 9215 Complex Facility Risk Review. A summary of the detailed estimates was provided to Headquarters for inclusion in the FY 2009 budgeting process. Y-12 implemented a Continued Safe Operating Oversight Team for the 9212 Complex to evaluate performance indicators for long term assurance of the safe operation of this facility while the UPF project is designed and built. The team will report annually on performance indicator trends, and the first report was delivered to the DNFSB in April. Additionally, resource planning is continuing in an effort to meet risk reduction goals.

B&W Y-12 completed 163 shipments of LLW and other materials for disposal at the Nevada Test Site. These shipments contained approximately 203,191 ft3, representing >78 percent of the Y-12 forecasted disposal volume for the fiscal year. Additionally, Y-12 anticipates exceeding the forecasted disposal volume at Nevada Test Site for the fiscal year.

Two HEU recovery efforts from different countries were completed under the Global Threat Reduction Program, including removal of final HEU from South Korea.

Y-12 completed the disposition of “no defined use” lithium that is excess to Defense Programs needs. Ten shipments (more than 500 drums) of the material were sent to the Nevada Test Site for disposal. The space created by this effort will allow for storage of other needed lithium materials.

Readiness activities for the ES-3100 shipping containers were completed. This Y-12-developed Type B fissile material container allows safer and more efficient transport of uranium for DOE, commercial, and international customers.

Community Impact

Y-12 continues its outreach programs to surrounding communities. Some initiatives include:

- Worked with Anderson County High School and Oak Ridge High School in a manufacturing partnership to help train students for working in a technical or manufacturing environment such as Y-12.
- Led the NNSA complex in mentor-protégé agreements with universities and small businesses as part of the economic development activities.
- Sponsored the Oak Ridge Secret City Festival, which showcased the history of Oak Ridge and the Manhattan Project facilities to an estimated 30,000 visitors.

xiv. Office of Fissile Materials Disposition, Office of Site Engineering and Construction Management (OSECM)

The OSECM oversees NNSA activities at the SRS for the accomplishment of Departmental commitments for the disposition of surplus weapons-usable fissile materials. The Office also serves as the interface with the NNSA Site Office to ensure timely and effective direction, oversight, and communications for the NNSA program. OSECM provides guidance on policy for executing engineering, design and construction activities in accordance with DOE Order 413.3A; oversees the integration of engineering, design and construction planning and schedules for the Mixed Oxide Fuel Fabrication Facility (an NRC-regulated facility), the Pit Disassembly and Conversion Facility, and the Waste Solidification Building projects. In addition, OSECM oversees the integration of program resources (financial and human) to maximize efficiencies and provides functions critical to project success, including QA, safety, safeguards, and project controls, including baseline change control.

15. Project Management Initiatives

The Waste Solidification Building (WSB) Project completed the design phase of the project in 2008 and is expected to start construction during the first quarter of FY 2009. In addition to supporting Board's staff reviews of the project safety analysis; geotechnical analysis; structural design; electrical design; and mechanical processes, the following safety related activities were completed:

- The WSB project performed an evaluation of the ventilation systems as part of the implementation plan commitment for Board Recommendation 2004-2. The evaluation results and justification were provided to the Independent Review Panel for review.

- The project issued the PDSA and supporting documentation and analysis.

- Following the issuance of DOE-STD-1189-2008 in March of 2008, the project completed an evaluation of the safety analysis against the new requirements. While no new safety systems or upgrades were required by the evaluation, some additional accident scenarios now require prevention or mitigation by the existing systems. The results of this analysis were documented in the PDSA.