NRRPT® NEWS

National Registry of Radiation Protection Technologists

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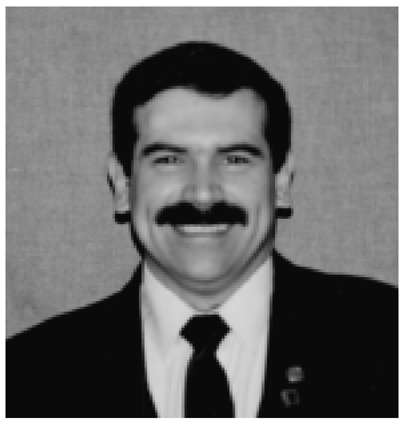
Chairman's Message



John Molner

This is my final opportunity to address the Registry as Chairman of the Board. My term of office and 5-year term on the Board comes to a close on December 31st. These have been challenging years for both the Registry and for the country as a whole. I believe that we have come through stronger than we ever have been in the past.

Even though new membership to the Registry has leveled off, there is an increased interest in our profession. We as an organization have been approached on the national and international level to participate as equals and partners in the discussions of the pressing issues of our day; Homeland Security, development of the new work force and emergency response are just examples.

I have had the honor and pleasure to participate on the NRRPT Board of Directors and Panel of Examiners for the last 20 years. My personal contribution to the Registry is minor compared to the collective efforts of all Board and Panel members since our incorporation in 1976. The Registry is a true synergistic organization. We as an organization are definitely greater than the sum of the individual parts. That synergy includes the Registry as a whole. The Registry's greatest strength is the individual RRPT. Each RRPT is a true ambassador for the Registry and radiation protection as a profession. Your daily efforts reflect on the value the Registry brings to society, and that has never been truer than in today's world.

One of my main concerns over the last two decades has been what the Registry provides to its members after Registration. The Board and Panel have produced many value added initiatives including scholarships, college credits and Registration Maintenance to name a few. None of these success stories would have been possible without the support of the members. Many of the ideas acted upon by the Board have come from suggestions made by the active members of the Registry.

The incoming Board Chair, Kelli Gallion, will be faced with many new challenges during her term, but I know she will enjoy the collective support of over 4,000 RRPTs. I will be taking on a new job as Chairman of the Executive Committee. In this new capacity I will be focused on the strategic plans for the NRRPT. The Executive Committee researches the 'What If' scenarios for growth and future involvement. As always, I welcome and request input from all of our members on where WE should be going and/or what need has gone unanswered.

Thank you for your continuing support and for the trust that you have given to all of us on the Board and Panel.

John Molner, Chairman of the Board

NRRPT Board of Directors / Membership Meeting

The invitation is still open to all Registry members to attend the 61st **NRRPT** Board of Directors and Panel of Examiners meeting in Coral Gables, FL (near Miami). The **NRRPT** meetings begin Saturday, January 10 and continue through Tuesday, January 13, 2004. Members and/or visitors are encouraged and welcome to attend Board meetings on Saturday and Tuesday. More information as well as the ALARA Meeting Reservation Form is located on the home page of the **NRRPT** web site (www.nrrpt.org).

Registration Maintenance Points -- **NRRPT** registered members will receive 2 points for attending the 4-day conference and .25 point(s) for each PEP course attended.

PEP Courses -- A third PEP Course has been added to the schedule. Dwaine Brown, from Halliburton Energy Services, will conduct a 2-hour course titled "Transportation Regulations and the ALARA Principle".

All PEP Courses will be held at the Hyatt Regency Coral Gables Hotel on Sunday, January 11, 2004 in the Venetian West Room. Following is the course schedule:

8:30am - 10:30 - "ALARA and Containment" by Frank Hejmanowski

11:00am - 12:00 - "**NRRPT** Question Development" by John Molner

1:30pm - 3:30 - "Transportation Regulations and the ALARA Principle" by Dwaine Brown

The PEP Course Registration Form is located on the home page of the **NRRPT** web site (www.nrrpt.org).

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Cleanup of the Head End Cells at the West Valley Demonstration Project

Scott Chase, West Valley Nuclear Services Company (WVNSCO)

Project Description

Cleanup efforts at the West Valley Demonstration Project (WVDP) have shifted from the focus on high-level radioactive waste processing to decontamination and dismantlement (D&D) of the former nuclear fuel reprocessing plant. A portion of these D&D efforts are being focused on cleanup of the Head End Cells (HECs).

The HECs were originally used between 1966 and 1972 to mechanically prepare spent nuclear fuel (SNF) for chemical processing to recover uranium and plutonium. The HECs are heavily shielded hot cells that were used to shear the SNF, store the sheared SNF prior to chemical dissolution, and receive the leached SNF hulls for eventual transfer to an on-site disposal area. Decontaminating these facilities includes the repair and replacement of failed equipment, and retrieving, characterizing, processing, packaging, and storing loose debris. Engineering work began in 1996 to plan the cleanup effort for these cells.

The Head End Cells consist of two main cells: the Process Mechanical Cell (PMC) and General Purpose Cell (GPC). The mechanical process used in these cells involved receiving spent fuel from the Fuel Storage Pool (FSP) and placing it on the PMC's size reduction tables. The fuel assemblies' end fittings (top and bottom areas of the long fuel assemblies) were cut off and any straps or outer casings were removed. The fuel was then put into fuel magazines that were pushed into a 250-ton shearing device that reduced the fuel to ~2-inch-long pieces (hulls). Those pieces dropped through a chute into critically safe baskets in the GPC and were stored in special cooling racks until the baskets were ready for the dissolution process. The fuel was lifted into another cell where it was chemically removed from the fuel hulls and put into a solution. The empty hulls were then brought back into the GPC and placed on a sorting table to ensure the fuel was properly removed. The empty hulls were moved up through a shielded hatch opening to the Scrap Removal Room (SRR), a buffer cell that allowed for personnel entry and removal of the hulls.

Through historical reports and upon an initial radiological survey of the cell, it was found that the HECs contain a significant quantity of loose debris generated during SNF recovery operations. As a result, the HECs were heavily contaminated with spent fuel, activation products, and fission product radionuclides. Radiation levels in the HECs range from general area dose rates of 100 R/hr to hot spots of 2,000 R/hr. Both alpha and beta/gamma removable contamination levels are on the order of billions of disintegrations per minute. Therefore, all the cleanup work in the HECs must be performed remotely.

The significant amount of loose debris discovered in the PMC and GPC consisted of general contaminated equipment and scrap from fuel and waste handling, fuel assembly hardware, leached fuel hulls, fine particles, miscellaneous fuel-bearing objects, and waste from the Analytical Cells. In addition to debris, water had infiltrated the GPC due to its below-grade location and created further damage to the cell and its equipment.

The primary consideration for cleaning up the HECs is ensuring the radiological protection of workers and the environment. The WVDP's policy is to maintain radiation exposure of workers As Low As Reasonably Achievable, (ALARA) and the most effective way to achieve this goal is to perform operations remotely. Unfortunately in the case of the HECs, much of the remote operations equipment, including the shielded viewing windows, the GPC shield door that shielded an adjacent Crane Maintenance Room, and all the remote handling capabilities, had deteriorated to an unusable condition. Replacement and repair of the equipment was necessary before debris retrieval and packaging could begin.

In parallel with these physical facility changes, the safety and waste management bases for performing the expected work activities were reviewed and new approaches to cleanup were developed. Since the chief consideration for safe completion of cleanup work was limiting radiological exposure to workers, it was important to evaluate the criticality potential of the spent fuel-related debris and arriving at the most effective and efficient way to collect and package it.

The Head End Cells Project team was formed to ensure integration between the various aspects of the project. The core team consisted of a project manager and various project leads. Each of the project leads was assigned an area of specific responsibility. To aid the project leads, support personnel were matrixed into the project. The support personnel included Radiation Protection, D&D Operations, Waste Management, Design Engineering, Industrial Health and Safety, Procurement Services, Project Controls, Construction Projects, and Quality Assurance.

Shield Window Refurbishment

All the shielded viewing windows in the PMC and GPC had deteriorated to the point where they no longer provided visual access to the cells. Each of the shield window assemblies consists of leaded shield glass in a concrete/cast iron shot-filled window assembly. The spaces between the shield glass panes are filled with mineral oil. In the PMC, the total window assembly weighs approximately 15 tons; each piece of shield glass weighs between 800 to 1,500 lbs. The windows needed to be pulled from the window cavity into the operating aisle to allow for removal and replacement of the glass and fluid, but the floor in the operating aisle could not support the weight of the window assembly. To help distribute the 15-ton weight of the window assembly and to facilitate its removal, a structural steel extraction table was installed in the aisle.

To protect the workers and control the spread of contamination during the removal process, a containment tent was erected in the operating aisle to facilitate the refurbishment work. Airborne radioactive contamination was managed by ventilating the containment tent back to the PMC through an empty manipulator port, eliminating the potential for releasing radioactive contamination from a local filtration system failure. Radiation exposure to personnel was reduced by installing temporary steel shielding around the window opening while a temporary shield door was slid into place in front of the window cavity.

Lessons learned from refurbishment of the first windows were incorporated by the project team into the field work for subsequent windows, resulting in a reduction of the time needed for refurbishment of the later windows by almost 75 percent. These radiological protection measures allowed personnel to perform the refurbishment work in radiation fields of less than 5 mR/hr and resulted in no personnel contaminations.

GPC Shield Door Repair

The GPC shield door required repair to allow personnel entry in the GPC Crane Room (GCR) to support removal of failed equipment. The 50-ton shield door had been left in a halfway open position when the facility was shut down in 1972, and the drive mechanism located in the GCR had failed. The drive mechanism was damaged further from periodic flooding of the GCR from surface water infiltration. General area dose rates in the GCR were 30 to 150 mR/hr, with hot spots of greater than 300 mR/hr gamma. There was also a large amount of dirt and debris covering the floor. Removable contamination levels exceeded 1 million dpm/100cm^2 beta/gamma. An engineering evaluation was performed with significant input from Radiation Protection and Maintenance personnel. It was determined that replacement of the failed components, rather than a new design and equipment fabrication, would best ensure the maximum degree of radiological protection and cost-effectiveness. A means to safely secure the shield door during the repair process was also devised using standard trailer jacks and a base plate grouted to the floor.

Due to the complexity of the repair work, the project team decided to construct a full-scale mockup of the GCR. This full-scale mockup then allowed Operations and Maintenance personnel to review each step of the repair process and develop the necessary tools and techniques to accomplish the repair. Prior to the repair work being started, one-half-inch thick steel shield plates were placed on the floor of the GCR to cover the contaminated dirt and debris. General area exposure rates were reduced by more than 20 percent and airborne contamination levels were reduced by 99 percent. The drive mechanism replacement was then conducted over a four-month period.

The refinement and execution of the repair approach resulted in a personnel exposure reduction of greater than 65 percent, from the original 2,980 person millirem estimate to the actual 1,037 person millirem exposure. A contamination fixative was also applied to the old equipment to ensure that airborne contamination levels remained low and to facilitate its future packaging for disposal

Remote-Handling Equipment Replacement

Removal of the failed bridge-mounted cranes and power manipulators posed a significant contamination control challenge. New hard-walled enclosures were constructed over the existing PMC Crane Room (PMCR) and GCR to serve as buffer areas during removal and replacement of the crane bridges. Concrete roof hatches weighing up to 25 tons were removed or relocated from the ceiling of each crane room to provide ready access to the cranes during the removal process, and lighter steel covers were installed in their place.

The crane bridges were constructed of carbon steel, measured 16 feet rail-to-rail, and were 9 feet wide; each weighed approximately 7 tons. Initial radiological data on the crane bridges showed high contamination levels and gamma dose rates of 30 to 80 mR/hr, with hot spots of up to 650 mR/hr. The initial dose estimate, based on hands-on mechanical size-reduction, was 1,600 person millirem. Due to the high potential personnel exposure, the project team conducted an evaluation of alternative cutting methods. An oxy-gasoline cutting technology was found through a technology sharing program with the Fernald Environmental Management Project. The oxy-gasoline technology offered the advantages of cutting much faster and providing several safety features not found with oxy-acetylene torch cutting. Working directly with the torch vendor, a first-of-its-kind, 13-foot-long cutting tool was fabricated. This specially designed torch allowed operations personnel to size-reduce the PMC crane bridges while standing in the enclosure located above the PMCR.

Before using the oxy-gasoline torch, a full-scale mock-up of the bridge girder was fabricated and constructed. The mock-up provided a means to train Operations personnel on the use of the torch and refine the tools and techniques to be used. As an added measure to control the spread of contamination during cutting, a strippable coating was sprayed on the bridges and other miscellaneous pieces of equipment. The entire evolution, from setup to crane bridge removal, lasted seven weeks for the first of two PMC crane bridges. The project team reviewed the work done on the first crane bridge and implemented improvements for removal of the second bridge. By factoring in the lessons learned, the time to complete the removal of the second crane bridge was reduced to two weeks.

The new single bridge, having both the crane and the power manipulator, was then installed through the PMCR enclosure onto the rails in the PMCR. This unit has operated successfully, with only minor maintenance repairs required, for approximately two years.

Because the GPC crane bridge was of lighter construction and thermal cutting created airborne contamination challenges, mechanical cutting was used to size reduce the bridge. The crane bridge and power manipulator bridge were moved to the GCR. Personnel entered the room and performed hands-on, size-reduction of the bridges using a special large-capacity band saw. Similar to work done in the PMC, the new GPC crane bridge was installed through the GCR enclosure onto the crane rails in the GCR, moved into the GPC, and has been used for approximately eight months

Safety Basis

The Safety Analysis Reports (SARs) written by WVNSCO and the accompanying Safety Evaluation Reports (SERs) written by the U.S. Nuclear Regulatory Commission (NRC) and DOE serve as the safety basis for the WVDP. The applicable SAR was reviewed at the early stages of project planning and it was determined that a revision was necessary. The primary reason for a revision was an existing NRC SER restriction prohibiting disturbance of the material in the GPC prior to obtaining complete characterization information. This restriction had come about based on previous criticality evaluations, which considered the presence of water in the GPC and concluded that under certain conservative conditions, a criticality event was credible if the spent fuel-related debris was reconfigured. To address the NRC SER restriction, additional process knowledge characterization information was documented and criticality safety analyses were prepared based on the planned GPC work. These analyses considered the proposed methods for collecting and packaging the spent fuel-related debris.

Lifting the restriction was justified by showing that both under normal and under credible abnormal and accident conditions the areas being cleaned and the storage areas would remain subcritical. The analyses were then transmitted to the NRC for review and concurrence along with a proposed revision to the SAR. The NRC concurred with the new SAR and issued a SER that lifts the prohibition on disturbing the material in the GPC. Along with the issuance of a revised SAR, the procedures that implement the SAR requirements in the field have been prepared and will be issued concurrently. By considering the field implementation of the safety requirements in parallel with preparing the criticality analyses, maximum field flexibility has been built in to the safety basis.

The original strategy for revising the SAR was to consider cleanup of the HECs as a single effort. However, this would prevent proceeding with work in both cells until the lengthy SAR revision and approval process was completed and the NRC SER restriction lifted. Therefore, to accelerate cleanup, the facility infrastructure upgrades were reevaluated and approved to proceed in parallel with the SAR revision. Also, since the NRC SER restriction applied only to the GPC, the PMC work was separated from the overall HEC's work scope. The planned PMC work was then evaluated on its own and was determined to be within the existing safety basis. PMC cleanup work was accelerated by two years using this approach.

A fire hazards analysis (FHA) was also conducted for proposed HEC operations. The presence of combustible material and potentially pyrophoric metal (zircalloy fuel cladding) in the cells was evaluated in terms of the likelihood and consequence of fires occurring in the HECs. Fire protection measures were then devised based on the recommendations in the FHA, and included packaging combustible material first in the debris retrieval sequence, restricting and controlling the use of "thermal" methods of debris size-reduction, and prohibiting the use of decontamination methods that would remove the oxide layer present on zircalloy fuel cladding. The physical facilities were also modified for fire protection purposes. A screen was placed over the open hatch between the PMC and the GPC to reduce the amount of particulate sent downstream to the ventilation system filters during a fire. The screen also reduced the amount of airborne particulate that was filtered during normal operations. A supply of Class D fire extinguishing agent was placed in the PMC and GPC for delivery by the remote-handling equipment to provide fire response capabilities in case of a metal fire.

Waste Management Basis

In addition to the characterization and packaging issues for highly radioactive waste common throughout the DOE Complex, the WVDP also has some unique problems. The former spent fuel reprocessing activities at the Western New York Nuclear Service Center (WNYNSC), which includes the 220-acre WVDP, were considered a commercial operation and, therefore the WVDP was not included as a defense-related facility in the legislation that created the Waste Isolation Pilot Plant (WIPP). As such, the WVDP's transuranic (TRU) waste cannot be shipped to WIPP for disposal. However, in the absence of any other disposal facility for TRU waste and recognizing that most, if not all, the debris to be packaged in the HECs would likely be categorized as TRU waste, waste packaging plans were developed using WIPP's established contact-handled (CH) and proposed remote-handled (RH) TRU waste acceptance criteria (WAC).

There are two key factors for planning to satisfy the WIPP WAC during D&D operations: having information on the chemical, physical, and radiological composition of the debris; and using containers that either meet the WAC or containers that can later be placed into WIPP-acceptable disposal containers. However, the characterization information existing prior to cleanup was limited to only in-cell radiation measurements and partial radiological analysis from 1986. Therefore, a sequential characterization approach was taken.

The debris types in the HECs were evaluated based on their origin for potential radiological composition and likelihood to contain hazardous constituents. Sampling debris items in any individual container. Individual container characterization for WIPP acceptance and transport classification would be performed later when the containers were placed in their final disposal container.

An innovative in situ gamma spectroscopy unit was deployed in the HECs. This unit aided in identifying and quantifying gamma-emitting radionuclides in debris and equipment and targeting specific areas for sampling. Field characterization activities were conducted first in the PMC. Lessons learned from PMC sampling and analysis activities were incorporated into the GPC characterization campaign and the GPC sampling activities were conducted in half the time.

Thirty-gallon containers were selected for packaging debris based on the size constraints of the HECs and to allow for the greatest degree of flexibility for packaging into the final disposal containers. The hatches between the hot cells had been sized to accommodate the transfer of 30-gallon containers, which are essentially the same as the scrap drums used during spent fuel reprocessing operations. The 30-gallon container also offers more options for over-packing and shielding than are available with larger containers. The container can be placed readily into the proposed RH-TRU waste canister; this is not possible with a 55-gallon drum because its interior diameter is the same as the RH-TRU canister.

In parallel with these major equipment and program activities, a myriad of other tasks were completed prior to cell cleanup operations and included providing specific tools for remote operations, ensuring essential spare equipment was in place and repair capabilities existed, ensuring field implementing procedures were available, and training and qualifying both operations and support personnel to perform the cleanup work.

The HEC projects cleanup scope of work began with the cleanup of the combustible materials to reduce the immediate potential for a sustained fire in the HECs. Materials including wood, plastics and rubber were packaged and size reduced using shears/bolt cutters. During this time, tooling was being developed for further size reduction activities. Due to the nature of the ventilation of the cells, any cutting technology that produced large airborne particulate had to be ruled out. Engineers chose to take the simple approach, using off-the-shelf hand tools that hobbyists would use to cut materials and perform maintenance tasks, rather then implementing complex designs.

One of the first innovations developed was the attachment of grips to a safety blade cutting knife that could be easily handled by a remote manipulator. This knife was capable of slicing old tarps and vinyl coverings into sizes that were more conveniently handled. Other tools were developed to help cut some of the smaller pieces of broken manipulators that were left behind in the cells. A bench-top band saw was modified and lowered into the cell from a crane hook. This saw was very successful in cutting up broom and mop handles, and pieces of pipe that were used during cell operations. Additional hand-held band saws were modified to cut the 8-inch-diameter manipulators that were broken and abandoned in the cell.

As the cell cleanup efforts progressed, the dose rates of the packages began to increase. Initial drums were loaded with general combustible waste using the small tooling that was readily available. These 55-gallon drums were low dose (<500mR/hour) and could be packaged using hands-on methods. Engineers developed methods to minimize contamination by covering the initial waste packages (30-gallon drums) with a remotely removable covering. When it was time to bring the package out, the covering was removed while the drum was suspended in the air, and the drum was then immediately removed. The drums were being removed from an area with contamination levels in the billions of dpm/100cm^2 and the contamination on the initial packages was minimal.

Additional efforts to allow for the project's overall dose reduction ALARA strategy were investigated in the area were the drums were weighed, measured for radiation dose, and overpacked in 55-gallon drums or shielded containers. The SRR was refurbished and allowed for drums to be brought out in a lower background radiation level area. Engineers developed a method to remotely take weights and dose readings, then place drums in shielded containers using a 55-gallon drum with

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Contact: Mark Helton (803) 831-3777

Cabrera Services, Inc.

CABRERA Services, Inc., a small business, combines radiological engineering and remediation expertise with radioactive materials management, environmental, and health and safety capabilities to solve complex issues for government agencies nationwide.

Contact: Robert Sharkey (860) 289-1885

Chase Environmental Group, Inc.

Chase maintains a staff of professionals with years of experience in providing radioactive and mixed waste disposal solutions. Chase also offers comprehensive remediation and decommissioning services

Contact: John O'Neil (877) 382-2124

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prepositioned radiation probes on it. The drum was mounted on a floor scale and brought up, its contamination covers were removed and weighed, dose rates were taken, and the drum was placed in a shielded container without exposing the operators to radiation. The workers now only had to enter a low-dose, low-contamination zone and bolt the final lids on the drums to remove them.

The WVDP explored other areas to help reduce exposure to workers while handling waste. The Chemical Process Cell (CPC) had been cleaned out and racks were installed in the cell for storage of solidified high-level waste canisters from the vitrification process. When the vitrification process was completed and all of the available rack space had not been used, the WVDP refurbished the flow path between the GPC and the CPC to allow for temporary waste storage of higher-dose waste drums. This process allowed remote storage of the waste drums and ensured worker safety for storage of TRU waste drums until the disposal path for this waste is determined.

Future NRRPT Exam Dates

February 21, 2004

Deadline for application: Dec. 31, 2003

August 14, 2004

Deadline for application: June 18, 2004

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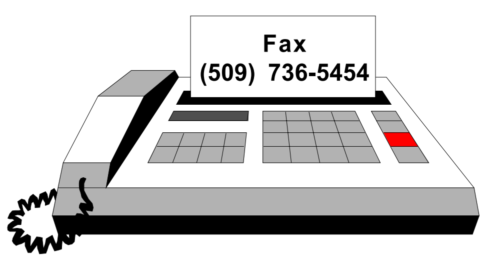

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