



NEWSLETTER

DECONTAMINATION DECOMMISSIONING AND REUTILIZATION DIVISION MAY 2006

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"The DDR Newsletter is a publication prepared by the DDR Division Newsletter Editor with input from various information providers for each issue for DDR Division community consumption. **Access to the newsletter is a benefit of membership in the DDR division.** It is a semi-annual publication issued in the Spring and Fall of each year. Please encourage colleagues who might have an interest in our newsletter and our other DDR activities to join us in the ANS and specifically the DDR Division. Membership details for joining the DDR Division can be found at the division's website - <http://ddrd.ans.org> "

If you would like to contribute news or an article to the DDR newsletter please feel free to contact John Millacci, the DDR newsletter editor at (804) 783-0185 or John_Millacci@wpi.biz.

CHAIR'S MESSAGE

As I wrap up my term as the Chair of the DD&R for 2005-2006, I can honestly say I enjoyed every aspect of the position and was fortunate enough to work with some of the finest people in the industry. The people involved in DD&R division have made it what it is today and I am always impressed how our division continues to provide tangible value to the nuclear industry. Over the last 10 years, the nuclear industry has consistently demonstrated nuclear facilities can be decommissioned in a safe and cost effective manner. Licenses have been terminated for numerous facilities and many DOE and commercial facilities have been returned to Greenfield or have been made available for other uses; truly demonstrating good stewardship to the community and the environment.

I have no doubt our division will continue to be an integral part of the nuclear industry as we fund annual scholarships to students studying in the nuclear and environmental fields, sponsor and support D&D conferences and workshops, such as the upcoming 2007 DD&R Topical being held in Chattanooga, Tennessee as well as our excellent newsletter we issue twice a year to share information both domestically and internationally. In addition, this will be the second year in which we will recognize our peers through the ANS-DD&R Division Lifetime Achievement Award and the ANS DD&R Project Award of Excellence.

As I end my term as Chair of the DD&R I want to thank everyone on the Executive Committee as well as the program committee members for their tireless efforts in keeping us such an active division. I want to especially thank Mark Price for his work on Program efforts, Jim Byrne for providing much needed support in all areas and taking on the challenge to put together what I am sure will be a very successful DD&R Topical in Chattanooga in September of 2007, and to Larry Boing, who has performed the lions share of work in supporting me this last year.

Let's make it our goal that everyone who can get involved in the DD&R Division activities does so. Involvement can be anything from writing an article for our newsletter, offering to assist with the upcoming DD&R Topical in 2007 to running for a position on the Executive Board of our division. Again, thank you for your continued support.

Joe Carignan
Division Chair

UPCOMING MEETINGS AND CONFERENCES

2007 DDR Topical Meeting in Chattanooga, TN, September 16-19, 2007

DD&R is planning a topical meeting scheduled for September 16 -19, 2007 in Chattanooga, TN at the Chattanooga Hotel, (<http://www.chattanooga.com/>). We are building on the very successful DD&R 2005 Topical Meeting in Denver CO. The meeting will be a forum for the discussion of the social, regulatory, scientific, and technical aspects of decontamination, decommissioning, and reutilization, and waste management. The 2007 conference program will include lessons learned derived from commercial, government, and international project updates and technology developments in the areas of decommissioning, waste management, site closure and legacy management. In addition to a comprehensive

technical program, there will be a Technology Expo, technical tours, and numerous fun activities and opportunities for attendees and guests to enjoy Southern Hospitality at its finest. The call for papers can be found at <http://www.ans.org/meetings/docs/2007/ddr07-cfp.pdf>. If you are interested in assisting us with conference planning or paper reviews, please contact Jim Byrne at jbyrne@firstenergycorp.com.

ANS 2006 Annual Meeting “A Brilliant Future: Nexus of Public Support in Nuclear Technology” in Reno, Nevada – June 4-8, 2006

DD&R will be participating with 4 Panel (P) sessions and 1 Invited/Contributed (I/C) session under the “Waste Management and Decommissioning Technologies” track. These sessions are as follows:

- DOE Cleanup Program Update (P)
- DD&R Technological Advancements (P)
- DD&R Hot Topics and Emerging Issues (P)
- Clearance of Solid Materials: Federal and Industry Update (P)
- DD&R General (I/C)

For more information, check the ANS website at <http://www.ans.org/meeting/annual>

ANS 2006 Winter Meeting and Nuclear Technology Expo “Securing the Future in Times of Change” in Albuquerque, New Mexico – November 12-16, 2006

Sessions to be determined.

MEMBERSHIP

As of early April, 2006 – DDR membership stands at 993 members per the ANS electronic Member Directory. This is an improvement from the 898 number back in January, 2006 but short of the 1097 members we had in September, 2005. Our division has a lot to offer as demonstrated at our very successful topical meeting we had in Denver last year. Let’s spread the word and get even better participation for the Chattanooga meeting in 2007. Please share with your colleagues the fact that there is value added with DDR membership and that we are a very active division with collective resources including access to our information packed DDR semi-annual Newsletter! Efforts have started to expand our membership - more news will be forthcoming shortly on this activity.

Results of the 2006 DDR Membership Survey

The 2006 DDR member survey has been completed and the results evaluated. We had over 25% of the membership participate – 278 responded and 804 opted not to participate. Of the 278 respondents – 158 are actively working in the DDR area. The two largest industry segments represented were: sub-contractors and government contractors. These two groups made up 142 (~51%) of the 278 respondents. Just fewer than 80% of the respondents felt that DDR provided ‘added value’ to what they are doing in their everyday jobs. That’s a good response for such a diverse crowd that we are working with in our division. There was also a great response to get additional volunteers to support the DDR activities – over 100 persons stepped up and offered to help the division officers and other volunteers in some way to support the expanding the activities of the division. Thank you for those of you who did step forward and volunteer to support DDR!

On the issue of meetings participation – generally speaking - members favor the ANS Winter meeting for participation over the ANS Summer meeting and also favor stand alone DDR topical meetings over embedded DDR topical meetings. The likelihood of participation in future meetings followed this same pattern. As to why members were **not** participating – the greatest number of responses was due to: 1) limitations on travel, 2) job work load requirements and 3) employers not supporting ANS activities.

On the issue of other DDR member professional societies and organizations – the three largest # of responses of DDR members participating in meetings of other organizations were: 1) the Health Physics Society - 63 responses, 2) State Professional Engineer organizations - 44 responses and 3) the American Society of Mechanical Engineers - 34 responses. Those three dominated the responses - others were scattered across many various groups. The Health Physics Society also had the largest member of respondents' participation in other affiliated organizations meetings with 44 respondents indicating such.

On the issue of future planning for DDR – the main response here was to aggressively pursue additional membership especially now that there is significant decommissioning activity external to the United States. Although some respondents favored merging back in with FC&WM division, many also responded that we should consider merging back in to another division - either ESD or perhaps an even smaller division. Some responses were: add Life Extension to our charter/mission, reduce the number of meetings, and prepare more decommissioning related position papers to gain greater visibility. The bottom line overriding message here was to pursue additional new members.

On the issue of the content of the DDR newsletter – we really came away with lots of good suggestions here on how to expand or modify the coverage of the newsletter. The Top 5 responses were: 1) identify DDR Industry Best Practices - 166 responses, 2) continue with Project Status Updates - 54 responses, 3) submit Book Reviews on new industry resources - 93 responses, 4) publish Summaries of Division Topical Conferences - 76 responses and 5) list Upcoming Conferences - 75 responses. Other comments received were: including more information on technologies, more international coverage and more coverage of Federal Agency activities. This is good feedback and will be forwarded to the new Newsletter Editor for his consideration and for our discussion among the DDR leadership.

On the issue of the content of the DDR website – we received mainly positive feedback. There were several requests that the website should be updated more routinely – like on a monthly basis. There was also additional content requested to be added by several responders: to post conference summaries, to post Executive Board meeting minutes, to post the DDR roster. This is good feedback and was forwarded to the webmaster and discussed among the DDR leadership. If you visit the website you will already begin to see improvements in the overall content and layout.

Again many thanks to everyone who responded – the DDR leadership will take the results and look to work on those areas where feedback was received and look for other opportunities to enhance division operations.

DDR Membership Promotion

The DDR Division is conducting a new member promotion for the year 2006! All new members who join the DDR division in 2006 will be entered for a drawing to win a copy of the reference text 'Decommissioning Handbook'. This 500-page text was edited by A. Taboas, A. Moghissi, and T. LaGuardia and was sponsored by the American Nuclear Society (ANS), the American Society of Mechanical Engineers (ASME), and the U.S.

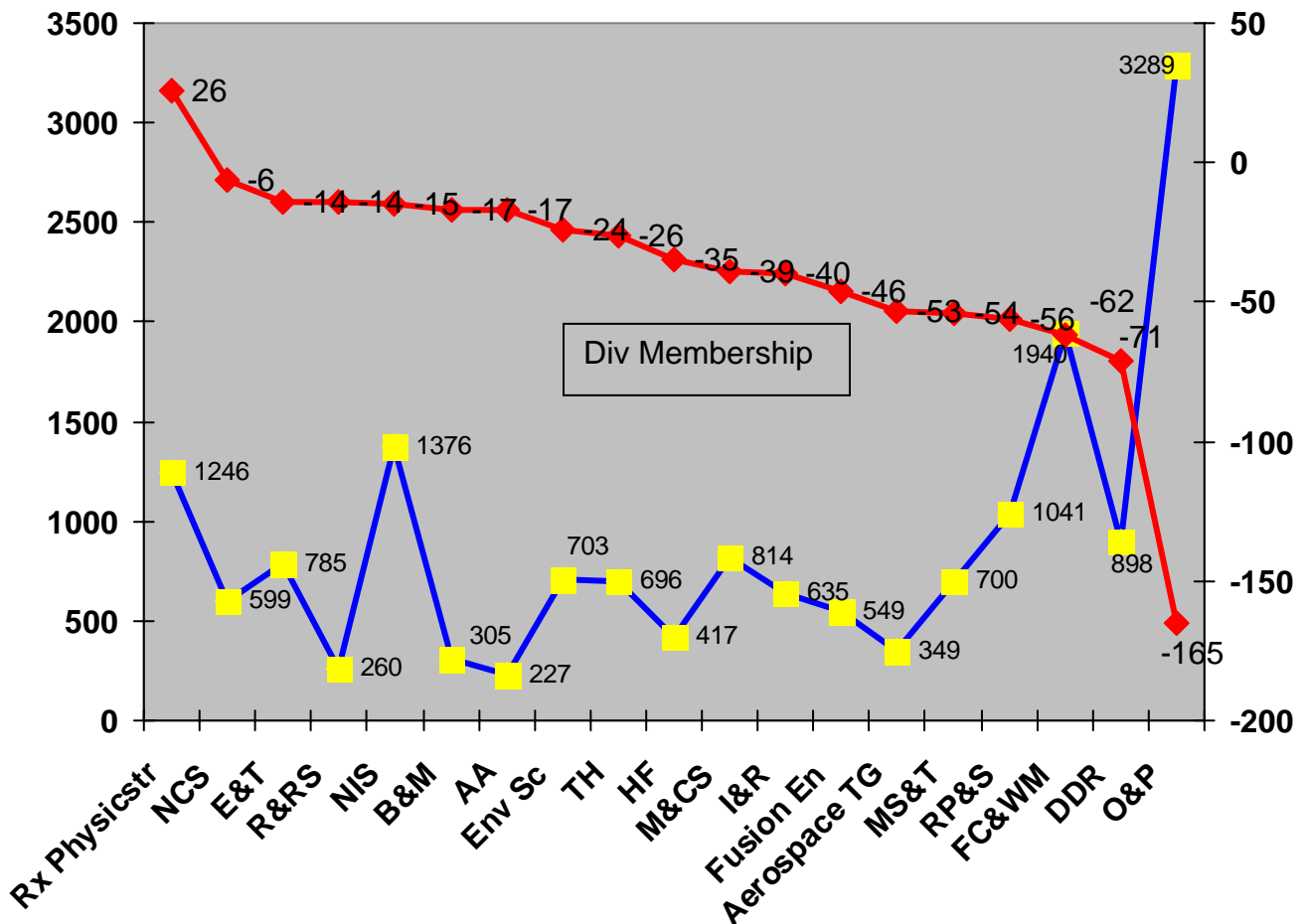
Department of Energy. This authoritative reference in nuclear decommissioning is a comprehensive effort combining discussions on policy, engineering, and science and provides both a full introduction for those new to the field and a current desk reference on regulations, resources, and experience. The printed text is supplemented with a compact disk and allows for updates via Internet access.

We will have two drawings to select two winners of these textbooks with one entry being made for each new member joining the DDR division after March 1, 2006. The first of these drawings will cover those new members joining the division between March 1, 2006 and June 30, 2006. The second drawing will be for those new members joining DDR between July 1, 2006 and December 31, 2006. ANS will provide us the names of the new DDR members and the official entry dates for the drawings.

The retail price for this text is \$100 USD. So by joining the DDR division and should you win one of these texts you will recoup 50% or more of your first year dues depending on where you reside. You must select DDR as one of your professional divisions otherwise you will not be eligible to enter this drawing.

In addition, look for a promotion working with RadWaste Magazine to provide free subscriptions to some of our new members this coming year. Details are still being worked out.

ANS Division Membership Delta –
Jan 2005 vs. Jan 2006



AWARDS AND HONORS

Nominations are now open for the 2006 DDR Awards. Nomination forms can be found at the website. Let's have another good spirited round of competition for these valuable awards! Nominating period closes June 30, 2006. There is an open position for DDR Awards Chair, contact L Boing lboing@anl.gov for more details.

ANS-DD&R Awards

The DD&R Executive Committee (EC) and all DD&R members strive to recognize and honor accomplishments of colleagues who have made outstanding contributions to the field of decommissioning, decontamination and site reutilization. To that end, the DD&R Division EC has established awards to recognize their colleagues who have demonstrated outstanding achievement, service and contribution to the technical area. Two awards have been established for this recognition and these are detailed below.

The ANS-DD&R Division Award of Excellence

Purpose: This award is intended to recognize individuals for their efforts and achievements on a specific project which has contributed to the advancement of any one of or all of the fields of decontamination, decommissioning or site reutilization. The basis for nomination for this award is detailed below. However, nominations should be based upon the contributions of an individual or group of individuals making a specific and significant focused contribution to a state of the art project, an important publication, or on another major technical achievement. The Award of Excellence is intended to reward members of a project team and the award is made to the project team represented by project representatives to accept the award. This is in marked contrast to the Lifetime Achievement Award.

Criteria: Award nominees are to be judged based upon the perceived significance of the project or activity considering the following criteria:

- Exceptional contribution to the successful completion of a DD&R related project or activity or its supporting functions (i.e. standards, significant technical achievement, public outreach, etc)
- Involvement in ANS and DD&R related activities (Conferences, embedded topical conferences, annual meetings, committees, etc)
- Contribution by an individual which provides positive professional or public image to DD&R or any of its related areas
- Efforts that have improved the overall effectiveness of the decontamination, decommissioning and reutilization tasks undertaken by the DD&R industry

Nominations: Nominees for this award do not have to be a U S Citizen nor be a member of ANS. The nominee must be living at the time the nomination is made. Non-ANS members as well as ANS members can submit nominations. Nomination forms are available for this award from the DD&R Division website (<http://ddrd.ans.org>). In addition, once a year a 'general call for nominations' for these awards will be made through a notice in the DD&R newsletter and by other means as deemed appropriate. All nominations must be submitted to the DD&R-EC for evaluation and selection. The awards timeline is also available at the website.

The Award: A maximum of two awards per calendar year are allowed. The award shall be comprised of a certificate of recognition and/or a plaque or an equivalent. A summary article on the winning nominees project shall be prepared by the award recipients and published in the DD&R division newsletter and posted on the DD&R website as well as published in the Radwaste Solutions magazine as soon as possible after the award is presented. Scheduling for award consideration and presentation can be modified by the DD&R EC Chairperson.

The ANS-DD&R Division Lifetime Achievement Award

Purpose: This award is intended to recognize a more senior-level individual for their achievements and contributions to the advancement of any one of or all of the fields of decontamination, decommissioning or site reutilization. The basis for nomination for this award is detailed below. However, strong consideration should be given to the contributions of the individual in making specific and significant contributions to the state-of-the-art of the DD&R area, an important publication in the DDR area, sustained noteworthy technical achievement, or an industry wide sustained record of significant achievement, accomplishment and technical excellence in DDR and other nuclear related areas. The Lifetime Achievement Award is intended to reward an individual member and the award is made specifically to that individual. This is in marked contrast to the Award of Excellence.

Criteria: Nominees for this award are to be judged upon the perceived satisfaction of fulfilling the following criteria:

- 25 years or more in the nuclear industry with at least 10 years in the DD&R area
- Exceptional contribution to the successful completion of DD&R related projects or activities or its supporting functions (i.e. standards, significant technical achievement, public outreach, etc)
- Involvement in ANS and DD&R related activities (Conferences, embedded topical(s), annual meetings, committees, etc) including international
- Involvement in a unique project or assistance in providing a positive professional image to DD&R related areas
- Involvement in improving overall effectiveness of the decontamination, decommissioning and reutilization tasks undertaken by the DD&R industry worldwide

Nominations: Nominees for this award do not have to be a U S Citizen, but do need to be an ANS member or a retiree. The nominee must be living at the time the nomination is made. Non-ANS members as well as ANS members can submit nominations. Nomination forms are available for this award from the DD&R Division website (<http://ddrd.ans.org>). In addition, once a year a 'general call for nominations' for these awards will be made through a notice in the DD&R newsletter and by other means as deemed appropriate. All nominations must be submitted to the DD&R-EC for evaluation and selection. The awards timeline is also available at the website.

The Award: A maximum of one award per calendar year is allowed. The award shall be comprised of a certificate of recognition and/or a plaque or an equivalent. A summary article on the awardees professional achievements upon which the award is based shall be prepared by the nominator and published in the DD&R division newsletter and posted on the website as well as published in Radwaste Solutions magazine as soon as possible after the award is presented. Scheduling for award consideration and presentation can be modified by the DD&R EC Chairperson.

DECOMMISSIONING MUSINGS

Decommissioners Musings by Larry Boing lboing@anl.gov

This section is intended to point readers to sources of available information that they might find useful in their DD&R work. There is much information in the DDR newsletter about on-going DD&R projects/activities at various sites, in various countries, regions and on all of the various technical aspects of our work. I would like to focus this issues column on international decommissioning, maritime decommissioning and on the topic of decommissioning standards. All of these are fairly recent development in the decommissioning field.

Last column, I provided readers some details on the activities of the International Atomic Energy Agency (IAEA). I am happy to report that we will now be regularly receiving input on the decommissioning activities of the Agency for our semi-annual newsletters on happenings in Vienna, Austria at the Agency offices. We look forward to including this material in future issues of the newsletter. There is an interesting narrative article and photo essay on the IAEA Home Page on the situation in Iraq relative to the Tuwaitha Nuclear Site and radiological conditions and issues there regarding environmental restoration and decommissioning - the URL for this article is - <http://www.iaea.org/NewsCenter/News/2006/tuwaitha.html>. This Web article includes some narrative material on the situation as well as some interesting photos of the Tuwaitha Complex and discussions with one of our own DDR members. On an aside, the Agency is also currently planning a “Lessons Learned from Implementation of Decommissioning” Conference in Athens, Greece, December 11-15 of this year. More details on this conference can be found at the IAEA website www.iaea.org under the tab ‘Meetings’.

Another project that has been receiving lots of attention in the nuclear decommissioning contractors’ community is the upcoming project to perform the decommissioning of the Nuclear Ship Savannah. The licensee for the ship is the U S Department of Transportation-Maritime Administration. The characterization survey report of the vessel has been posted and is available for downloading at the website given below. Further details on this upcoming decommissioning project can be found at the website https://voa.marad.dot.gov/programs/ns_savannah/index.asp. If I recall correctly, there have only been five ships in the world similar to this nuclear-powered commercial vessel. The N.S. Savannah was a commercial cargo ship and operated from the early 1960s into the early 1970s.

I am trying to ‘start us back up’ on the topic of decommissioning standards. We are investigating the possibility of a joint effort in the standards development with colleagues of the ASTM organization and their E10.03 Committee. We are looking at possibly jointly developing decommissioning standards to support each others needs relative to different aspects of decommissioning standards. Any DDR member reading this who is interested in possibly supporting the development of and/or review of standards under this arrangement – please send me an email. Dick Meservey of INL is the ASTM POC as well as serving on the EC of DDR. Please give me your feedback.

Please let me know if you have a suggestion for an interesting topic for the next newsletter column. That’s all for now – talk with you again in the fall!

DD&R WEB PAGE

The DD&R web site (ddrd.ans.org) continues to be an excellent resource for Division Members. It provides a convenient way to identify and contact Division Officers and/or members of the Executive Committee so that you can readily provide your input to them. The web site also provides notices of upcoming meetings of interest to the Division, and includes other miscellaneous material such as the Mission, Bylaws, Operating Manual, and Five Year Plan for the Division. The DD&R Newsletter is accessible through the Members Only portion of the web site.

The web site is currently being updated to include additional information which will likely be complete by the time you read this newsletter. The DD&R website is (one of?) the best and current Division web sites within the ANS organization. In order to maintain this status, a significant revision of the website is planned. Therefore, if you have suggestions that you would like to see addressed, please do not hesitate to send them to me.

John Gunning
gunningje@ornl.gov

FERNALD DECOMMISSIONING UPDATE

Fluor Fernald is about to declare victory at the Fernald Site that it has managed for almost 14 years. The historic, uranium fuel manufacturing site near Cincinnati, Ohio, will close forever this summer, after completing a \$4-billion cleanup project ahead of schedule. Progress has been remarkable. Fluor Fernald will meet the requirements of all five Records of Decision negotiated for the site under the Comprehensive Environmental Resource Conservation and Liability Act, and essentially tore down or dug up everything built or buried at the site since its founding in 1951.

Fluor Fernald has not only cleaned up and restored the site, but it has secured the trust and involvement of stakeholders and regulators, performed work safely, and managed baseline costs in its contract with the Department of Energy to significantly less than the target cost projected for the job. During Fluor's tenure at Fernald, its recordable incident (accident) rate dropped consistently from 3.59 in 1994 to 0.75 in 2005 (more than 8 times better than the U.S. construction industry rate of 7.8) and the project maintains that type of level today.

Recently, Fluor completed cleaning out and demolishing 254 buildings and structures in the central production area of the Fernald Site, and about 100 additional structures on other site areas. Most of the buildings were contaminated and were demolished under strict radiation control procedures, even administration buildings and water towers. Fluor also dug up, treated, and safely shipped out wastes that filled more than 10,500 train cars. The waste had been buried in pits at Fernald during the Cold War years.

Fluor also built an 800-foot wide, three-quarter-mile long, 65-foot high On-Site Disposal Facility (OSDF) to hold low-level wastes including building debris and contaminated soils. The OSDF, which saved time and costs

estimated at 15 years and nearly \$2.9-billion, now holds 2.9-million cubic yards of material – enough to fill two Empire State Buildings. Fluor remediated three large silos that held difficult, unusual byproducts whose remediation proved to be the most technically challenging. The material consisted of very rich, partially leached ore containing high concentrations of heavy metals. The waste from the Silos 1 & 2 constituted the largest source of radium contamination in the world, and there was no precedent for its handling, packaging and disposal. Fluor safely emptied the silos, treated the waste, and shipped it off site for disposal. Now, Fernald workers are tearing down the treatment and shipping facilities that handled the Silos’ waste.

Fluor also built and operated the largest treatment plant in the world to remove uranium contamination from groundwater, and then converted the plant to a lower flow system for long-term pumping and remediation. The plant has thus far treated more than 12 billion gallons of water and removed more than 7,000 pounds of uranium from the Great Miami River Basin Aquifer – the sole-source aquifer under the Fernald Site. More than 50 acres of contaminated groundwater (75 percent of the affected area) has been restored to permissible limits. Aquifer restoration is expected to continue at Fernald until approximately 2021, as part of the responsibilities of DOE’s Legacy Management Office.

In the final steps in closure, Fluor workers created over 80 acres of wetlands and 60 acres of open ponds on the Fernald Site. They also planted a patchwork blend of native plants from the various nearby areas, seeded more than 300 acres with native prairie grasses, and restored the central, most heavily remediated, portion of the Fernald Site as a tall grass prairie, interspersed with wetlands and open water. They planted native tree and shrub species to expand existing woodlots on the perimeter of the site. In total, Fluor Fernald workers colonized more than 67,000,000 saplings, shrubs and seedlings, representing better than 100 plant species. They selected species to maximize wildlife habitat and food resources, and have succeeded in attracting multiple wildlife species to the site. In addition, they re-graded, seeded, and stabilized creek slopes on the site with bio-engineering techniques that included placing fiber matting, fiber “logs,” and willow cuttings. A major event to celebrate closing the Fernald is planned at the site in September.



Fluor Fernald worker observes a new wetland area created as part of Site restoration work



7325-D1648

Fernald workers dressed in radiation protection clothing and respirators examine a sample of waste from Silo 3

SAXTON DECOMMISSIONING UPDATE

The license for the Saxton Nuclear Experimental Corporation (SNEC) Facility was terminated on November 7, 2005. The license termination letter was presented to Mr. Gary Leidich President, FENOC by NRC Commissioner Jeffrey Merrifield in a ceremony at the site on November 8, 2005. The ceremony was attended by approximately 100 former workers, local public officials and local citizens and was a fitting conclusion to this project.



License termination letter presentation

As part of the ceremony, Commissioner Jeffery Merrifield and Gary Leidich, in conjunction with Harry Bradley (ANS Executive Director) presented the American Nuclear Society (ANS) Nuclear Historic Landmark Award to the Saxton Community Library. The award was originally given to Saxton Nuclear Experimental Corporation (SNEC) by former ANS President Larry Foulke during a 2003 on-site ceremony. The ANS award was transferred to Saxton Library in appreciation and recognition of the Saxton area community's participation during the SNEC decommissioning process.



ANS Executive Director Harry Bradley presenting plaque to Saxton Library

The SNEC Facility was built on a 1.148-acre plot of land adjacent to a fossil powered electrical generation facility deeded to SNEC by the Pennsylvania Electric Company (PENELEC). The SNEC Facility was a 23.5 MW thermal, pressurized water reactor (PWR) It is owned by SNEC, a wholly owned subsidiary of FirstEnergy Corp. and maintained by GPU Nuclear.

SNEC was designed and constructed by Gilbert Associates Incorporated (GAI) who worked under the direction of Westinghouse the prime contractor and reactor designer. A “Preliminary Hazards and Safety Report” was submitted to the Atomic Energy Commission (AEC) on July 24, 1959 and a construction permit was issued on February 11, 1960.

Construction of the SNEC Facility began in 1960 and was completed in 1962. The Nuclear Power facility first went critical on April 12, 1962 and it was operated until May 1, 1972, primarily for training and research and development purposes.

During its ten years of operation, the SNEC facility was a testing ground for many of the concepts and procedures currently utilized in commercial pressurized water power reactors. Pioneering contributions to the nuclear power industry included:

- The use of chemical shim solutions to supplement control rods for control of the nuclear fuel

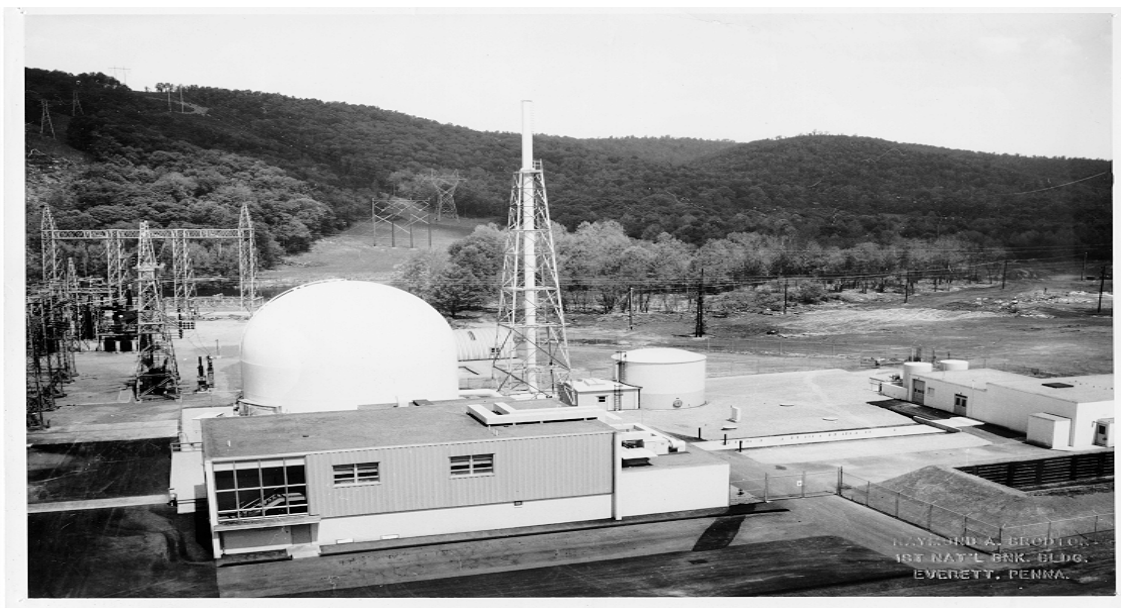
- The feasibility of operating nuclear fuel in a supercritical steam environment
- The utilization of mixed oxide fuels including plutonium fuels
- The design and development of improved fuel elements and materials
- The development of techniques and hardware utilized in assessing core performance
- The development of new control rod designs
- Load cycle experiments
- Failed fuel experiments
- Use of a multi-layer reactor vessel
- Plant start-up from cold shutdown using reactor heat
- Nuclear superheat tests using an in-core loop

In addition to this testing program the SNEC Facility also served as a training facility for operators from throughout the United States and also several foreign facilities.

The SNEC Facility was permanently shutdown on May 1, 1972. During its operation, the SNEC Facility operated through 3 fuel cycles with a total of 1005 effective full power days and generated 96,400-megawatt hours of electricity.

The nuclear fuel was removed from the site in 1972 and shipped to the Atomic Energy Commission (AEC) facility at Savannah River, South Carolina. Following fuel removal, the plant equipment, tanks and piping located outside of the Containment Vessel (CV) were removed. Additionally the buildings and structures that supported reactor operations were partially decontaminated from 1972 through 1974 and the facility was placed in storage.

Saxton Then



Saxton site1962



Saxton site November 7, 2005

RANCHO SECO DECOMMISSIONING UPDATE

Vessel Internals - Mechanical cutting and milling (and brute force) have been used to remove internals underwater. Internals cutting and packaging is complete. Core baffles and formers (>Class C) were placed in a fuel-type canister for storage in the ISFSI. Final vacuum drying of the canister prior to the move to the ISFSI is in progress. Class B and C internal pieces have been mechanically cut and are stored in liners onsite until disposal is arranged. Class A waste will be shipped to Energy Solutions in Utah once packaging is complete. Draining of cavity water has begun and once vacuuming of the cavity is complete will be accelerated in preparation for cavity cleaning prior to vessel segmentation.

Reactor Vessel –The vessel will be segmented for packaging and disposal. The method to be used is high-pressure water/grit cutting (not underwater). All pieces except beltline pieces will be shipped in sealand containers. The six beltline pieces will be placed in two boxes and grouted, then shipped by rail to Energy Solutions in Utah. No DOT exemptions are expected to be needed for shipment. Robotically controlled cutting equipment is currently being tested. Cutting is expected to be completed by year-end.

Containment Building – An RFP is out for the removal of all of the concrete in the building to the liner. This is believed to be cost effective as opposed to cleaning surfaces and chasing cracks.

Embedded Pipe –Cleaning of embedded drain pipe in the Auxiliary Building is in progress using a grit blast system that vacuums the debris and grit out the end of the pipe.

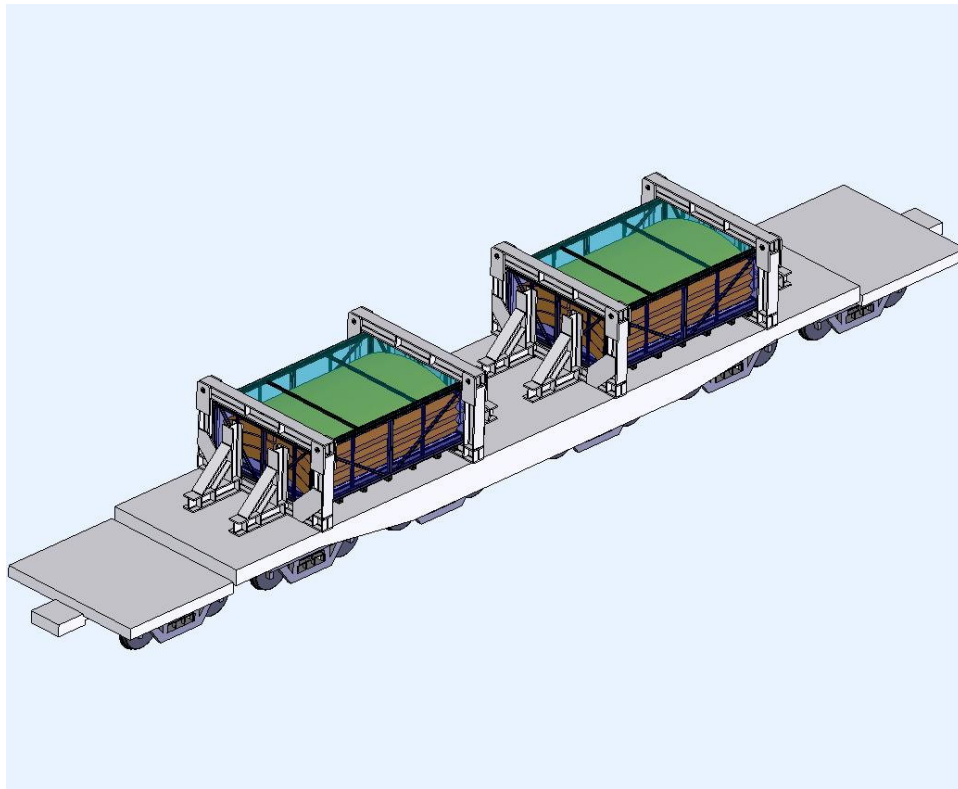
Outside Components – **Much of the contaminated underground pipe has been removed. Most remaining pipe will be removed this summer. Work is ongoing to remove temporary (non concrete) buildings and structures.**

License Termination Plan – The LTP was submitted in April. Meetings with the NRC have been held to discuss dose modeling, groundwater sampling and characterization so that the LTP approach was not unexpected. DCGLs have been determined using the industrial worker scenario due to the ongoing use planned for the site.

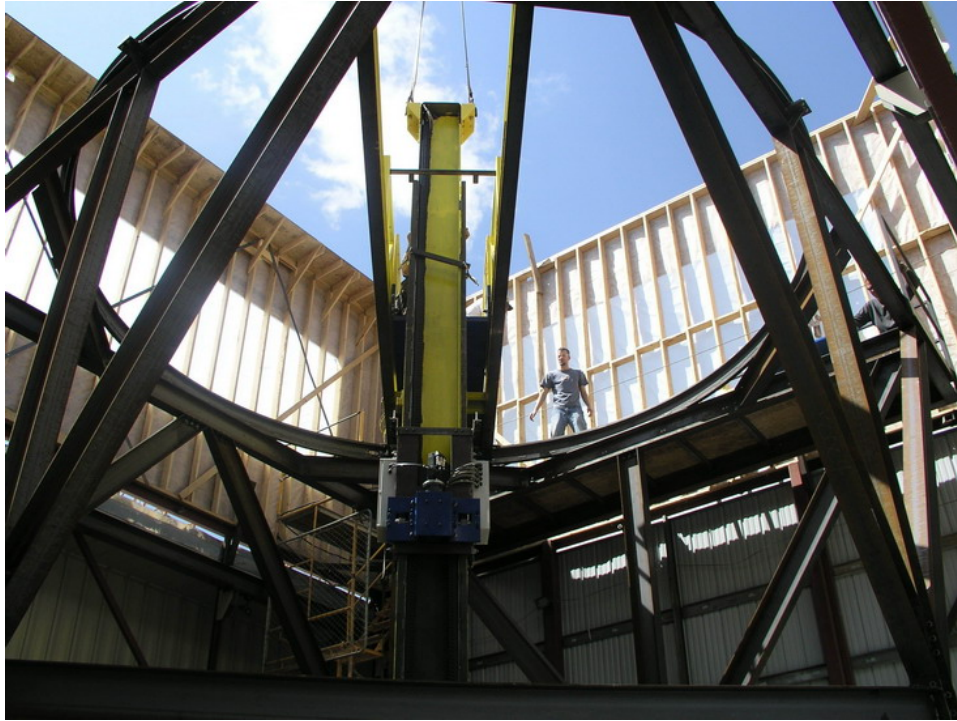
Auxiliary Building – Room decontamination has begun and is expected to continue for the next year.

Final Status Surveys – Final Status Surveys will begin soon based on methodology submitted in the LTP. While this work is “at risk” until approval of the LTP, only low risk activities will be performed initially.

Schedule – All current decommissioning activities are expected to be completed by the end of 2008. At that time a partial release of the site from the 10 CFR 50 license is expected. The remaining portion (the waste storage building) will be completed once waste disposal is complete. No date for final release has been determined.



Reactor Vessel Beltline Packages on Railcar



Reactor Vessel Cutting Mast being prepared for testing

CONNECTICUT YANKEE DECOMMISSIONING UPDATE

Connecticut Yankee continues to make excellent progress with demolition activities and ongoing decommissioning work at the Haddam Neck Nuclear Power Plant. Physical decommissioning is scheduled to be completed by the end of 2006. The plant site has accumulated more than 5.72 million safe work hours and is nearing six years since its last lost time accident.

The demolition of the intake/screen house and the B switchgear building is complete. The northern half of the yard crane has been dismantled and the southern end reinforced for limited operation. The removal of the canal discharge structure and remediation of the weir area continues. The interior demolition of the containment building is complete and the ICI pit has been filled with grout and backfilled to grade level. The removal of contaminated bedrock in the ion exchange system area is complete and has been backfilled. The spent fuel pool has been drained and the building and surrounding area are in the process of FSS surveys before release for demolition. Employee offices are being relocated to other areas of the site in preparation for demolition of the administration, warehouse and former information center building.

Demolition of the remaining containment structure has begun. Hydraulic hoe rams are being used to break up the containment dome, which is 170 feet high and 140 feet wide, with walls between 2.5 and 4.5 feet thick. The containment is being demolished from the bottom up by cutting three openings around the containment wall separated by 40 foot wide pillars. The pillars are then weakened one at a time to allow the containment to settle down on itself. This process will be repeated numerous times until the top of the dome is reachable with the hoe rams.

Integrated Site Closure activities continue to focus on groundwater characterization and monitoring, final status survey of miscellaneous land areas, and RCRA Corrective Action Program implementations. Remediation and clean-up of the peninsula area continues. NRC approval of the second partial release of a portion of the site property occurred on February 27, 2006.

The Connecticut Yankee Community Decommissioning Advisory Committee continues to hold quarterly public meetings on decommissioning and is planning to transition to a fuel storage monitoring committee at the end of the year.



Plant site taken on April 11, 2006



Containment with the first round of cuts on the bottom of the structure

SONGS UNIT 1 DECOMMISSIONING UPDATE

Southern California Edison continues to make excellent progress in its decommissioning of San Onofre Nuclear Generating Station Unit 1 (SONGS 1). The only structures remaining include the containment sphere, a portion of the sphere enclosure building wall, the spent fuel building, and the radwaste buildings. The project is 63 percent complete with over 93 of the 229 million pounds having been removed since mid-1999. Since the fall of 2005, the project has completed removal of the turbine deck, the surrounding turbine building foundations and underground piping, and filled part of the Circulation Water Systems discharge structures with slurry. Phase 1 of the decommissioning project continues to be projected for completion in 2008.

The project has maintained an excellent safety record, and attributes the vigilant safety oversight by supervisors in the field, supported by a strong management commitment to safety, as the real key to the project's success.

Current Focus

Key decommissioning activities for the remainder of this year include completing the containment demolition, removing the fuel storage and radwaste buildings to approximately 12 feet below grade, and shipping approximately 40 million pounds of LLRW materials from the site.

In March of 2006, removal of the spent fuel pool liner began as the next major decommission project activity for demolishing the spent fuel storage building. The pool liner work is expected to complete in July of this year.

Independent Spent Fuel Storage Installation (ISFSI)

The first pad of the SONGS Independent Spent Fuel Storage Installation contains 31 Advanced Horizontal Storage Modules (AHSM). Eighteen AHSMs have been used to store SONGS 1 fuel assemblies and SONGS 1 GTCC waste. Beginning in 2007, the remaining 13 modules will be used to store fuel assemblies from the two SONGS operating units.

Looking Ahead

During the next twelve months, the project will focus on completing the following decommissioning activities:

- Removing the radwaste building
- Dismantling the Unit 1 Spent fuel pool and building.
- Dismantling the north turbine deck extension.
- Removing the remaining containment internals/structures
- Dismantling the containment sphere



Photo inside containment using fog canon to control demolition dust



Containment loading lift liners for removing crushed debris

BIG ROCK POINT DECOMMISSIONING UPDATE

Three individual and precisely controlled blasts were successfully completed in December at Big Rock Point. The work assisted in the demolition of the large concrete monolith located inside the plant's former containment sphere. The blasts were used to "soften" the concrete and steel rebar monolith that once housed Big Rock Point's reactor vessel, steam drum, spent fuel pool and other equipment. The explosives were designed, placed and detonated in order to fracture – but not drop - the structure which stood 75-feet tall at its apex.

The "softening" allowed workers to more efficiently demolish the structure using standard demolition equipment – a 16,000 pound wrecking ball and hydraulic powered ramming equipment. The explosives were employed in response to the difficulty encountered in earlier demolition projects of similar structures at Big Rock Point and other nuclear sites across the country. "Demolition of the turbine building earlier this year using the wrecking ball proved just how solidly the plant was constructed," said Ray Flowers, Big Rock Point demolition project manager. "It took us longer than expected to bring the turbine building down due to its superior structural integrity."

Controlled Demolition Inc. (CDI) was contracted by Consumers Energy to plan, engineer and execute the blasts. "CDI was hired because it is the recognized worldwide leader in using explosives to assist in the demolition of unwanted buildings," said Kurt Haas, Big Rock Point site general manager. "In addition to successfully performing similar work at other nuclear sites, they have also brought down such recognizable structures as the containment building at the Maine Yankee nuclear site, Seattle's Kingdome, Pittsburgh's Three Rivers Stadium and the J. L. Hudson Building in Detroit. For a job like this, it was important that we identify and hire the industry leader."

Preparation for the blasts began several months ago as the plant's trademark containment sphere was being dismantled. CDI personnel developed the blast plan, which detailed the amount and placement of explosives in the concrete, along with safety procedures and contingency plans. Using powered machines and hand drills, CDI personnel drilled 271 horizontal and vertical two-inch diameter holes compromising almost 4,000 liner feet into the concrete. CDI personnel then placed the exact amount of explosives into the predetermined holes for each individual blast. Blast 1 was located in the area where the reactor vessel was once located; blast 2 occurred was located in the former spent fuel pool area; blast 3 occurred in the former steam drum area. Approximately 500 pounds of explosives were used in the three blasts.

An extensive number of safety precautions were implemented for the work, including:

- Establishment of an 800-foot blast zone in which all personnel were required to vacate;
- A blast mat constructed of chain link fencing and fabric was laid over the individual blast zones to keep debris in place;
- A detailed countdown procedure and contingency plans were established and followed;
- Site security was increased and all non-essential personnel left the site during the blasts; and
- Advance notification of appropriate authorities was made.

"The months of planning paid off – the structure remained standing as planned after the blasts and the concrete and rebar were softened," said Haas. The structure was demolished to grade using wrecking balls and other equipment. Once at grade, other challenges awaited

Big Dig almost complete

Boston has its Big Dig – an eighteen-year, \$11 billion project to construct an underground expressway – and Big Rock Point has its Big Dig. While the Big Rock Point work is not quite on the same scale, it is in its own right a significant effort. Millions of pounds of crushed concrete and tangle strands of steel rebar are all that remain of the once majestic containment sphere. And while Big Rock Point’s blue-green sphere was familiar to area residents and boaters, only “part” of the picture was visible to the public. Workers are currently removing part of the sphere not seen by the public, the remaining steel shell and steel-reinforced concrete that extends 30 feet below grade. Somewhat resembling a scene from a late night science fiction movie, hydraulic hammers, rams and back hoes, stood on top of the wreckage busting, scooping and loading the debris into containers capable of holding 44,000 pounds each. Day after day, down and down they went until the machines were no longer visible from the surface. Once completed, a total of more than 32 million pounds of concrete – 23 million pounds that once housed equipment, and nine million pounds that the sphere once rested upon – will have been removed. The excavation will then be surveyed by plant, NRC and state of Michigan technicians to ensure it meets site release criteria before it is backfilled with clean soil.

Comments from the site general manager

On August 29 the project will mark its ninth anniversary and the end of demolition work. The only physical work left will be some final surveys and confirmatory samples to prove that the site meets all state and federal requirements for releasing the property for any future use. The Nuclear Regulatory Commission and the State of Michigan will complete independent verifications and document their final approval by early 2007. Then approximately 475 acres including a mile and a half of Lake Michigan shoreline will have a new beginning. While no agreements have been reached yet regarding the future use of this beautiful stretch of land, Consumers Energy has stated its preference to sell it to an organization that would provide access to the general public.

Over the history of the plant thousands of skilled workers have been involved with the safe conduct of work. Today less than 100 people remain on the project. For those of us remaining the end of the project is approaching and a new beginning is upon us. Some of us, myself included, will retire in northern Michigan. Some are making plans to transfer to new locations and others are finalizing plans to start new careers. Whatever our future may hold our ongoing involvement in our community and our continuing commitment to perform our work safely remains constant.

We continue to meet unique challenges – challenges that some of us never imagined we would face while working in a nuclear power plant. One example was our use of explosives to efficiently soften concrete that once formed the structures around the nuclear reactor. The work was completed safely, without incident. To date we have safely removed nearly 85 million pounds of material in thousands of shipments from the site. We continue to receive high marks on our performance from our regulators and others who closely watch our progress.

The successful conclusion of the project brings my career in the nuclear power industry full circle. After receiving my nuclear engineering degree from the University of Michigan I was involved for the next 34 years in the design, construction, operation, and decommissioning of nuclear power plants across the nation and overseas. During this time I saw one of the safest industries in this country, expand, improve, and mature into a proven, dependable and environmentally friendly source of electricity. It is very encouraging to this old “Nuke”

to see this industry poised to respond to this country's energy problem with new, efficient and still safer nuclear plants. This month my son, Jason, graduates from my alma mater with his degree in nuclear engineering. The future is bright and exciting for him and for me.

Kurt Haas
Site General Manager



After using explosives to soften the concrete and rebar inside the containment sphere, workers mined and packaged the debris for disposal.



A road was built to allow equipment to travel down into the containment sphere and remove debris.



After the blast, Note the steel rebar seen in the center of the monolith.



Workers draped a black blast mat over the monolith before each blast and the bow in recognition of the holiday season.

WEST VALLEY DECOMMISSIONING UPDATE

As West Valley Nuclear Services Company (WVNSCO) approaches its 25th anniversary of conducting nuclear cleanup activities at the West Valley Demonstration Project (WVDP), the company is taking great pride in maintaining one of the best safety records in the DOE-EM complex. Safe performance of work is a top value for WVNSCO – a value that is exemplified in the WVDP reaching nearly 4 million consecutive work hours and 3.5 years without a lost time work accident or illness in April 2006. WVNSCO has received numerous safety commendations from its customer, the DOE, and its parent company, Washington Group International.

In November 2005, the Department of Energy presented WVNSCO with an exemplary safety award in recognition of 3.5 million safe work hours and 1000 consecutive safe work days. Also in November 2005, the company qualified for its third consecutive

Washington Group International Presidents Award for Safety, which recognizes business units that have reached one year and one million work hours without a lost time work accident or illness. The site, which first obtained DOE-Voluntary Protection Program Star status in 1999, recertified as a Star site in late 2005.

WVNSCO certified its 100th Safety Trained Supervisor in February 2006, as part of its ongoing effort to keep safe work practices in the forefront of all its business objectives. The certification process, which is sponsored by a joint venture of the Board of Certified Safety Professionals and the American Board of Industrial Hygienists, is recognized by OSHA as a key part of a company's overall safety program.

Contract Status and Activities – In late 2005, DOE awarded WVNSCO a one-year contract extension for the WVDP through December 31, 2006. The scope of the work is similar to the work performed in 2005 – centered primarily on low-level waste processing and shipping, infrastructure reduction, and facility D&D.

Legacy Waste Activities – Low-level waste processing and off site shipment and disposal set a one-year Project record in 2005, with 335,000 ft³ of Class A LLW shipped to the Nevada Test Site and Energy Solutions (Envirocare) for disposal. With all 300 truckloads and three rail shipments completed safely, WVNSCO successfully reduced the site's inventory Class A LLW by approximately 50 percent.

DOE's 2005 issuance of the WVDP Waste Management Environmental Impact Statement ROD has enabled the Project to pursue additional off-site disposal of its low-level waste. The ROD has been an important factor in determining the work scope for 2006, which includes continued off-site disposal of up to 700,000 ft³ of radioactive and industrial waste this year.

Modifications and upgrades are underway at the site's Drum Cell to allow for the retrieval of the first of the nearly 20,000 cement-filled drums of LLW from storage in that facility. The drums, produced in the 1980s and '90s, were the product of pretreatment of liquid HLW in preparation for vitrification. Off-site shipment of the first 5000 drums is expected to begin later this year.

Materials stored on outdoor lay down areas are being sorted and recycled, scrapped, disposed of or stored, depending upon their applicability to future activities at the site. Five active areas are slated for closure this year; with the first, the vitrification hardstand, being cleared and closed in April 2006.

Infrastructure Reduction – Considerable strides were made in reducing the site’s infrastructure during the past two years, including the removal of the equivalent of approximately 150 office trailers from the site. Office personnel have been relocated in permanent structures at the site and in a nearby office building, clearing the way for the most ambitious infrastructure downsizing effort in the site’s history.

With the excess trailers removed from the site, this year’s work is centered on identifying and removing ancillary obsolete and underutilized systems that can be removed from service. The reductions will reduce maintenance needs and result in operations cost savings.

D&D Activities – As the site continues to reduce its operational activities, structure and equipment needs lessen. As a result of those diminished needs, obsolete and unneeded structures and equipment are being identified for removal. This year’s planned removal list includes the cask decon station for the site’s now empty fuel pool and the site’s vitrification chemistry laboratory. High-level waste vitrification at the site was completed in 2002 and dismantlement of the vitrification facility equipment was completed in July 2005. Structure removals include now empty storage buildings that held LLW. Additional pumps, process boilers, and condensers will also be removed from the site’s Main Plant as part of the D&D activities.



Waste boxes loaded with LLW are being secured on a truck for off-site disposal



Workers process waste in one of the WVDP's waste processing containment structures



Large scale debris is being size-reduced and packaged with a remotely-operated Brokk TM

FERMI 1 DECOMMISSIONING UPDATE

In December 2005, the Fermi 1 staff safely reacted sodium residues in Primary Sodium Loop No. 1 after separating the loop from the reactor and building a processing system to perform the reaction in-situ. Efforts are underway to setup the reactor for processing, as well as Loops Nos. 2 and 3. Prior to processing the reactor, the rotating plug and other mechanisms on top of the reactor will need to be removed.

In early 2006, camera inspections and dose measurements were taken inside the reactor. The Request for Proposal for the reactor vessel and large component removal portion of the project was issued. Work is underway to remove mechanisms from the top of the rotating plug. The first pieces that protrude into the reactor vessel were removed. The accompanying pictures show one of the Offset Handling Mechanism tubes removed from the reactor. Workers finished cutting up the Inert Gas Vapor Trap in April and other Inert Gas System tanks have been removed or are almost completely cut up.

Considerable work has been performed lately in characterizing waste from paint abatement and work on painted or previously painted surfaces. So far, some paint chip samples from vacuum bags have been analyzed as having sufficient lead to meet RCRA hazardous waste levels and/or TSCA PCB levels. Some have been under the limits. Results received so far show HEPA filters used for area or point suction during lead work do not meet the RCRA criteria to be considered hazardous, even ones used when cutting a tank whose paint contained about 40% lead. PCB concentration above TSCA limits have been measured in two HEPA filters. The latter will be disposed of as PCB bulk product waste with the painted pipe currently being stored or disposed of as PCB bulk product waste.



HANFORD RIVER CORRIDOR CLOSURE PROJECT

River Corridor Contract first step in Hanford Closure

In August 2005, the Department of Energy selected Washington Closure Hanford to manage Hanford's first closure contract, the River Corridor Closure Contract. This contract replaces the Environmental Restoration Contract, managed by Bechtel Hanford from 1994-2005.

Washington Closure is a limited liability company established by Washington Group International, Bechtel National and CH2M Hill to manage the River Corridor Closure Project.

New Hanford contract

There are a number of differences between a traditional management and operations contract and a closure contract, the biggest being that the contractor signs up to complete the job within a specified time period and budget.

In this case, Washington Closure has agreed to clean up the 218-square-mile Hanford river corridor by 2013 for \$2.1 billion. Within the scope of work is the demolition of 486 facilities, remediation of 370 waste sites, placing in interim storage four surplus plutonium production reactors and treating and disposing of more than four million tons of contaminated waste.

Project Challenges

Some of the demolition and cleanup of waste sites is pretty straightforward. However, many others present significant challenges.

Technical challenges include the cleanup of the 618-10 and 618-11 burial grounds and the cleanup and demolition of several 300 Area facilities. Remediation of the burial grounds poses significant risks from high radiation and contamination levels. In addition, the limited information available on the buried waste materials indicates that some of it could be considered transuranic waste, which poses its own disposal challenges. Project staff is developing risk mitigation strategies as part of the planning process for safely removing all types of waste materials.

Demolishing significantly contaminated hot-cell facilities, such as 324, 325, 327 and 329, has not been attempted on this scale at Hanford. The high radiation levels and contamination in the hot cells and the heavy concrete walls mean we will have to use nontraditional decontamination and demolition techniques. Current plans call for filling the cells with cement and cutting them in pieces using a diamond-wire saw for disposal at Hanford's Environmental Restoration Disposal Facility.

Another challenge in working with these unique facilities is doing so without interrupting research activities under way in nearby Pacific Northwest National Laboratory research buildings.

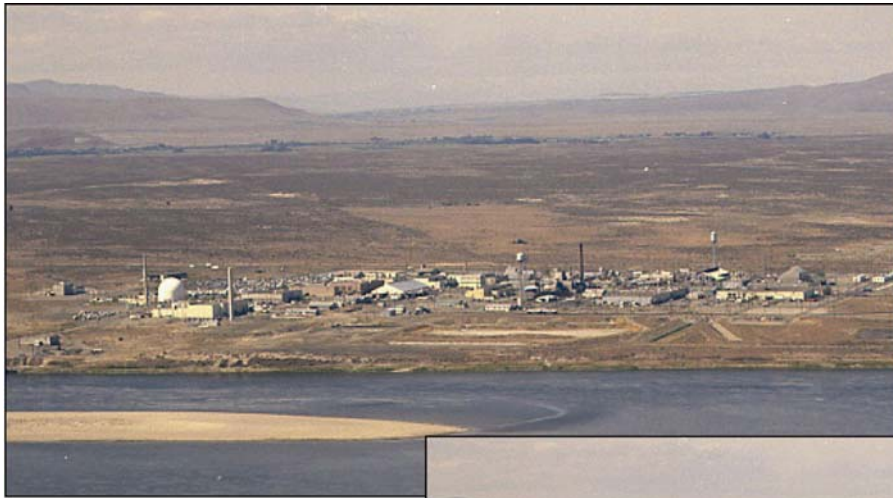
Project accomplishments to date

The River Corridor team has made substantial progress since assuming operation of the project in late August 2005. The final work to place H Reactor in interim safe storage was completed in October 2005. H Reactor is the fifth of nine Hanford plutonium reactors to be placed in interim safe storage, or cocooned. Four reactors are left. Demolition work is scheduled to begin on N, K East and K West reactors in fiscal year 2008. B Reactor, the world's first full-scale nuclear reactor, is on the list to be cocooned, but has been scheduled as near the end of the contract as possible. That will give DOE time to work with other groups to see if the reactor can be preserved as a museum.

As for D&D of other facilities, the schedule calls for Hanford facilities to be demolished in FY 2006. As of the end of March 2006, 36 facilities had been demolished, and project managers expect the accelerated demolitions to continue. The last major liquid waste site located near the Columbia River is nearly complete. Over the last 10 years, workers have removed 5.6 million tons of contaminated material from 65 liquid waste sites. It finishes an entire class of waste sites, eliminating contamination sources that ultimately threatened the groundwater and the river. Workers also completed remediation of the Mile-long-Trench in K Area, which had been underway since 2002. Since that time, workers have removed and disposed of nearly 452,000 tons of contaminated soil and debris.



One billion gallons of radioactively contaminated cooling water from the K East and K West reactors was dumped into Mile-long Trench from 1956 to 1972. To clean up the trench and soil below, River Corridor Closure Project workers removed more than 450,000 tons of contaminated material, eliminating a potential source of contamination that threatened the groundwater and Columbia River.



Hanford's
300 Area

Today



2012 Closing

E0510057.4

Located about one mile north of the city of Richland, all buildings in Hanford's 300 Area are scheduled to be demolished by 2012. The 300 Area housed reactor fuel manufacturing facilities, process development buildings and research laboratories. Some of the laboratories built in the 1940s and 1950s are still in use.



The 314 Metal Extrusion Building is one of the first major facilities in 300 Area to be demolished and the first of more than 230 facilities to be demolished in the next seven years by Washington Closure. The building was contaminated with asbestos, beryllium and radioactive materials.



Excavation at Hanford burial grounds and waste sites – dating to the early 1940s – sometimes yield unexpected results. Workers have found drums of waste, canisters of radioactive materials, forklifts and numerous other items not listed in the disposal records.



Workers remove or fix-in-place hazardous and radioactive materials before beginning demolition of any structure. During demolition, water from foggers and fire hoses help keep dust and contaminants from becoming airborne and away from workers.

HANFORD DECOMMISSIONING UPDATE

Hanford's Central Plateau

U Plant Zone - Record of Decision achieves many 'firsts'

In a significant step toward cleaning up facilities on Hanford's Central Plateau that produced plutonium during the Cold War, the Department of Energy, Environmental Protection Agency (EPA), and the Washington Department of Ecology signed a Record of Decision (ROD) for closing the U Plant Canyon.

"Canyons" were built during the nuclear-defense era to dissolve fuel rods irradiated in production reactors and extract materials, such as plutonium, from the resulting solutions. Canyons are very large concrete structures, typically about 800 feet long. The U Plant Canyon is the first of DOE's canyons scheduled to be closed. Fluor Hanford and the DOE have already hosted a workshop to share their experience with the U Plant ROD, and lessons learned will be shared with other sites where canyon buildings are located, such as the Idaho National Laboratory and the Savannah River Site.

The ROD for closing U Plant outlines a cleanup pathway that is flexible enough to be applied to other canyons with different amounts and types of radiological contamination. The 112-page ROD is available on the Hanford web site, www.hanford.gov, "Special Announcements" section.

The U Plant ROD won a U.S. EPA "ROD of the Year" award for decision document quality. Fifteen RODs were received from 9 EPA regions in the seventh annual competition. The Region 10 office of the EPA was one of three recipients of a "ROD of the Year" award this year.

Fluor Hanford crews have begun removing vitrified clay piping around two disposal cribs near U Plant. The pipe was used in the past to drain contaminated process waste from U Plant to the disposal cribs and was known to have leaked in the past. The activity is one of several near-term projects to remediate U Plant Zone waste sites.

Closing the Plutonium Finishing Plant

The Plutonium Finishing Plant operated from the 1940s to the 1990s and produced about two-thirds of the country's plutonium during the Cold War. Current activities are focused on ensuring the continued security of stored plutonium while cleaning out and demolishing the 63 facilities that cover 15 acres.

In a move that will allow greater flexibility as the PFP complex is demolished, the Department of Energy recently announced plans to ship plutonium stored at the plant off the Hanford Site from 2007-2009.

After removing the last of the "held up" plutonium from plant equipment and piping in 2005, crews continued working to repackage and remove miscellaneous sources of radioactivity. In November, the final Material Access Area in the plant's main building was eliminated. Consolidating the special nuclear material in the plant provides crews more space and flexibility to work.

Thirteen of the plant's buildings—support facilities—have been demolished to date. Crews are well on their way to having most of the equipment removed from the first highly contaminated facility slated for demolition (by September 2006). 232-Z once contained an incinerator that was used to burn plutonium-contaminated waste.

In February, Fluor Hanford crews began a project to determine the extent of contamination under an historical disposal crib (216-Z-9) next to the plant. The trench became one of the most contaminated at Hanford during production years, when it received liquid wastes from PFP in the 1950s and 1960s that contained chemical solvents laced with plutonium. The solvents were used in recovering uranium and plutonium from plutonium-bearing waste. A slanted borehole will be drilled to a depth of 140 feet to sample layers of earth under the trench.

Transuranic Waste Retrieval and Shipments to WIPP

In October 2003, Fluor Hanford began retrieving drums and boxes of waste from low-level burial grounds in Hanford's 200 West Area. The waste is in the form of contaminated debris, tools, clothing, and other materials generated in the 1970s and 1980s.

The waste containers were stacked on asphalt pads, covered with plywood, draped with tarps, and then covered with dirt. Once the drums are retrieved, workers determine whether they contain low-level waste, which can be disposed of in a lined, permitted facility on the Hanford Site, or transuranic (TRU) waste, which is then prepared for shipment to the Waste Isolation Pilot Plant (WIPP) in New Mexico.

As of the end of March, crews had retrieved 17,000 drums for characterization and disposal. The Tri-Party Agreement among DOE, Washington State and the U.S. Environmental Protection Agency calls for DOE to retrieve all contact-handled, suspect TRU waste (expected to be the equivalent of 75,000 drums) by the end of 2010, with interim milestones each year.

In March, Hanford resumed shipping transuranic waste to WIPP, with 233 shipments containing 6,820 drums of waste.

Hanford's River Corridor – K Basins Closure

The scope of work for closing Hanford's K Basins includes removing and treating approximately 50 cubic meters of radioactive sludge, removing more than 125 tons of debris and empty fuel racks, draining water as the basins are partially filled with grout, and removing the basins themselves. The basins are approximately 400 yards away from the Columbia River, one of the country's major waterways.

In late 2005, the Department of Energy set a new schedule for completing those activities, with new milestones set in the Tri-Party Agreement. The new schedule reflects new work scope and emerging conditions not previously identified.

In December, Fluor Hanford crews finished removing nearly 200 empty fuel racks (weighing 40 tons) from the K East Basin. In February, workers finished removing 60 tons of debris from that basin. At the same time, Fluor Hanford installed an improved vacuuming system for the sludge designed to improve water clarity.

After pausing to remove the debris and racks from the K East Basin, Fluor Hanford crews resumed vacuuming radioactive sludge. A video showing sludge vacuuming before and after removing racks and debris can be viewed on the web at [\[link here\]](#). Workers have made steady progress, containerizing approximately 90 percent of the 42 cubic meters of sludge in the K East Basin to date.

Workers have installed the hose-in-hose system that will be used to transfer sludge from the K East Basin to the K West Basin. Crews are testing the system, which is slated to begin transferring sludge from the K East Basin to underwater containers in the K West Basin by this fall.

In the K West basin, workers finished removing all empty spent fuel canisters in October and began vacuuming and consolidating sludge in that basin.

Also in October, Fluor Hanford began treating the first radioactive sludge from the K Basins. The sludge is being treated at Hanford's T Plant. Four cubic meters of sludge was removed from a section (the North Load Out Pit) of the K East Basin. The sludge from this area is less radioactive than the bulk of the sludge in the K Basins.

Workers are measuring and mixing the sludge with grout in 55-gallon drums in Hanford's T Plant Canyon. The grout solidifies and encapsulates the sludge for permanent disposal, either as low-level waste or contact-handled TRU waste, depending on each drum's radioactive content. The process is expected to generate up to 300 drums of treated waste when the project is finished later this year, with 207 drums of treated waste produced through April.

In February, Fluor and its employees in the K Basins were recognized with a "Better Workplace" award by the Association of Washington Business. The award honored Fluor Hanford's success in using ergonomics engineering to reduce injuries on the K Basins project by 90 percent while completing the removal of 2,300 tons of spent nuclear fuel from December 2000 to October 2004.

Fast Flux Test Facility (FFTF): Fuel assembly and sodium removal continues

In April, the American Nuclear Society presented Fluor Hanford with a plaque designating the Fast Flux Test Facility as a Nuclear Historic Landmark. The inscription on the designation plaque reads, "A flagship of the U.S. Department of Energy Breeder Reactor Program, which achieved national and international acclaim for design, engineering, and operational excellence." FFTF is one of approximately 75 facilities around the globe that has been recognized since the ANS award program began in 1985.

Fluor Hanford has managed FFTF for the Department of Energy since 1996 and is deactivating the facility to put it into a safe standby state. The designation does not affect ongoing deactivation activities, which include removing 375 fuel assemblies and more than 200,000 gallons of sodium coolant.

As of the end of March, crews had washed and removed 367 of the 375 fuel assemblies from the facility and finished working on all five assemblies that required special processing to identify failed fuel pins and separate sodium-bonded pins. Workers are preparing the last 8 fuel assemblies, which are sodium-bonded, for future shipment to the Idaho National Laboratory.

When presenting the designation plaque at FFTF, ANS president-elect Harold McFarlane noted that even though the facility is being deactivated, the fuel and material testing—as well as the information gained while operating FFTF—will help the country as it moves forward with its renewed interest in nuclear energy.

Groundwater Remediation

Most of Hanford’s cleanup activities, including deactivation and decommissioning of facilities and cleanup of waste sites, is geared toward protecting the groundwater under Hanford from contamination. In March, workers finished drilling all 12 wells in Hanford’s 100-N Area along the shore of the Columbia River near a former production reactor (N Reactor). These wells will support an innovative new method for capturing strontium-90 and preventing the contamination from reaching the nearby river.

A “sequestration barrier”—a “wall” of liquid containing chemicals to attract and bind the desired material—will be installed by injecting the sequestering agent into the soil under the water table in two phases. The first phase of the 300-foot chemical wall should be operational this fall. Sequestration chemically ties up the strontium-90—with a half life of 28 years—and holds it in place while radioactive decay occurs.

The source of the contamination was nearby cribs and trenches, which received an estimated 10 billion gallons of contaminated water from operations in the nearby N Reactor from 1963 to 1991.



Crews have finished cleaning up one of the most highly contaminated areas in the Plutonium Finishing Plant, which produced the majority of the country’s plutonium for national defense from the 1940s to the 1980s. This important work paves the way for tearing down the first highly contaminated facility at the plant this summer.



A “concrete cracker” breaks up a large slab so that crews can excavate a buried waste pipe, a precursor to some of the first cleanup work on waste sites in Hanford’s central plateau area.



Hanford’s U Plant is the first “Canyon” in the DOE Complex with an established regulatory and cleanup pathway for disposition. A Record of Decision was signed in October by the Department of Energy and the Environmental Protection Agency, with concurrence from the Washington State Department of Ecology.

WIPP DECOMMISSIONING UPDATE

EPA recertifies WIPP – the nation’s only operating deep geologic repository

The Waste Isolation Pilot Plant’s (WIPP) ancient salt beds will safely contain transuranic (TRU) radioactive wastes for 10,000 years. That was the conclusion of the U.S. Environmental Protection Agency (EPA) March 29 when it recertified WIPP for five more years.

Situated in New Mexico’s southeast corner, WIPP is a U.S. Department of Energy (DOE) facility designed for final disposal of plutonium-contaminated defense wastes and key to environmental cleanup of DOE weapons sites. Project facilities include surface receipt and waste handling facilities and underground disposal rooms, nearly a half-mile below the desert floor.

EPA first certified that WIPP would safely isolate radioactive materials for the 10,000-year regulatory timeframe in 1998, paving the way for disposal operations to begin in 1999. To ensure continued protection for WIPP workers, the public and the environment, Congress stipulated that EPA would reassess WIPP compliance to disposal criteria at five-year intervals from the date the first waste shipment was received.

TRU waste consists of materials containing alpha-emitting radioisotopes, with half-lives greater than twenty years and atomic numbers greater than 92, in concentrations greater than 100 nanocuries per gram of waste.

During the pre-operational years, WIPP efforts focused on science, politics, public outreach, legal challenges and regulatory firsts – WIPP’s unique repository and disposal mission did not fit conventional EPA standards for radioactive waste management. Anticipating what the EPA might require for certification, WIPP regulatory specialists forged draft compliance documents in 1994.

“What was difficult about the initial Compliance Certification Application (CCA) is that EPA did not promulgate the certification criteria until January 1996,” said Ross Kirkes of Sandia National Laboratories-Carlsbad Programs. “We were developing our performance assessment and application in the absence of any binding certification criteria from EPA. There was uncertainty about what the final certification criteria would contain, so we had to remain flexible.”

According to Kirkes, uncertainty was only half the challenge. The CCA team’s technical editors were located in Albuquerque, hundreds of miles away. The team used an FTP site for transferring the voluminous files, but Kirkes said dial-up modems and 3½ inch floppy drives was the best that mid-‘90s technology had to offer. “When we completed the application in 1998, one set of stacked CCA documents was over six feet high.”

Almost immediately after EPA certified WIPP, data gathering for the Compliance Recertification Application (CRA) began again. Repository performance assessment—or how the repository’s geology will behave over time—is a significant part of the EPA evaluation. With updated geologic data, computer modeling is used to project repository containment for the 10,000-year regulatory period.

“You can imagine how complex a set of predictive models would have to be to model the potential migration of radionuclides through geologic media over such a long time,” said Dave Kessel, senior manager of Sandia National Laboratories-Carlsbad Programs Group. “And, if that weren’t enough, we are required to assume that

future societies will forget that WIPP exists and will accidentally drill through the WIPP in search of petroleum or some other scarce resource. In spite of all this, the WIPP still demonstrates compliance with the release limits.”

With as many as 75 people involved in compiling data, authoring and reviewing the recertification application, and resolving more than 10,000 comments, the CRA was submitted to EPA five years to the date of first waste receipt on March 26, 2004. In the ensuing months, EPA requested additional information and analyses from DOE to assist its review. The 10,000-page CRA was declared complete in September 2005, and the EPA began a six-month technical review.

The DOE was clearly pleased with last month’s decision by the EPA to recertify WIPP. “EPA’s recertification reinforces the important mission of WIPP to safely dispose of defense-generated transuranic waste from across the nation,” said DOE’s Assistant Secretary for Environmental Management James Rispoli. DOE Carlsbad Field Office Manager Dave Moody was similarly upbeat. “EPA’s decision is further evidence of the great work that WIPP does and reinforces the fact that the WIPP program is sound.”

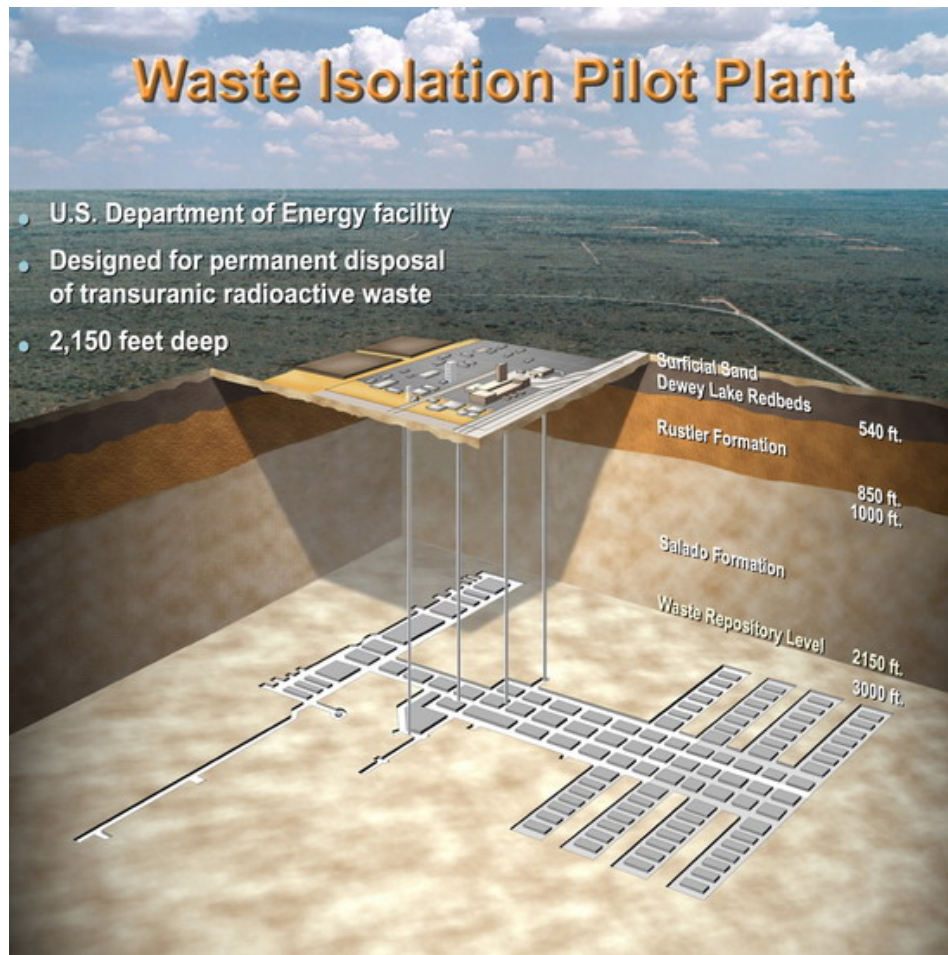
It was nearly 25 years from the time crews sank the first 2,150-foot-shaft to begin repository construction until receipt of the first waste shipment at WIPP. Now, seven years later, WIPP has led to the cleanup of 12 small-quantity TRU waste sites and, most notably, Rocky Flats Environmental Technology Site in Colorado, a large former weapons-making site.

To date, more than 4,500 waste shipments have safely arrived at WIPP’s gates. Over 77,000 waste containers (approximately 37,000 cubic meters) of TRU radioactive waste are meticulously stacked in WIPP disposal rooms—forever isolated from the accessible environment.

But there is much environmental cleanup work to be done. And the next compliance recertification application is due to EPA by March 26, 2009. For recertification team members from Washington Regulatory Environmental Services, Los Alamos National Laboratory-Carlsbad Operations, Sandia Carlsbad Programs Group and the DOE Carlsbad Field Office, the work has already begun.



WIPP waste handling technicians emplace waste in underground disposal room



INL DECOMMISSIONING UPDATE

Innovations Enhance D&D Safety and Productivity at the Idaho National Laboratory (INL)

Limited work space and the below-grade location of piping and equipment have challenged crews dismantling two Engineering Test Reactor (ETR) support facilities at the INL. But teamwork, innovation, and specially engineered systems and tools have helped D&D crews overcome these obstacles.

RTC-643, the 14,000 square foot ETR compressor building, housed two huge air compressors and three air heaters, which supplied heated, hydrocarbon-free air to ETR's experiments. The facility's equipment was also used to support the aircraft nuclear propulsion program. As D&D nears completion, about 6,000 cubic feet of asbestos have been removed from piping, and the building's three 20,000 pound air heaters have been removed and disposed. Crews have partially disassembled the two large air compressors which will allow for easy removal and disposal following building demolition.

The 6,000 square foot RTC-644 building housed 12 large heat exchangers used for removing reactor fission heat. The small, congested facility extends 18 feet below grade and the only opening to the facility was a 3 x 7

foot door on the south side. During reactor operations, 36-inch pipe re-circulated 50,000 gallons of water per minute through the reactor and heat exchangers, which transferred heat to a secondary system that dissipated heat to the atmosphere.

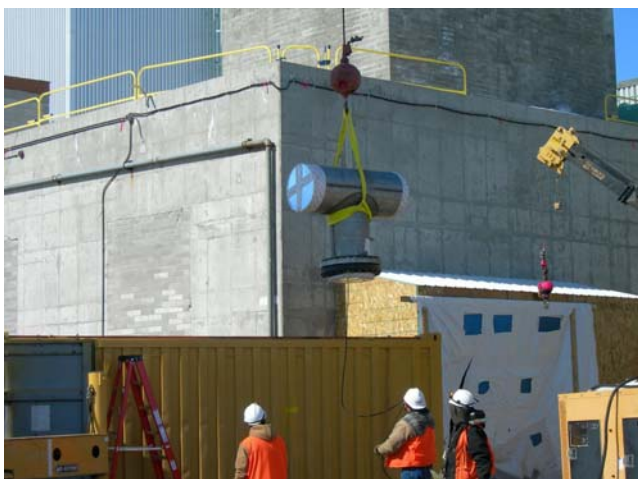
Separating thousands of feet of 24- and 36-inch pipe in RTC-644 using conventional power tools would unnecessarily expose workers to strain, exertion, and cutting hazards. A safer alternative that requires little worker exertion, plasma cutting, uses super-heated gas to cut steel.

The process began with workers cutting two large openings in the walls of RTC-644 for personnel and equipment ingress/egress. From one of the openings, crews remove separated piping sections and will soon remove the heat exchangers. A 16,000 cubic foot-per-minute air mover sufficiently ventilates cutting operations and provides contamination control. Fire protection engineering specified strict controls for plasma cutting operations. The controls include installation of special spark arrestor pads upstream of the air mover's filters, restrictions on combustibles within 35 feet of cutting, and a constant fire watch with fire extinguisher. Additionally, workers must don fire-retardant coveralls, leather welding gear, and respirator masks fitted with darkened lenses.

Prior to cutting, crews rig and suspend piping components with chain falls to maintain control during cutting and subsequent removal from the building. Ventilation on the piping system keeps contamination and smoke away from workers. The plasma torch, small compared to power tools, allows workers to quickly cut stainless and carbon steel up to ½-inch thick. After separation, workers cap pipe ends and move sections to a top-loading cargo container.

“Compared to using sawzalls, plasma cutting is easier and requires very little physical effort. We spend some time setting up required safety protections, but plasma cutting is a safer and more efficient cutting method,” said Wade Waddoups, a welder on the RTC-644 D&D crew.

Plasma cutting began in early March and has already helped workers safely remove hundreds of feet of piping. In early April, crews will rig, lift, remove and dispose of the 20,000 pound heat exchangers. Remaining asbestos abatement from RTC-643 will be completed in late March. Following strip-out of all piping and equipment from RTC-644, both facilities will be demolished in early summer.



UNITED KINGDOM DECOMMISSIONING UPDATE

UK Decommissioning: NDA Strategy now approved by Government

The Nuclear Decommissioning Authority's (NDA) creation represents the biggest change to the structure of the UK civil nuclear industry in the last 35 years. Its strategy, setting out how the UK will tackle the clean up of its historic nuclear facilities, has now been approved by the UK Government and was published on 30 March 2006. The NDA is a new organization, set up by Government to provide UK-wide strategic focus on decommissioning and environmental restoration of legacy nuclear sites. Its current budget is around £2bn (\$3.4bn) a year. NDA's mission is to deliver a world class programme of safe, cost-effective, accelerated and environmentally responsible decommissioning of the UK's civil nuclear legacy in an open and transparent manner and with due regard to the socio-economic impacts on local communities.

The 2005 National Life Cycle Baseline shows that the current estimated undiscounted cost of delivering the NDA's remit (decommissioning, clean-up and commercial operations) is £62.7bn (\$107bn).

NDA says that its top decommissioning priority is dealing with the higher-hazard legacy ponds and silos at the chemical processing plants Sellafield and Dounreay. This will bring about the hazard reduction that is required to make these sites safe for this and future generations.

NDA goes on to say that the current strategy represents a safe, well-understood and costed approach to decommissioning Magnox reactor sites. However, British Nuclear Group's current and proposed decommissioning strategies leave the demolition of reactor buildings and final site clearance to future generations. These strategies have been driven by the fact that, hitherto, there was no prospect of an ILW management facility in the foreseeable future. Housing the internals of the reactors in their pressure vessels, contained within robust biological shields, represented the safest and most cost effective way of storing ILW until its long-term management is resolved.

NDA's has declared that the strategy for decommissioning Magnox sites will remain the approach currently pursued by British Nuclear Group. However, NDA believes that the case for decommissioning the Magnox reactors to an accelerated timescale warrants serious evaluation and it proposes to work with the industry and regulators to do this. Subject to Government approving a convincing business case, NDA's aspiration is to achieve earlier final site clearance at reactor sites. NDA recently signed a Mutual Cooperation Agreement with EdF (the organisation planning the decommissioning of the Magnox reactors in France) to share know-how, R&D and new technological developments. This will allow access to EdF's accelerated decommissioning technology and will help to inform the business case that NDA plans to develop.

NDA will use competition for the management and operation of UK legacy sites to encourage innovation, to improve contractor performance and deliver best value to taxpayers. Its competition schedule, which takes account of the sale of British Nuclear Group, sets out timescale to deliver these objectives.

Start competition process	Sites competed
2006	Low Level Waste repository (Drigg)
2007	British Nuclear Group sale
2008	Magnox South reactor sites Dounreay
2009	Magnox North reactor sites Harwell and Winfrith
2012	Sellafield and Windscale

NDA is very clear about what it needs from Government to deliver its Strategy. In particular, the long-term management arrangements for radwaste will be key enablers. If NDA can make the business case for accelerating the decommissioning of Magnox and other reactor sites, it still needs to find a solution for the large quantities (some 80,000te) of graphite that will be generated.

The UK Government is currently consulting with the public on radwaste management matters. Consultation on LLW disposal arrangements started on 28 February 2006 against the background that the LLW Repository near Drigg in Cumbria has insufficient capacity to take all the waste that will arise from decommissioning and clean up in the UK. The Committee on Radioactive Waste Management (CoRWM) is due to make recommendations to the Government on options for long-term management arrangements for higher-level radioactive wastes in July 2006. The Committee's recommendations, the Government's subsequent decision and implementation of the preferred solution will have major implications for NDA's approach to clean up of legacy sites.

The NDA's Strategy can be found at www.nda.gov.uk.

Paul Woollam

Chief Decommissioning Strategist, British Nuclear group (Reactor Sites)



The Magnox reactors at Dungeness A will cease generation in December 2006 and will be among the first reactor sites to be competed, in 2008



NDA will compete the M&O contract for the Sellafield site in 2012 (both pictures are Sellafield)

SELLAFIELD DECOMMISSIONING UPDATE

1. CLEANUP AT SELLAFIELD

During the last financial year the British Nuclear Group Sellafield Cleanup organization have delivered safe and accelerated visible progress; building confidence and trust with customers, regulators, stakeholders and local communities.

Beginning the year with a budget of \$320 million, close to \$500 million of work has been delivered. Proof that accelerated cleanup on some of the UK's most challenging and high hazard nuclear facilities is being achieved.

2. DECOMMISSIONING PROJECT

Excellent progress has been made during 2005/6 across the **Decommissioning Project Portfolio** by delivering the safely accelerated and visible cleanup of redundant facilities. Working in some of the most hazardous environments in the UK industry, the team has effectively implemented both innovative and off-the-shelf solutions to complex decommissioning challenges; delivering the customer requirement to accelerate the reduction of hazard at the Sellafield site.

At the **North Group Compound**, retrieval of 400-tons of plutonium bearing waste from one of the oldest storage buildings at Sellafield has been successfully completed. This significant achievement, utilizing both remote and manual techniques, has contributed enormously toward meeting a regulatory specification to ensure that this legacy is stored safely in modern and engineered conditions.

Working in a highly alpha contaminated environment, the dedication and skill of the decommissioning workforce enabled the retrieval, packing and export of waste at an impressive rate of 26 200L drums each and every working day. A massive 3,700 drums of waste arising from this project have been placed in modern

storage awaiting volume reduction. This huge task was accelerated by 3 years and delivered for \$2.68 million less than the baseline estimate.



A worker dismantling an alpha contaminated glove-box at the North Group Compound

The **Demolition Group** continues to grow stronger in its performance, with the safe and effective demolition of over 11 redundant buildings at Sellafield. Traditional demolition techniques have been deployed safely in some of the most high profile radiological areas of Sellafield; creating vital space for new plant critical to legacy waste retrieval and also enabling the eventual removal of land from the largest controlled area in the UK industry – the Sellafield Separation Area.

Preparation for the demolition of the 4 **Calder Hall Cooling Towers** is progressing safely and the removal of internal materials from the towers, such as asbestos piping, timber and plastic packing, is now complete.



Removal of internal material from the Calder Hall Cooling Towers

An innovative Diamond Wire cutting technique is being used in the UK for the first time at Sellafield, enabling British Nuclear Group to deliver the cleanup of the **Solid ILW Storage Cells**. The advanced cutting process uses foam as a flushing medium, removing the need to use cooling water. Key advantages include no requirement for water sample analysis for disposal and less cutting sludge resulting in lower disposal costs and work time. Brought to the site by the supply chain the technique also minimizes any risk to the environment as no toxic substances are used. The technique is currently being used to remove reinforced concrete shield walls and lobbies around the Solid Waste Storage Cells in blocks by making long vertical and horizontal cuts and drilling two holes through the wall. The holes will allow a fork lift truck to remove 2-ton sections of wall, removing the need to demolish the walls and handle the rubble.

Further observable evidence of safe decommissioning progress is being made across a range of other redundant plants by deploying leading edge remote technology to dismantle equipment and reduce hazard; in some instances within environments contaminated up to 400 rem/hour.

2. WASTE PROJECT

The Waste Project team continues to perform efficiently and grow from strength to strength in their vital mission to support the decommissioning and commercial operations at Sellafield. With accurate upfront characterization and volume minimization as their focus, they are leading the way using specialized teams and fresh initiatives, to improve waste management efficiency to support the acceleration of decommissioning at Sellafield.

Major progress has been delivered regarding the management of **Plutonium Contaminated Material (PCM)**. Construction and commissioning of **Engineered Drum Store 3** were safely completed during the year; culminating in the regulatory consent to operate this important facility. This further capacity for PCM storage is crucial to the ongoing legacy cleanup and commercial nuclear operations at Sellafield.

The **PCM Stores Team** also celebrated a record breaking 13 years without a lost time accident during 2005. This excellent safety performance was achieved across a number of facilities where over 13,500 drums of PCM have been received and stored during the last 3 years.



The first active PCM drum is introduced to Engineered Drum Store 3

The **Waste Treatment Complex** at Sellafield has also achieved a record breaking year of performance. The plant receives, assays, and then compacts 200L PCM drums before arranging them into 500L product drums that are then grouted and placed in the Engineered Drum Stores. The target for 2005/6 was to treat 2,250 drums, a target that was successfully met one month early while smashing the previous year's throughput of 1,323 drums. This ramp-up of treatment is part of a phased improvement plan to increase throughput to 4,000 drums/year over the next 2 years; the improved capability is necessary for treating the predicted PCM arising from accelerated cleanup and decommissioning operations.

To support the relocation of 44 drums of PCM silt, a work program is being instigated to trial a decontamination technique on the PCM silts utilizing a process called Supercritical Fluid Extraction. This technique relies on the properties of a supercritical fluid to extract radioisotopes from a soil type matrix, thus reducing the classification of the waste from PCM (ILW) to LLW or lower. The initial work is focused on determining the efficiency of the technique and the feasibility of undertaking the process on a pilot scale. If successful the process may have wider application in treating PCM contaminated soils and rubble from future decommissioning and demolition work.

Excellent progress is also being made to improve the efficiency of **LLW Management** at Sellafield. The team has worked in harmony with other cleanup projects and areas of the site to remove and dispose of historic LLW, open up new disposal routes, increase the volume of exempt material and visibly transform historic waste black spots.

At the **Waste Monitoring and Compaction Plant** the compaction of waste from 65 backlog ISO containers was successfully completed. This is a major hazard reduction milestone, taking historic waste that was unsuitably containerized and reducing its volume before placing it into safe and robust storage conditions.

Active commissioning of the new **Sellafield Metals Recycling Facility** is progressing to plan and the first skip of fully recycled metal has been safely dispatched. This facility is integral to the waste minimization effort at Sellafield and will play an increasingly important role as decommissioning accelerates. Approximately 250,000-tons of steel will be generated through demolition activity at Sellafield - the equivalent to building 5 Titanic liners - and this new facility will maximize the volume of exempt steel that can be recycled or sold as scrap metal in accordance with the Nuclear Industry Code of Practice.



Plasma cutting of redundant ISO containers at the new Metals Recycling Facility

In the Separation Area construction of a new **Waste Handling Facility** progresses with the completion of the concrete pour for the base slab and the installation of a car crusher for compacting waste. Once operational this new facility will reduce the volume of LLW consigned by Sellafield to the low level waste repository. Initial operation of a new bag monitor at the facility is already increasing the volume of exempt material by monitoring soft waste, such as used PPE, in an area of low background radiation. Thus far the operation has reduced the activity declared by consignors by a factor of 100.

A newly established **Clearance & Characterization Team** has also been established to underpin the waste minimization program at Sellafield. Their main goals are to assess and characterize buildings that are scheduled for demolition and identify the appropriate waste disposal routes. The team also plays a key role at Sellafield in opening up new waste outlets in order to enable faster decommissioning and demolition, without reducing the expected lifetime of the low level waste repository. The team recently sampled and characterized 3 buildings that were erected in the 1950s that are scheduled for imminent demolition; all 3 were successfully characterized as exempt. Waste disposal will be avoided and 800-tons of concrete and rubble have been designated for reutilization within the site at Calder Hall.

3. DISPOSAL AND STORAGE PROJECT

An excellent year's performance has been delivered at the **low level waste repository at Drigg**. The site is the only LLW disposal operation in the UK; receiving and disposing an average of 550 half height ISO containers of waste each year (11,000 m³/yr) for both nuclear and commercial customers. The team has successfully emplaced a total of 686 containers against a revised baseline target of 680. But this is just the day job!

Alongside this impressive performance the team have also been retrieving a legacy of PCM from the site and shipping it back to Sellafield. 91 large PCM items, such as glove-boxes, and 1,460 PCM drums have all been safely removed and dispatched to Sellafield for storage. Another achievement has been exceeding the retrieval and processing target for 112 containers of backlog LLW. A final total of 119 containers have been processed, creating vital storage space in the Engineered Vault used for long-term LLW disposal.



The Gemini container used for moving PCM items from the low level waste repository to Sellafield

4. LEGACY PONDS PROJECT

The first significant moves have been made to cleanup the **Pile Fuel Storage Pond**. It was used for cooling fuel intended for defense purposes as it left the Windscale Pile reactors shortly after the end of the Second World War. 4 empty skips have been removed from the pond; representing the first such removals in 6 years. The skips have been taken out to create space for the installation of new equipment vital to the retrieval of radioactive sludge from the pond. Removing these empty skips has provided valuable information that will underpin plans for removing the remaining 180 skips in the pond.

The design and manufacture of new equipment to support the bulk retrieval campaign is progressing to schedule and includes local effluent and sludge treatment plants, and a new skip tipping and washing system. An important step toward repackaging and removing cans containing oxide fuel has also been achieved with the in-pond corraling of all skips containing this material. The team at this facility celebrated an impressive 4 years without a lost time accident during 2005.



The first skip in 6 years is removed from the Pile Fuel Storage Pond

Excellent progress has been delivered both to prepare for future waste retrievals and to reduce the current risks associated with the **First Generation Magnox Storage Pond**.

An extensive survey of every visible inch of the pond and its contents, using off-the-shelf marine technology, has been successfully completed. Over 5,000 hours of footage has been meticulously analyzed by plant experts and compared with existing pond databases to create an accurate picture of what is probably the most high profile and challenging fuel storage pond in the industry. This new and accurate knowledge has enabled the

creation of a detailed plan for pond management during future retrievals, and identified an opportunity to accelerate the retrieval of a Magnox fuel skip earlier than planned.

This skip was safely removed from the pond during 2005 and the fuel was successfully reprocessed at another Sellafield facility. This landmark achievement signified the first fuel export from the pond in 15 years, and has opened the door on a possible realistic option for dealing with some of the fuel in the legacy ponds at Sellafield.

Steve Bruce, project manager, emphasized: “This has been a very exciting project for all involved and has generated a highly motivated team totally committed to a successful outcome. The project team has achieved tremendous successes using innovation and ingenuity to deliver a challenging project within very short timescales.

“Once again, British Nuclear Group has clearly shown it has the skills and experience to deliver breakthrough thinking to safely accelerate the clean-up and decommissioning on the Sellafield site.”

* denotes predicted values	Hanford	Sellafield
Daily worker dose during retrievals	1-2 mrem	10-20 mrem*
Pond water activity level	2 $\mu\text{Ci/L}$	54-135 $\mu\text{Ci/L}$
Activity release to pond through IX process	972 $\mu\text{Ci/day}$	81 Ci/day*

Radiological comparison between the Sellafield First Generation Magnox Storage Pond and the Hanford K Basins



The retrieved Magnox fuel skip within a 50-ton transit flask leaves the legacy pond

Other significant signs of tangible progress have been: the removal of 3 years worth of historic LLW in one financial year! the refurbishment of 4 badly corroded steel trestles that support the Skip Handling Machine gantry, the demolition of buildings to create a site for new plant vital to the removal of pond sludge, the installation of remotely controlled heating to protect redundant sludge and effluent pipes, the removal of internal equipment from fuel inlet cells to create operational export facilities for pond waste, and the complete upgrade and replacement of the radiological surveillance and building evacuation system.

Notwithstanding this impressive delivery the team also clocked up more than 1 million man hours without a lost time accident. A fantastic achievement considering the work over the past year has involved the whole range of activities including design, construction, demolition, commissioning and control and surveillance operations. There has been a wide range of hazards to manage including radiation, contamination, work at heights, and falling objects.

5. LEGACY SILOS PROJECT

It has been a significant year of delivery for the Legacy Silos Project, safely completing the most hazardous undertaking at Sellafield during 2005, and safely accelerating over \$32 million of work during 2005/6.

The safe replacement of a redundant building crane at the **Magnox Swarf Storage Silos** signified successful completion of the most hazardous project at the Sellafield site during the year. Using one of the largest mobile cranes in Europe (800-tons), removal of the old crane involved lifting loads of up to 50-tons through the building roof, around 20 meters above the roof of the silos structure.

Excellent detailed planning and the full engagement of everyone involved ensured the work was executed flawlessly without even a cut finger! The heaviest lift, the 50-ton redundant crane chassis, took a painstaking 7 hours to safely balance the load before lifting commenced; a testament to the precision and care that British Nuclear Group Sellafield Ltd applies to safe project delivery.

The new crane was then introduced to the building, again via the roof, and has been successfully commissioned and handed over to the building operations team. Completion of this critical path activity is vital to enable the removal of redundant equipment and the introduction of 2,000-tons of new waste retrieval machinery in the near future.



Redundant crane section after removal through the roof of the Magnox Swarf Storage Silos

Another key achievement has been the off-site testing of heavy duty hydraulic manipulators. These have been developed as the remote handling tool for use across the legacy plants requiring major waste retrieval operations. The target for this round of testing was to achieve a minimum of 1,200 hours mean time between failures. Currently one manipulator has achieved 1,800 hours while simulating routines required for retrieving waste from the Magnox Swarf Storage Silos using the new generation of retrieval machines. The second manipulator achieved over 1,200 hours while performing a range of other predicted plant tasks such as handling scrap.

Much other important work has been delivered recently to upgrade safety significant systems and prepare the silos for full scale waste retrievals. Over \$16 million of this work has been accelerated from the 2006/07 near term work plan and has included the removal of redundant silo liquor transfer equipment, and the installation of engineered water top-up systems for maintaining safe liquor levels in the silos.

Acceleration of work scope has also been the theme at the **Pile Fuel Cladding Silo**. The sealing of the silo compartment charge holes and demolition of the transfer tunnel (fall 2005 newsletter) were part of a large structural improvement phase which was delivered for over \$14 million less than estimated, with the major work packages accelerated by up to 3 years.

The team have built upon and continued this excellent performance through 2005/6 by bringing forward even more key work like: the transfer of plant instrumentation to guaranteed supplies and the installation/interconnection of a new argon plant and associated delivery pipe-work. The new seismically qualified argon plant will play a crucial role in maintaining waste stability and safety during future retrieval operations.

INTERNATIONAL ATOMIC ENERGY AGENCY

Decommissioning activities at Waste Technology Section, IAEA - The lack of early interest in reuse of contaminated sites is often a hindrance to expediting decommissioning in some IAEA Member States. This is caused by insufficient knowledge of experiences available world wide and industrial and other opportunities that were exploited successfully. In addition, reuse of decommissioned sites is a significant means to partly offset the financial burden associated to decommissioning, re-employ workers and specialist staff, and reduce the decommissioning impacts on the local economy. Fig 1 highlights some new industrial activities being established in the context of Greifswald NPP decommissioning, Germany.

A technical report in press (TRS # 444) includes an overview of completed decommissioning projects world wide and important factors involved in reusing decommissioned sites for new purposes, either nuclear or non-nuclear. Lessons learned from these projects and practical guidance is highlighted. Special emphasis is given in the report to the following strategic issues:

- Mutual interactions of decommissioning strategies and site reuse options; the need for early planning
- Roles, interests and responsibilities of operators, regulators, government decision-makers, local authorities and other stakeholders
- Reuse for nuclear applications
- Unrestricted or restricted release targets (green field vs. brown field) as major factors in facility/site reuse

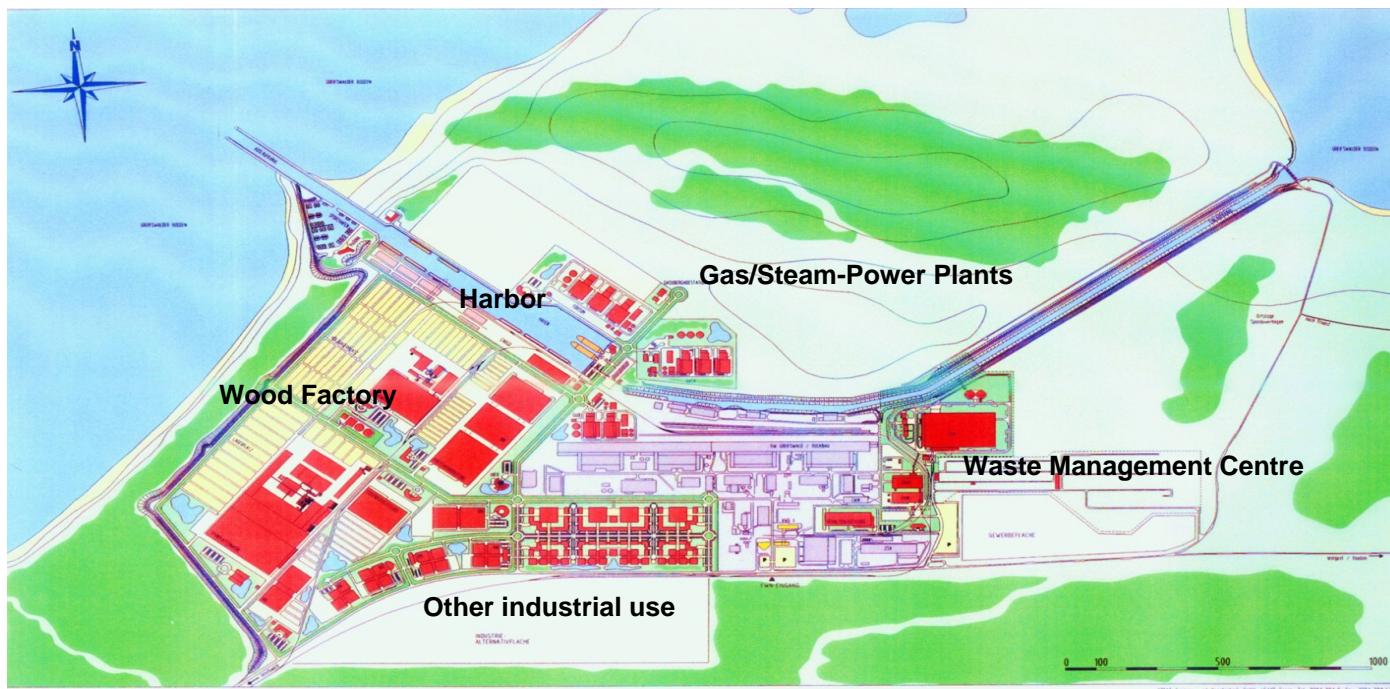
- Site assets as factors orienting site reuse
- Duration of institutional control period and how to minimize it through site re-development
- Partial vs. total site release
- Industrial, residential and other non-nuclear reuse options
- Social, political and economic factors
- Operating experience and lessons learned from a number of reuse projects
- Site reuse as a factor to expedite completion of decommissioning.

A technical report (TRS No. 440) “**The Dismantling of Contaminated Stacks at Nuclear Facilities**” was recently published by the IAEA. Nuclear stacks become contaminated over the operating lifetime through the accumulated deposition of radioactive particulates and the absorption of radioactive gases. This contamination may be difficult to remove dependant on the operating conditions and the chemical-physical characteristics of the contaminants over time. In addition, the physical logistics of stack dismantling may be complex, e.g. difficulty in severing concrete at heights. Thus alternative techniques such as explosives or one-piece removal have been developed and successfully used. Dismantling radioactively contaminated stacks should therefore take into account the radiological and conventional hazards to the workforce and the public in general. Several options have been developed including preliminary decontamination prior to dismantling and direct dismantling of contaminated structures. Relevant aspects include project planning and management, health and safety, and the management and disposal of wastes resulting from dismantling. Fig 2 shows the explosive dismantling of the G-1 reactor stack in France.

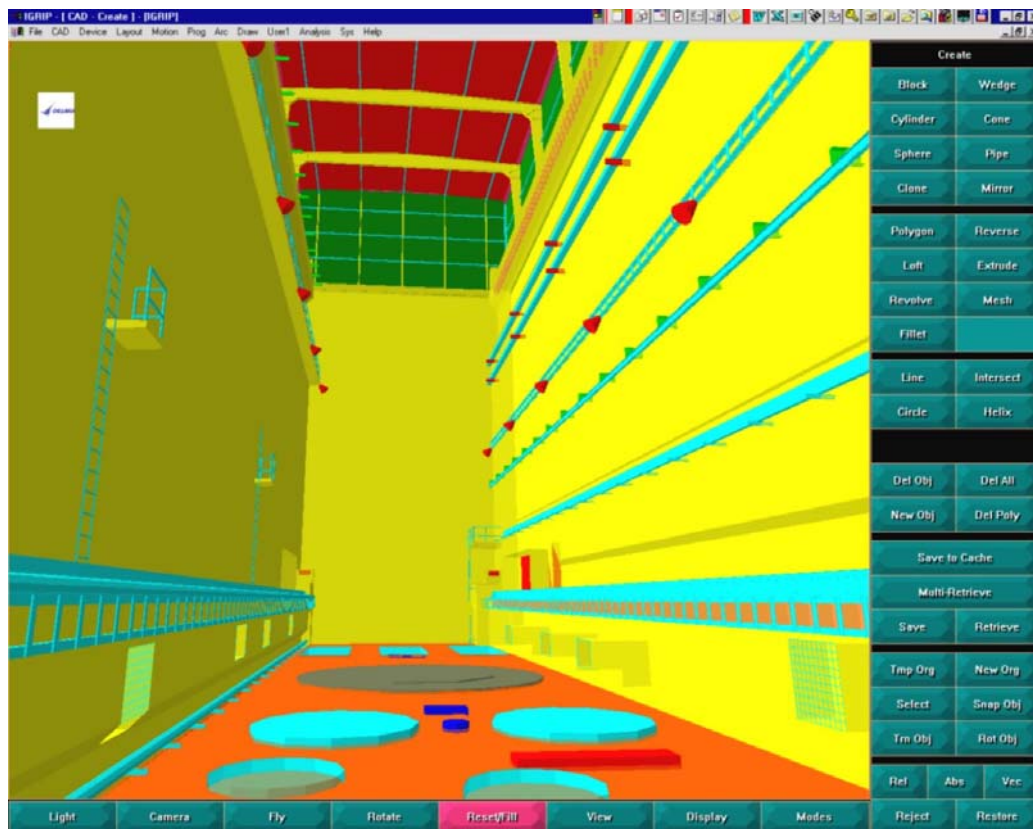
Among continuing national Technical Co-operation projects on decommissioning, one should mention a project on remote-operated techniques in the context of decommissioning of A-1 NPP, Slovakia. The highly contaminated state of a number of rooms and components in that plant make it difficult to conduct a physical and radiological characterization campaign based on manned access. To overcome these difficulties, remote-operated technologies are being developed/adapted in this project including 3-D graphics, laser-assisted recognition, gamma-camera imaging and graphic simulations of decommissioning activities. Fig 3 illustrates an IGRIP-simulated image of A-1 reactor hall.



Explosive dismantling of the G-1 reactor stack in France



New industrial activities being established at Greifswald NPP, Germany



IGRIP-simulated image of A-1 NPP reactor hall, Slovakia

The IAEA and Iraq

The International Atomic Energy Agency has recently started a new project assisting the Government of Iraq with the decommissioning of facilities that had used radioactive material and were damaged during the Gulf Wars. A meeting was held on 21 – 23 February 2006 to kick-off the project and begin implementation of the activities. The meeting was attended by over 50 participants from 20 Member States and international organizations.



Figure 1 - Russian IRT-5000 Research Reactor located at the Tuwaitha Nuclear Research Center

and the sites. Currently many of the sites are not properly identified or controlled. Another major issue is the management of waste that already exists and that which will be generated during the decommissioning. Currently there is a waste storage facility at the Tuwaitha Nuclear Research Center, but it does not have the capability to handle the waste that will be generated during decommissioning. Also records for the material currently stored at the facility are not available and the waste is not characterized. The development of a waste management strategy will also be part of this new project.

This is an essential project as it can have a definite impact on the lives of the local population. The Agency is looking forward working with the representatives from the Government of Iraq and other Member State representatives who are interested in contributing to the success of the project.

This new project is divided into three phases, based on the current situation in the country and the availability of information. The first phase will identify facilities and sites that are contaminated and require decommissioning and remediation. It will also capture all existing data and prioritize the facilities and sites based on hazard and risk. The second phase will analyze the existing data and determine where additional data is needed to allow for proper planning. An overall country decommissioning strategy will be developed and resources put in place to begin the implementation of the decommissioning plans. The third phase will be the actual implementation of decommissioning and remediation activities. This will be a long term project, with the first phase lasting 1-2 years.

Many of the meeting participants did not realize the extent of the problem. There are at least ten sites and over 100 buildings that will require evaluation and possibly decommissioning or remediation. The facilities range from research reactors and radiochemical plants to uranium separation facilities. A number of buildings were demolished and buried in ‘un-engineered’ excavations, just to get the material out of the

way.

There are a number of issues that will require resolution during the implementation of the project. The main one is the security of workers

DDR TECHNOLOGY-Nochar High Tech Polymers

Nochar's High-tech Polymers Solidify Radioactive Waste Worldwide

Nochar, Inc. of Indianapolis, IN supplies state-of-the-art waste solidification polymers to the nuclear industry to solidify **organics, acids, alkalines, alcohols, sludges, and aqueous waste** into a solid matrix for the safe transportation and disposal.

Nochar polymers are among the world's most tested solidification technologies for non-leaching, long term stability, and high gamma fields, both in the United States and internationally.

These state-of-the-art polymers can be targeted to specific radioactive waste streams. Nochar and The Chamberlain Group of Lynchburg, VA, have developed and deployed **eighteen** different polymers and blends designed to solidify LLW, MLLW, and TRU liquid waste in a cost-effective one-step operation. Since 1997, Nochar polymers have been deployed on most major US Department of Energy nuclear sites which have resulted in **major cost savings**, compared with baseline treatment methods.

Internationally, Nochar and its marketing partners, Pacific Nuclear Solutions of Indianapolis, IN and The Chamberlain Group, have met with success in the nuclear sector as well.

Nochar polymers are currently solidifying liquid wastes in Slovenia, Romania, Australia and Canada. Major projects and testing programs using Nochar polymers are currently underway in Great Britain, Russia, China, Sweden and France.

At the Sellafield site in the United Kingdom, British officials expect to solidify several phases of organic liquid waste streams in late 2006 or early 2007. The Khlopin Radium Institute in St Petersburg, Russia has conducted extensive testing of Nochar polymers including, heavy gamma testing at 270,000,000 rad to qualify for waste treatment in Russia. Several technical papers have been written and presented at international conferences.

China Atomic has conducted testing of Nochar technology for two years and is set to sign a contract with Pacific Nuclear Solutions in the spring of 2006, and Nochar polymers will become the first U.S. solidification technology to be used in that country.



Khlopin hot cell testing in St. Petersburg

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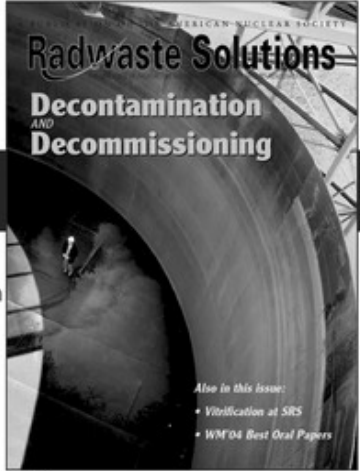
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