DECONTAMINATION DECOMMISSIONING AND REUTILIZATION DIVISION

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DISCLAIMER

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 review and use. Access to the newsletter is a benefit of membership in the ANS DDR Division. It is a semi-annual publication normally issued in the Spring and Fall of each year. Please encourage colleagues who may have an interest in our newsletter and other DDR activities to join us in the ANS and especially the DDR Division. Membership details for joining the DDR Division can be located at the division's website: http://ddrd.ans.org.

CONTRIBUTIONS

If you would like to contribute news or an article to the DDR Newsletter, please contact Mr. Steve Horvath, the DDR Newsletter Editor, at (865) 803-3592 or via e-mail at shorvath@energysolutions.com. If you have any recommendations regarding any aspect of the Newsletter, these are welcome as well.

NEW CHAIRMAN'S WELCOME

Fellow Members of the DD&R Division,

I want to thank you for your interest, membership, and participation in the third largest division within the ANS.

The DD&R Division had an excellent 2007-2008 during which John Parkyn was the Chair. I am indebted to John for his leadership as well as the hard work of all the other DD&R Division members and commit to do my best to meet or exceed the standards which he set.

The recently completed year included a very successful 2008 DD&R Topical Meeting held in Chattanooga for which Jim Byrne was the driving force. In addition, the division had positive marks in almost all the performance metrics established by ANS. Our membership chair has been relentless in her pursuit of new members and 34 have joined the Division since January of 2008. This mitigates somewhat the membership decrease that took place in calendar year 2007 from 1105 to 1029. During the ANS National Meeting in Anaheim of the Division Chairs with ANS President Don Hintz, I commented (partly in jest) that the Nuclear Renaissance seems to be having a negative affect on membership in the DD&R Division, but we certainly are not proponents of a return to the nuclear Dark Ages in order to boost the number of our members.

It is with some irony that I consider the timing of my career, which began near the close of the first Nuclear Power Era working on the return to startup of Fermi I (yes, this is a one), and during the autumn of my career fast reactors and fuel recycling (aka reprocessing) are finally returning to acceptability. Most of us realized years ago the environmental benefits of nuclear energy, and we often have difficulty understanding why public opinion does not see the issues as clearly or rapidly as we do. Hopefully, our vision will be realized during the current Nuclear Renaissance.

The era of decommissioning useful power reactors has thankfully ended, but there is still plenty of D&D work to be done. Initiated work on power reactors needs to be completed, a number of research reactors have D&D in progress or yet to be done, work on the nuclear transport ship SS Savannah is in progress, previous generation reactors in France and England are being decommissioned, material sites governed by 10 CFR 30 are being cleaned up an/or surveyed for release, major cleanup is still in progress at a number of large government sites, and other significant work is in progress or to start soon.

Please visit our website at http://ddrd.ans.org to find current information on activities of the DD&R Division as well as upcoming meetings, great pictures of numerous D&D activities, and of course our renowned newsletter that is only available to DD&R members.

I hope that the knowledge shared through the communication channels and venues provided by the DD&R Division will be helpful in making each of you successful as well as contribute to having the work performed safely, timely, and in a cost efficient manner.

I look forward to your support during the coming year, and if you have any suggestions on how we can better serve you, please do not hesitate to send them to me at gunningje@ornl.gov.

Sincerely,

John E Gunning

John E. Gunning
DD&R Chair, 2008-2009

CANADA: Cameco Corporation, Port Hope, Ontario, Canada

Contributed by: Aldo D'Agostino

CAMECO VISION 2010

Vision 2010 is a major cleanup and renewal initiative at Cameco's Port Hope, Ontario uranium conversion facility (PHCF). It involves the removal of contaminated soils and a number of old or under-utilized buildings, building materials and stored historic wastes, along with the construction of new replacement buildings with necessary landscaping.

The project is being carried out in conjunction with the Port Hope Area Initiative (PHAI) project, a joint federal-municipal government undertaking for the cleanup and long-term management of low-level radioactive and industrial waste in the Municipality of Port Hope. Vision 2010 presents a unique and timely opportunity to increase the operational efficiency and environmental performance of the PHCF, while also making the PHCF look more attractive and integrate better with the community's vision for the future.

Vision 2010 is to be realized through development of a preferred master plan using the following key objectives:

- Maintain existing plant operations at all times while soil remediation, demolition, and new construction is in progress. This will require sequential relocation of personnel, materials and tasks from one area of the site to another

- Consolidate site operations, in particular for cylinder-handling and storage facilities, so that the analytical laboratory and other operations related to the production of uranium hexafluoride (UF_6) and uranium dioxide (UO_2) are ultimately situated as close as possible to their respective centres of activity, where practical and cost effective

- Enhance site safety and security by ensuring that the design meets the required level of safety and security, with preference given to options that more easily achieve these goals

- Improve the working environment for Cameco employees, further inspiring employees and contributing to their health and welfare. The site should be a place that Cameco employees can show with pride and that confirms the importance of Cameco to the residents of the Municipality of Port Hope

- Implement, to the extent possible, the stakeholder planning objectives for Vision 2010 articulated by Port Hope community members and documented in the Vision 2010 Independent Advisory Report

- Optimize the site's overall operations through the remediation/construction process. Some approaches may be more effective from a construction standpoint but ultimately may not maximize the lifecycle potential for site operations. Others may present long-term flexibility but may be cost-prohibitive to achieve within the site restrictions. The goal is an optimized program that delivers maximum results when considering all technical, operational, commercial, environmental and social objectives.

Project location

The Municipality of Port Hope, with a population of 16,500, is located on the north shore of Lake Ontario about 100 km east of Toronto. In 2001, the then Town of Port Hope amalgamated with Hope Township to form the Municipality of Port Hope.

Port Hope is recognized as having the best-preserved 19th century streetscape in Ontario and its downtown is well known as a shopping destination for antiques and other specialty items. Port Hope is home to various industries, including Cameco's PHCF and Zircatec Precision Industries (Zircatec), a Cameco company.

The PHCF occupies an area of approximately 10 hectares on the shore of Lake Ontario. Immediately to the east of the site are the Port Hope harbour, the centre pier (currently leased by Cameco) and the Ganaraska River. To the south is a beach, which is remote from the recreational activities of the inner harbour, and used for strolling and fishing. The VIA Rail station building sits just to the northwest of the PHCF. To the north of the PHCF are the CN and CP rail corridors whose tracks cross the Ganaraska River valley on two viaducts supported on masonry piers. Commercial and residential areas are located north of the tracks and east of the river. The existing PHCF layout is illustrated in Figure 1.

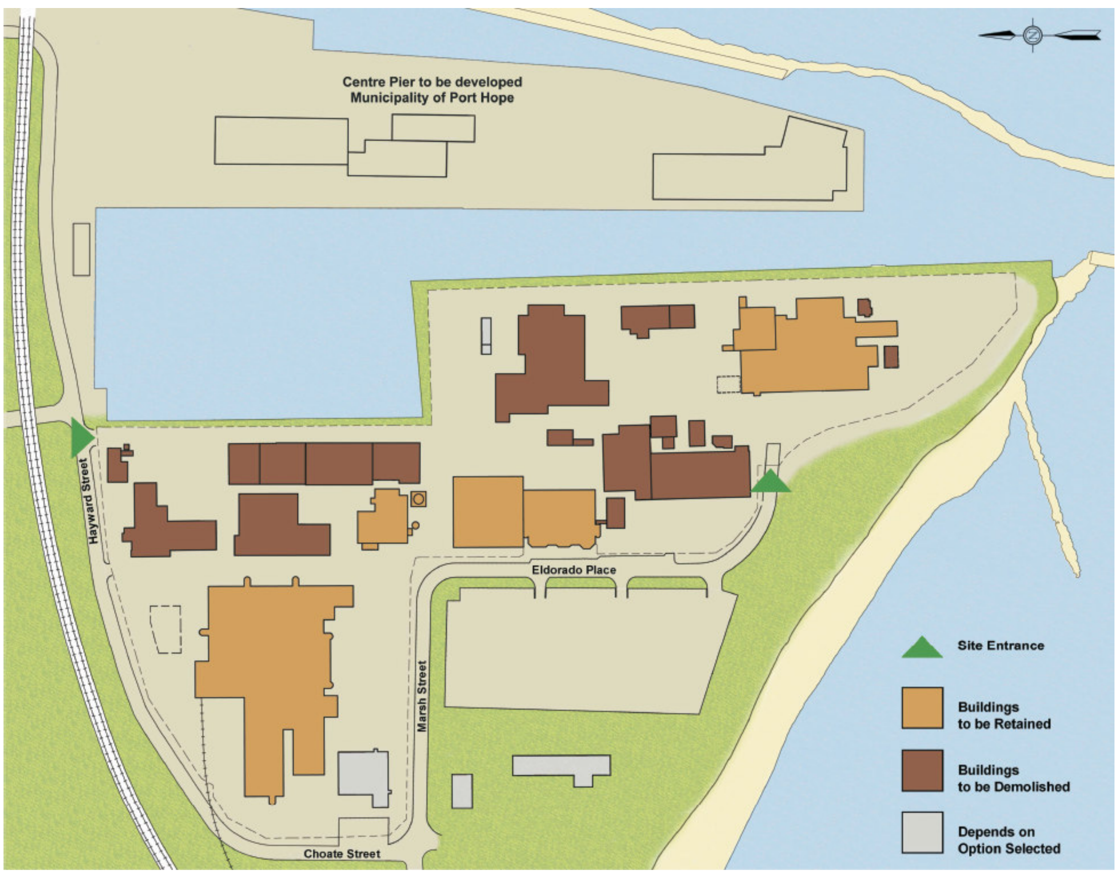


Figure 1. About two-thirds of the existing buildings are to be removed during Vision 2010 project

Cameco Corporation

Cameco Corporation is a Canadian company that is involved in the exploration, mining, milling, refining and conversion of uranium-containing materials, as well as manufacturing of CANDU reactor fuel and components through its Zircatec operations. Cameco's headquarters are in Saskatoon, Saskatchewan. Cameco's uranium refining and conversion operations are located in Blind River and Port Hope, Ontario, respectively. The fuel and reactor components manufacturing facilities of Zircatec are located in Port Hope and Cobourg, Ontario. Collectively, all of these operations are referred to as the "fuel services division" of Cameco. The processed uranium is part of the supply chain used in the manufacture of reactor fuel for electric utilities in Canada and around the world.

Cameco also produces electricity through its share of the Bruce Power Limited Partnership, which operates four CANDU nuclear reactors at a power plant on the east shore of Lake Huron in Ontario. Additionally, Cameco holds 53% ownership of Centerra Gold Inc., which was spun off from the company in 2004. Centerra is a growth-oriented, Canadian-based gold mining and exploration company engaged in the acquisition, exploration, development and operation of gold properties in Central Asia, the former Soviet Union and other emerging markets.

Site History

Port Hope was settled in 1793 by United Empire Loyalists. The Town of Port Hope was incorporated in 1834 as the seventh town in Ontario. Because of its position both on Lake Ontario and at the junction of the Grand Trunk Railroad and the Port Hope-Lindsay Railroad, industry and trading grew in the town. The harbour served as a terminus for agricultural products, coal and industrial output from the 1800s to the early part of the 20th century.

The PHCF was initially established by Eldorado Gold Mines Limited in 1932 to process ore from Port Radium, in the Northwest Territories, into refined radium. The radium refining operation ran until 1939 when operations were suspended for a short period for economic reasons. In 1943, the company was renamed Eldorado Mining and Refining Limited and in 1944 the company became a Crown corporation owned by the Government of Canada. The operation was then changed to a uranium processing plant.

The company was renamed Eldorado Nuclear Limited in 1968. In October 1988, Eldorado Nuclear Limited and the Saskatchewan Mining Development Corporation were merged to form a new entity, Cameco, A Canadian Mining and Energy Corporation. This organization was subsequently privatized in the early 1990s and the name was shortened to Cameco Corporation.

Currently, the PHCF receives nuclear-grade UO_3 from its Blind River Refinery for conversion to UF_6 or UO_2. These products are further processed at other facilities to produce fuels for light and heavy-water reactor programs, respectively. The PHCF also produces depleted UO_2. In addition to these fuels, the PHCF is licensed to manufacture depleted uranium metal components for use in a variety of industrial applications.

The PHCF has achieved ISO 14001 certification for its environmental management system (EMS).

Port Hope Area Initiative

Vision 2010 entails the cleanup and redevelopment of the PHCF site. Presently there are a number of old or under-utilized buildings, contaminated soils, and stored historic wastes on the PHCF site.

The federal government is responsible for removing historic low-level radioactive waste from the community. Through the Low-Level Radioactive Waste Management Office, the government is undertaking a project to consolidate historic low-level waste that is currently located in a number of locations throughout the Municipality of Port Hope. These wastes are the result of past industrial practices, which resulted in contaminated materials being allowed into the community.

When the project is completed, all historic low-level radioactive wastes will be transferred to a long-term waste management facility (LTWMF) within the municipality. The name of the local project is the Port Hope Area Initiative (PHAI).

The agreement between the federal government and the Municipality of Port Hope specifies that 150,000 m^3 of decommissioning waste at the PHCF is to be accommodated in the LTWMF. Cameco has a specified window of opportunity, during the time that the LTWMF is receiving wastes, in which to transport its decommissioning waste for placement at the facility.

Project works and activities

Vision 2010 consists of two components: site remediation and new construction. Activities within each of these areas will occur simultaneously as both aspects will be undertaken in incremental stages.

Site remediation

A preliminary remedial action plan has been prepared for Vision 2010. Remediation for this undertaking is comprised of three major activities: removal of historic waste, building demolition and soil excavation. All of these activities will generate contaminated material that will be shipped to the LTWMF.

When Cameco was formed in 1988, it assumed responsibility on behalf of the federal government for managing quantities of drummed waste that had been placed in storage by Eldorado Nuclear. Over the years, outlets were established for many of the materials and the drummed on-site inventory was reduced. However, the remaining on-site drums require relocation to the LTWMF.

There are 24 buildings on the site that are to be removed, ranging in size from small pump houses to large former production plants. Cameco's Vision 2010 team reviewed all available construction drawings and used them to estimate the quantity and type of materials present for demolition. The buildings slated for demolition will have the remaining equipment and materials removed and will be cleaned to remove surface contaminants. Once the buildings have been cleaned, they will be disassembled to the maximum extent possible rather than using traditional demolition methods in order to minimize the release of dust, limit the spread of potential contaminants, maximize the amount of material that can be cleaned and recycled as scrap metal or aggregate, and to reduce impacts on the operation of the facility.

The contaminated soil to be managed was identified in a phase two environmental site assessment undertaken in 2003. The volume was augmented in 2006 by a study undertaken to further delineate the sub-surface contamination on the main site.

The excavations will be conducted sequentially around the site as dictated by operational and new construction activities. The excavations will be small in area so as to minimize disturbance to operations. The rate of excavation will be at a pace that is matched to the receiving schedule of the LTWMF as stipulated by the PHAI.

New construction

Cameco developed a number of possible PHCF site layouts after a series of user group meetings and site inspections. The site layouts were further developed into four master plan options, each of which would meet the requirements of the PHCF. The community was consulted on the four options, one of which is illustrated in Figure 2.

Figure 2. One of the Vision 2010 master plan options includes a building for cylinder storage

For the purpose of the Vision 2010 project environmental assessment study, a preferred alternative is to be selected which integrates various elements of the four master plan options and addresses to the extent possible the stakeholder planning objectives articulated in the Independent Advisory Report.

With some variations, depending upon the master plan option selected, new buildings would include the following:

- a building near the UO_2 plant to store UO_2 drums and house other functions
- several small additions to the UF_6 plant, for possible uses such as wastewater treatment, indoor potassium hydroxide unloading and scrap metal processing
- a laboratory building housing both analytical and research labs
- a receiving building possibly combined with non-destructive examination and emergency vehicles storage
- a visitor centre; and
- a building to house the UF_6 cylinders.

Above-ground services at the PHCF are carried on pipe racks, many of which will be replaced during the construction phase. Below-ground services will be reconstructed or relocated as needed to properly service the PHCF as remediation and construction activities continue. Cameco will use the Vision 2010 project to enhance stormwater management on the property by consolidating and improving the existing system.

The community consultation results indicate that a “circle of green” is highly desirable around the PHCF and, thus a land ownership transfer between the municipality and Cameco may be required to maximize green space. Cameco and the municipality have entered into discussions with the goal of negotiating a land ownership transfer that could make possible the preference of stakeholders, consistent with the vision of the municipality for the community’s waterfront.

Federal environmental assessment (EA) process

The Canadian Nuclear Safety Commission (CNSC) is the federal authority responsible for the regulation of nuclear facilities in Canada. Approval from the CNSC, pursuant to the Nuclear Safety and Control Act, is required before Cameco may proceed with Vision 2010.

In September 2006, the CNSC determined that the EA for Vision 2010 would be classed as a comprehensive study. CNSC staff issued draft EA guidelines for the proposed undertaking in March 2008 and, with public and regulatory input, the guidelines will likely be finalized in September 2008. Cameco will then initiate the Vision 2010 Comprehensive Study EA, which includes a substantive public communication and consultation program.

Project schedule

If the EA and licence amendments for the Vision 2010 project were to be completed toward the end of 2010, construction activities could commence in 2011. The work would continue for approximately six years with closeout of this project in approximately 2017. In the meantime, the Vision 2010 team continues to advance designs and plans for the project.

Additional information

Additional information about the project can be found at www.camecoporthope.ca.

IAEA: Redevelopment and Reuse of Facilities and Sites: Looking Into the Non-Nuclear Past to Learn about Nuclear Future

Contributed by: Michele (Mike) Laraia, IAEA, Vienna, Austria

1 - BACKGROUND

Over time, buildings, monuments, bridges, industrial factories and mines, and a wide gamut of civilian and industrial structures reach the end of their original functions and get ready to assume new functions or become disused and are abandoned. Reasons for these changes include factors such as: technical-economic obsolescence, predominant elite dictating national priorities, prevailing religion, social interest or evolving traditions, natural or man-made events (e.g. blazes). It is interesting that the reuse of existing sites and facilities (or parts thereof) have generally received higher priority over demolition and starting of new developments afresh. Over uncountable centuries, mankind have refurbished, adapted, and eventually reused historical places for new goals. Redevelopment and reuse (R/R) rather than demolition were mandated by convenience (e.g. the usefulness of sturdy, usable structures), economics and –more recently- visual and aesthetic factors. It is noteworthy that in many cases more modern constructions were built on top of older buildings to take advantage of the existing foundations. For example, today's St Paul's Cathedral in London is the fifth church built on one and the same site. Any, even if long, list of historical reuse projects would be an extremely limited sample of actual projects, which literally can be numbered in thousands. The following list is merely intended to convey an impression of the range of factors that prompted reuse and of the facilities subjected to such changes:

- The Pantheon in Rome, Italy. A Roman temple, followed by a Christian Church, ultimately a National Memorial
- In Brick Lane, London, a chapel built by Huguenot weavers in the 18th century was converted into an orthodox synagogue in the 19th century when Jews fleeing from Russia arrived in the East End. When they moved to the suburbs, the next wave of poor immigrants, from Bangladesh, converted it into a mosque, the Jami Masjid
- The Chilwort Gunpowder Company, UK, closed its works in 1920 as the end of World War I caused a massive overcapacity in the industry. On closure, many of the buildings were fired as the standard and most effective way of decontaminating former explosive buildings. At Chilworth a number of process buildings were retained and converted into dwellings. A variety of structures were adapted, including small brick-built expense magazines, corrugated-iron process buildings, and more recently erected structures including the press house and the acetone recovery stove.
- The Roman Ruins at Vienna, Austria. Roman houses existed in this place for almost 2000 years and in the Middle Ages buildings were erected on top of those (fig 1)

Figure 1 – Roman Ruins in Basement of Modern Building, Vienna, Austria

Closer to our times, a growing sense of archaeology and the intrinsic value attached to historical buildings, factories and other structures led the authorities or site planners to convert them to museums for public admiration. Again, a list of such projects would call for a book on its own and a good deal of examples are given in subsequent sections. A preliminary list may include the following projects chosen arbitrarily.

- In Vienna, Austria, the Imperial Stables built in 1723-25 were altered and enlarged in the 19th century, and reused as the Vienna Exhibition Palace. Eventually in the late years of the 20th century the buildings were converted to a Museum Quartier (“Museum Island”) incorporating the Architecture Centrum and Library, Museums of Modern and Contemporary Arts, and related offices. Interactions with the public and other stakeholders were an important aspect of R/R, as mentioned in this paper for other R/R projects

- In Scotland, the Prestongrange Industrial Heritage Museum occupies the site of the former Prestongrange Colliery, which opened around 1852 and closed in the early 1960s. The museum charts the development of local industries from the mining of coal which first took place on this site in the 12th century, to brick and pipe making, pottery, salt and soap manufacture and brewing.
- In Paris, the Orsay Museum was originally a railway station, Gare d'Orsay, constructed for the 1900 World's Fair. By 1939 the station's short platforms had become unsuitable for the longer trains that had come to be used for mainline services. After 1939 it was used for suburban services and part of it became a mailing center during World War II. In 1977 the French Government decided to convert the station to a museum, which was opened on 1 December 1986. The Orsay Museum holds mainly French art dating from 1848 to 1914, and is best known for its extensive collection of impressionist masterpieces. (Fig. 2)

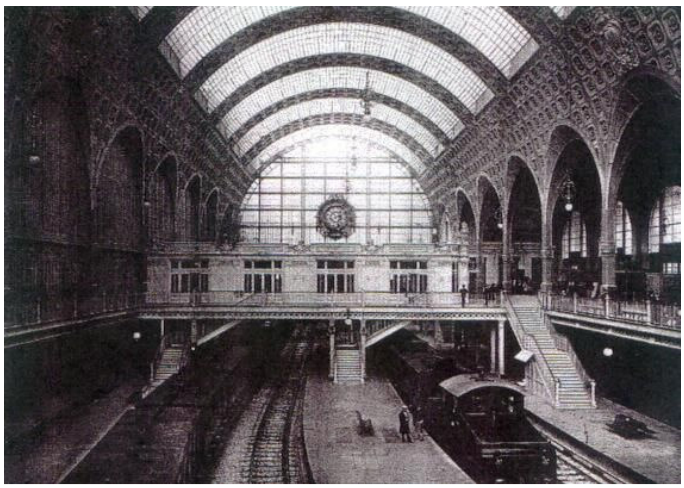


Figure 2a: Gare d'Orsay, a Railway Station
Figure 2b: Museum d'Orsay

In more recent times, historical buildings are often considered as landmarks. One interesting case in question is the dome at the Dounreay Nuclear Centre in Scotland. The future of the 50-year-old steel sphere remains unresolved as the nuclear site is decommissioned. On one side, the potential of the dome as a landmark and national monument should not go unexplored. On the other hand, the sphere is corroded and contaminated by tritium and any future owner would be faced with large expenses just to paint it. Fig 3 shows a likely candidate for preservation as a national monument, the egg-shaped dome of the Philippines Research Reactor.

In conclusion of this historical overview, one should also note that the R/R of historical or otherwise remarkable buildings and other structures attract publicity. This in turn is likely to increase the value of land/premises and encourage investors.

Figure 3: Dome of the Philippines Research Reactor

2 - INTRODUCTION

In the past it was said that nuclear decommissioning management should be aimed at the final disposal of waste and the restoration of a site to almost pristine conditions. This concept is not acceptable any longer and decommissioning should not be an endpoint of a facility or site but should rather be the starting phase of a Redevelopment and Reuse (R/R) [1]opportunity for a facility or site. A decommissioning strategy based on total demolition of a facility or site should be the last resort; rather, the focus should move to R/R options to be ideally included in the decommissioning strategy.

The R/R of nuclear and non-nuclear facilities after decommissioning is an option that is currently not optimized. The ongoing Nuclear Renaissance is starting to apply pressure on the developers to redevelop and reuse existing nuclear sites and brownfields. Over the past few years, several cases were documented as proof of successful R/R of decommissioned facilities.

Decommissioning costs can be significantly lower if the R/R potential of facilities or sites are identified at an early stage in the life cycle of a facility since the extent of decommissioning can be influenced by the R/R options. Early reuse and redevelopment plans will ensure that best use is made of the assets, infrastructure and land resources (e.g. roads, railways, etc.) associated with the sites. This approach could also result in minimising decommissioning waste.

Currently conceptual decommissioning plans exists for most nuclear facilities but these plans are confined to the achievement of release conditions and do generally not include possible reuse options. Such plans should also include the securing of facilities and sites after decommissioning until successful R/R. Emphasis should be on the identification of structurally sound buildings and property not to be demolished. This is part of the move towards sustainable development suggesting that R/R options must always be considered.

Sustainable development also implies the need to combine socio-economic development with conservation of natural resources such as land and to maintain community integrity. The identification of R/R options supports the requirement that uninterrupted employment needs to be ensured. The operators of nuclear and non-nuclear facilities have an (ethical, if not legal) responsibility towards the employees and the local communities. This responsibility must not be seen as a burden but must be converted into a possible profitable action for the operators, ensuring sustainable development.

Fundamental environmental principles — Reduce, Recover, Recycle and Reuse (the 'Four Rs') — are integral to sustainability and successful decommissioning. Applying these principles means minimizing radioactive contamination and recovering, recycling and reusing materials, equipment, buildings and sites to the fullest practicable extent. Disposal is used only as a last resort. Public expectations attach high value to site reuse because of the potential for workforce re-deployment and local redevelopment. Commercially, the best reuse of a successfully decommissioned site may well be the construction of a new nuclear facility in its place; and this option may also be congruent with national needs and local aspirations. From a national perspective in many countries, nuclear power is gaining increasing policy support as a reliable source of affordable and cleanly generated electricity. From a local perspective, the replacement option draws upon skilled labour already available and is therefore likely to enjoy local public acceptance that is common to communities familiar with nuclear power.

The location of a facility to be decommissioned is an important factor that needs to be considered from a socio-economic perspective. Most of the facilities that become obsolete or where the operational functions have been modified are located in geographic areas already heavily populated and close to commercial districts. Mostly older facilities targeted for decommissioning were originally constructed on the edge of a growing city but are in the centre of an urban area and are engulfed by city sprawl. The overall public sensitivity toward the environment and possible discharges and pollution has increased significantly. The reuse options of facilities located in the centre of urban areas must consider the public needs and perceptions before implementation of an R/R option. Industrial redevelopment around water bodies may not be supported by the public. Arguments such as that the disused facilities were there first do not sway the public. Negative public sentiment has a major impact on a company or government entity when they are making decisions about where to commit their limited funding for upgrades and modifications. Within urban areas buildings may become obsolete for present day uses, although remaining structurally sound. The fate of these buildings depends on appreciation and sensitivity toward the public sentiment. The need to preserve the historic buildings is an important part of maintaining historic industrial character that forms an anchor for future redevelopment. In this regard, one should also note that reused buildings/factories tend to be publicized and turn into tourist attractions generating extra revenues to the owner (media coverage, tickets sold etc). To this end it is often convenient to keep signs of the former use (e.g. a historical façade). (Fig.4)

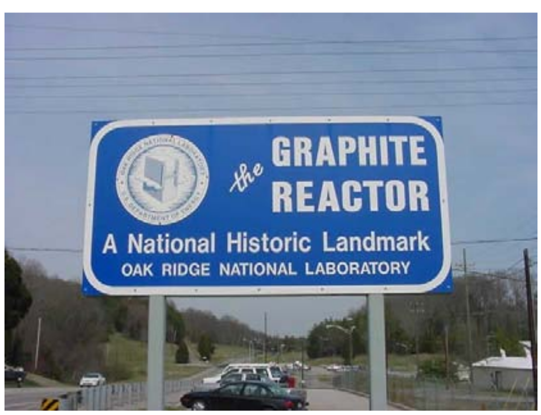


Figure 4: ORNL Graphite Museum

Last but not least, the economics. For a long time, urban regeneration has been driven by various combinations of political will and business. But it has depended heavily on public money and has been often threatened by red tape. Now there are signs of change. Experience has helped developers to tackle bureaucratic obstacles. And less public money is needed to back projects, as some of the most sophisticated investors are becoming more attracted to regeneration projects as a sound place to put their funds. As private finance moves in, are financial returns the only measure of success for regeneration projects? The creation of jobs in areas afflicted by unemployment is certainly a complementary measure. At London Docklands the working population rose from none to 64 000. The number of visitors attracted to a city is another important aim when regeneration schemes have financed cultural showpieces. The Guggenheim Museum was the result of a move by Bilbao authorities to attract the Guggenheim Foundation to the city, when the traditional industries of shipbuilding and steelmaking collapsed in the early 1990s. Within two years after the first full year of the Museum (2001) extra tax revenues had already covered the cost of bringing the museum to Bilbao.

Finally it is to be recognized that R/R opportunities should be considered on a case-by-case basis. In a number of cases, demolition and greenfield release of the site will be the only available option, since R/R would be too costly or impractical. However, the information currently available should be enough to call for at least consideration of R/R in most decommissioning projects.

3 - GENERIC EXPERIENCE AND LESSONS LEARNED

There are various examples of reuse options and these options should be studied for facilities, buildings and sites on a case-by-case basis since the R/R options for any nuclear facility and site are unique.

There are numerous reuse options available for industrial facilities and sites. Examples of such reuse options are the following:

- Museums.
- Art studios.
- Offices.
- Residential units.
- Schools.
- Nuclear site development.
- Landfill, waste storage and repository.
- Brownfield development (industrial development).
- Combination of options etc.

There are various aspects that have a major impact on the choice of the final R/R options. Some of the factors that should be taken into account when considering R/R option are:

- Socio-economic impact. (job retention or creation, financial benefits etc.)
- Decommissioning impact (scope of decommissioning work, waste generation, timing, regulatory issues, etc.)
- Stakeholder impact (public needs and demands and regulatory framework)

These factors vary in content for nuclear and non-nuclear R/R plans and are discussed in the following paragraphs.

Socio-economic impact

The economic viability of an R/R option is critical to ensure successful R/R. The selected R/R option should provide the owner or developer with a reasonable return on investment and should generate sufficient income to ensure the long-term maintenance of the facility and associated open spaces. Sometimes, the value of the assets (land, infrastructure) in their R/R for new purposes is so high to significantly offset the cost of decommissioning.

This was the case of the University Research Reactor at Manchester where the of land value increased dramatically due to expansion of the nearby city and 60% of decommissioning costs were recovered through the subsequent R/R. The Sao Paulo case, where the cost of decommissioning (some 2M$) was more than offset by the sale of the land (12 M$) stands at one extreme of the range. In many cases, there is little to gain in pure economic terms (social, cultural and economic factors being excluded for now), since nuclear and other industrial sites are often remote and the land remains cheap. Cases of increased land profitability can be due to factors such as: expansion of nearby cities, promotion of ad-hoc activities (e.g. museums, business parks etc), or making use of extant infrastructure for new installations. A holistic reuse could include the conservation of the heritage value of the facility but should not compromise the sustainability of the R/R option. The impact of successful R/R is experienced beyond the boundaries of the heritage asset itself and should aim at a socio- economic boost for the community.

The R/R of a facility can have very positive social-economic impact on a community:

- Property values are likely to rise in the case of successful redevelopment.
- Employment issues are not affected to the same extent as shutdown and decommissioning. Re-employment could be a driving force for redevelopment.
- Maintenance of educational opportunities.
- Sustained tax revenues and municipal income that could even increase.

The R/R of facilities, buildings and sites has various other benefits/advantages. Older or existing facilities have existing assets and infrastructure that can be reused. Examples of such assets are the following:

- High quality electricity supply connections.
- Airstrips, roads, rail or sea access with offloading facilities.
- Office space.
- Well established utility supplies (e.g. cooling water systems, steam supply, etc.)
- Well developed security systems (cameras, fencing etc.)
- Well established underground features (e.g. vaults, tanks, pits, fire protection systems, sewerage systems, and other waste retention systems). If the site will not be reused these underground features may have a major impact on decommissioning but for a site that will be reused it could have many benefits.
- Support services (e.g. catering, public transport).
- A partly ‘captive’ local workforce with a high level of technical skill.
- Prestigious old/historic buildings.

Decommissioning impact

R/R is likely to have an impact on the scope and extend of decommissioning including action related to equipment dismantling and decontamination. For specific R/R scenarios equipment could be required for similar or adaptive reused. Reuse of equipment could result in a significant cost saving when compared with cost of full decommissioning and re-installation of new equipment.

When considering R/R options the buildings should be inspected, (e.g. facility design, materials of construction, and current condition) to evaluate whether the buildings could be reused or demolished. Current building requirements applicable to the specific reuse option might not be met by the old building e.g. seismic requirements and it could be just to costly to renovate the building to comply with current building requirements. In this context, it should be noted that dismantling activities may result in extensive damage to structures, making R/R problematic.

Intended reuse should be a driving factor in determining the clean-up standards. The clean-up methodology should be aligned with the redevelopment scenario. As an example asphalt capping can be reused as a parking area and at the same time contain contaminated soil and prevent the leaching of contamination into groundwater or the migration of contamination to neighbouring areas.

Decommissioning should include all steps leading to the release of buildings, land, facilities and equipment for R/R. Approval of release criteria associated with a selected R/R option should be obtained in good time to ensure the inclusion of the applicable criteria in the R/R strategies. Since it is not always possible to release a decommissioned site or facility the R/R options are limited due to remaining liability and ownership requirements.

Stakeholder impact (regulatory requirements and public involvement).
Public concern regarding social issues can eliminate certain redevelopment options. On the contrary, the public need for infrastructure schools, residential property, business areas etc should be recognized and considered in R/R options and strategies.

The regulatory requirements especially in the nuclear industry dictate the compilation of R/R options and strategies. The applicable authorisation criteria and guidelines for the various phases, clean-up criteria and characterization methodologies and techniques etc, should be adhered to. Clean-up criteria would differ for a future industrial use or limited exposure scenario versus the more stringent requirements for public use or a planned use with an unlimited time of exposure. Early involvement of regulators is critical in the case of planned R/R. The viable R/R options should be approved/accepted by the regulators as part of the decommissioning strategy prior to decommissioning. Failure to obtain prior approval could result in much higher decommissioning cost and/or the future R/R plans could be jeopardized.

4 - CONCLUSIONS

R/R options are site specific and the viability of the different options should be considered for each site. Some approaches or options may be viable from a construction viewpoint but it will not maximize the potential of the site. Other approaches and options may present long term flexibility but are costly and could be restricted by the site characteristics. The selection of an R/R option should consider the impact of each option in terms of the following key attributes; cost of option, technical, operational, commercial, environmental and social objectives. The factors could be considered and weighted in accordance with relevant contribution in a systematic multi-attribute analysis.

5 - BIBLIOGRAPHY

INTERNATIONAL ATOMIC ENERGY AGENCY, Redevelopment of Nuclear Facilities after Decommissioning, Technical Reports Series No. 444, IAEA, Vienna (2006)

INTERNATIONAL ATOMIC ENERGY AGENCY, Managing the Socio-Economic Impact of the Decommissioning of Nuclear Facilities, Technical Reports Series No. 464, IAEA, Vienna (2008)

WORLD NUCLEAR ASSOCIATION, Position Statement, Safe Decommissioning of Civil Nuclear Industry Sites, London, (2006)

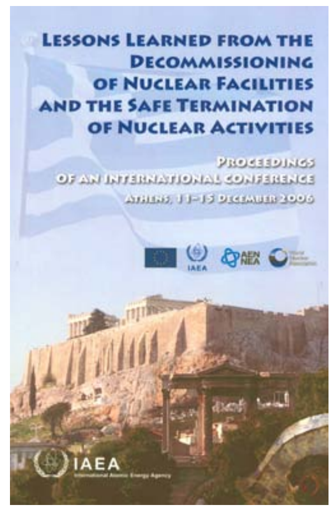
IAEA: Overview of IAEA Activities Related to Safety of Decommissioning

Contributed by: B. Batandjieva and P. O'Donnell, IAEA, Vienna, Austria

1. International Action Plan on Decommissioning of Nuclear Facilities

Following the outcomes of the International Conference on Safe Decommissioning for Nuclear Facilities, held in 2002 in Berlin, an International Action Plan on Decommissioning of Nuclear Facilities was approved by the IAEA Board of Governors in 2004 (GOV/2004/40). The plan includes ten actions that were successfully implemented by the IAEA - (i) magnitude of decommissioning; (ii) safety standards; (iii) safety assessment; (iv) decommissioning of research reactors; (v) waste management; (vi) information exchange; (vii) funding: (viii) release and reuse of materials, sites and buildings; (ix) long-term preservation of information; (x) stakeholders and social issues (http://www-ns.iaea.org/tech-areas/waste-safety/decommissioning.htm).

In 2007 the Action Plan was reviewed and revised in line with the outcomes of the International Conference on Lessons Learned from the Decommissioning of Nuclear Facilities and the Safe Termination of Nuclear Activities, held in Athens, Greece in December 2006. The revised Action Plan includes the establishment of a formal peer review mechanism, recommendations on lessons learned from decommissioning in the design, operation and decommissioning of new build facilities; launching of a new international project on use of safety assessment in planning, and implementation of decommissioning, preparation of an international conference (follow-up of Athens), etc. The Plan aims to establish the IAEA as an international focal point on decommissioning before 2010.

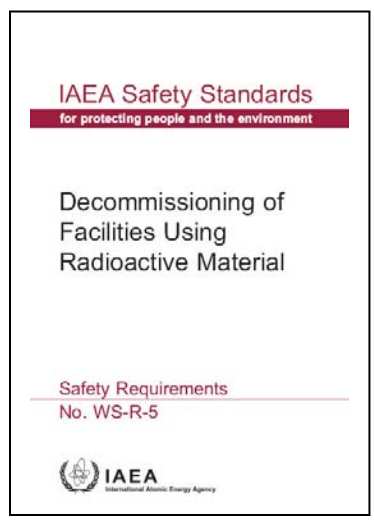


2. Safety Standards and Supporting Documents

The set of safety standards on decommissioning has been almost completed. A new Safety Requirement on Decommissioning of Facilities Using Radioactive Material (No. WS-R-5) and a new Safety Guide on Release of Sites from Regulatory Control on Termination of Practices (WS-G-5.1) were published at the end of 2006.

Work is underway on the draft Safety Guide on Safety Assessment for Decommissioning of Facilities Using Radioactive Material (DS376) which is expected to be published in 2008.

Revision of the existing Safety Guides on decommissioning of nuclear power plants and research reactors o. WS-G-2.1), decommissioning of medical, industrial and research facilities (No. WS-G-2.2) and decommissioning of fuel cycle facilities (No. WS-G-2.4) was initiated this year with the view to prepare the revision of these for Member States comments at the end of 2009. The revision of these standards aims to update the guidance in accordance with the new Safety Fundamentals (No. SF-1), Safety Requirements No. WS-R-5 and experience and lessons learned of Member States in this field.



Since June 2007 the IAEA is working on a new Safety Guide on Orphan Sources and Radioactively Contaminated Material in the Metal Recycling Industry (No. DS 411).

The draft document is planned to be submitted to WASSC and RASSC committees for Member States comments in Oct 2008 and also to be presented at the International Conference "Control and Management of Inadvertent Radioactive Material in Scrap Metal" in Tarragona, Spain (23-27 Feb. 2009).

3. International Projects

At present the Agency is coordinating the following international projects on decommissioning:

a. *Evaluation and Demonstration of Safety during Decommissioning of Nuclear Facilities (DeSa)* – an intercomparison and harmonisation project, initiated in 2004 with over 100 participants from 30 countries. A reference safety assessment methodology was established and applied to real facilities (a nuclear power plant, a research reactor and a nuclear laboratory). Further, recommendations were developed on the application of the graded approach, together with a procedure for a regulatory review of safety assessments for decommissioning. The project was successfully completed in Nov. 2007, and a follow-up project on Use of the Safety Assessment in Planning and Implementation of Decommissioning of Facilities Using Radioactive Material (FaSa) is planned to be launched in on 17 Nov. 2008 at the IAEA headquarters in Vienna (see http://www-ns.iaea.org/tech-areas/waste-safety/desa/start.asp).

b. *Research Reactor Decommissioning Demonstration Project (R^2D^2P)* - a six year project was initiated in 2006 with 37 participants from 13 countries participating in three groups dealing with planning, implementation and regulation of decommissioning – see http://www.ns.iaea.org/projects/r2d2project/default.htm#1

   The project aims to provide technical assistance to the Philippines in the decommissioning of the TRIGA research reactor, and also to use the project as an example for the participating countries that are preparing for decommissioning in the future. Series of workshops and expert missions have been organised during the last two years. In addition discussions are underway with China related to the inclusion of the heavy water research reactor (HWRR) near Beijing as a demonstration project in the R^2D^2P.

c. *Evaluation and Decommissioning of Former Facilities that Used Radioactive Material in Iraq* – the project was initiated in 2006 to provide technical assistance to the government of Iraq in three main areas of activity (i) data collection and analysis; (ii) prioritization system development and (iii) regulatory and strategic aspects (see http://www-ns.iaea.org/projects/iraq/default.htm). Regular meetings are being organised in Austria, Germany and France aiming at development of legal and regulatory framework, collection and prioritization of available data and development of remediation plans.

4. Peer Review Services

In response to the increased request for technical assistance on decommissioning (e.g. review of decommissioning plans, cost estimation), the IAEA has developed a new peer review service for planned and ongoing decommissioning projects. It is aimed to complement the existing international peer reviews, such as OSART (Operational Safety Review Team) and IRRS (International Regulatory Review Service). The first peer review is planned to be performed at the Bradwell site (Magnox NPP) in UK in June 2008 (http://www-ns.iaea.org/home/rtws.asp). The outcomes of this review will be presented and discussed at a technical meeting at the IAEA headquarters in November 2008. Similar peer review is under preparation for the 15 operating WWER units in Ukraine. The two-year review is planned to commence in 2008. This project is a joint initiative with the EU, government of Ukraine and the IAEA.

5. Exchange of Information

International Conference on Lessons Learned from the Decommissioning of Nuclear Facilities and the Safe Termination of Nuclear Activities, held in Athens, Greece in December 2006 was very successful. It was attended by 300 experts from 50 countries. The proceedings were prepared and published in September 2007 (web site http://www-ns.iaea.org/tech-areas/waste-safety/decommissioning.htm). A report of the outcomes of the conference was presented to the BOG on 5 March 2007 (GOV/INF) and a second report with the revised Action Plan on Decommissioning of Nuclear Facilities was submitted to the Board of Governors in Sept. 2007. A follow-up conference is planned for 2011.

6. Training and education

The IAEA is providing assistance to operators, regulators and other experts involved in decommissioning through national or regional training events (courses and workshops) in various thematic areas, e.g. project management, cost estimates and radiological characterisation. In 2007 the following events were organised (see http://www-ns.iaea.org/training/rw/wss-training.htm);

- Regional training course on decommissioning, Uzbekistan (May 2007);
- National workshop on Safety Assessment for Decommissioning of NPPs, Ukraine (Oct. 2007);
- National Workshop on IAEA Safety Standards on Decommissioning and Radioactive Waste Management, Ukraine (Oct 2007).

In 2008 the IAEA is planning to organise the following training events;

- Regional Workshop on ALARA during Decommissioning, Germany (April 2008);
- National Workshop on Safety Assessment for Decommissioning of Research Reactors, China (May 2008);
- Regional Workshop on Radioactive Waste Management and Clearance, Spain (June 2008);
- Regional Workshop on Decommissioning of Facilities Using Radioactive Material, Argentina (Oct. 2008);
- National Workshop on Cost Estimation for Decommissioning of Research Reactors, Russian Federation (Oct. 2008).

Reference training material on decommissioning and remediation of contaminated sites has been developed by the IAEA and expected to be published in 2008.

7. Technical Assistance

The IAEA is providing assistance on decommissioning to thirteen Member States in Europe with research reactors and nuclear power plants through a regional project RER3005 “Support in Planning of Decommissioning of Nuclear Power Plants and Research Reactors”. In addition technical support is also provided to Romania, Georgia, Ukraine, China, Serbia through national technical cooperation (TC) projects. This assistance is planned to continue in the 2009-2011 TC cycle and also expanded to other countries such as South Africa.

8. Cooperation with International Organisations

The IAEA is working closely in the field of decommissioning with (i) NEA/OECD through participation in the WDPP group annual meetings; (ii) WENRA meetings related to the review of reference levels on decommissioning – comments have been provided and discussed with WENRA at several meetings; (iii) UNECE on development of recommendations on monitoring of potentially contaminated scrap metal, meetings have taken place were comments on the document have been provided and discussed.

9. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

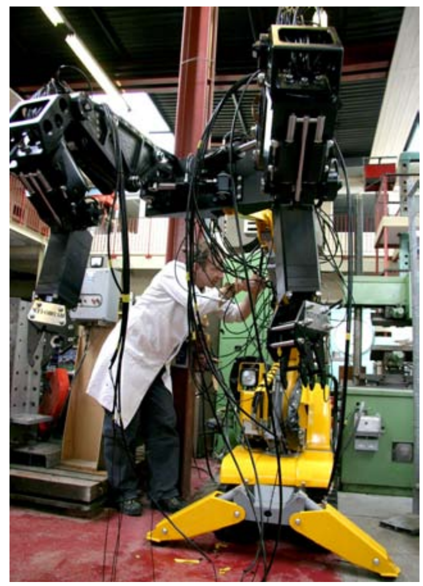
Since 2001 the IAEA is servicing the Joint Convention (with 46 Contracting Parties to date) that addresses safety of decommissioning in Article 26. The Agency has been (i) organising the review meetings of Contracting Parties (in 2003 and 2006), and (ii) promoting the convention through regional workshops and meetings, newsletters, brochures and a web site (http://www-ns.iaea.org/conventions/waste-jointconvention.htm). The Agency is working on the preparation of the third review meeting, scheduled for May 2009.

UNITED KINGDOM: Nuclear Decommissioning Education

Opportunities for University education in nuclear decommissioning at Lancaster, UK

Contributed by: Professor Malcolm Joyce and
Professor Derek Seward – Lancaster University UK (m.joyce@lanc

April 2005 marked a watershed for the nuclear industry in the United Kingdom (UK) with the formation of the Nuclear Decommissioning Authority (NDA) [1]. At that point the UK nuclear legacy of defunct nuclear power plants, reprocessing facilities and interim stores passed formally into the hands of the UK Government. With them went the responsibility for the contractorization of decommissioning these facilities and an associated multi-billion dollar programme of work lasting 25 years and beyond.



The UK nuclear industry has a diverse Engineering basis. As with most nuclear legacies, its roots are firmly rooted in the military push for weapon's grade material in the late 1940's and 1950's. The most significant technical challenges making up this legacy are the plant left in a non-standard state as a result of unforeseen accidents and processes that were poorly understood at the time. There is also plant for which the historical record is incomplete and, further, a fleet of Gen I reactor systems that have already been shut down or are coming to the end of their lives.

Somewhat unusual given the international context, the vast majority of these facilities stem from a nuclear fuel cycle reliant on uranium metal fuel of natural abundance, clad in magnesium alloy, moderated by graphite and cooled with pressurised carbon dioxide gas. Hence the legacy has specific technical challenges associated with significant quantities of activated carbon and corroded legacy fuel. Almost all the Gen I 'Magnox' reactors are now shut down and several of them are well on the way with their decommissioning programmes.
It will be several years hence before the Gen II reactor systems ('Advanced Gas-cooled' designs utilising enriched oxide fuel in stainless steel clad) reach the end of their lives. It is very unlikely that similar designs will be adopted in any future nuclear renaissance, with the current favourites being light-water cooled designs. The majority decommissioning technical challenge resides at Sellafield on the North-west coast of the UK and at Dounreay on the north coast of Scotland.

Prior to the establishment of the NDA, the nuclear industry in the UK suffered significant decline with Sizewell B, completed in 1995, representing the last major civil nuclear project commissioned in over twenty years. One effect that this has had upon the nuclear sector in the UK is that of skills and education: all dedicated nuclear engineering undergraduate provision in the UK ceased during this period and most of the post-graduate provision suffered significantly. We are now faced with the situation where a great deal of the expertise, both in the industry and that of the teachers/trainers in the education sector, are approaching retirement.

The requirement to decommission the UK nuclear legacy has turned the emphasis around, and the recent commitment to a new build programme in the UK further strengthens that position. There have been numerous skills surveys [2-6] and studies performed by the UK nuclear regulator and the UK Government skills' council for this sector – COGENT – all report significant shortfalls in the skills necessary to get to grips with these exciting, large-scale projects. Whilst no skills shortage can be reversed by education and training alone, this requirement is placing significant emphasis on the training of people aspiring to a career in the industry and of people already in the industry who will migrate from an operations-based role to a project-based role in decommissioning.

At Lancaster University in the UK we have made a significant commitment to appeal to the skills need for decommissioning in the UK. Lancaster is a small, medieval city on the west coast of the UK, geographically central. The university was established in the 1960's as part of the nationwide expansion of high-quality universities and the Engineering Department was set up in 1967. The Department is a General Engineering Department, meaning that all branches of Engineering (including nuclear) are offered under the same route, and students are encouraged at levels to diversify across traditional boundaries in way that we believe is consistent with what they will meet in industry.

A Masters course in *Safety Engineering* has been offered for several years which includes a specialism in nuclear safety. This course has been very successful, with alumni over the last six years exceeding 100 graduates from over twenty employing companies. With the advent of the NDA, we established our Masters programme in *Decommissioning and Environmental Clean-up* in 2004. This course follows a similar format to the Safety Engineering course, that is: six dedicated modules in various aspects of engineering, safety, management and environmental science. Each of these modules is assessed by either examination or coursework, and in most cases, by both. The coursework, where applicable, is addressed by teams of students to inspire team working amongst them. Finally the students are required to submit a technical research paper at the end of the first year of their two-year course, and to submit a dissertation at the end of their second year on an individual project area of their choice. The course format is shown schematically in Figure 1.

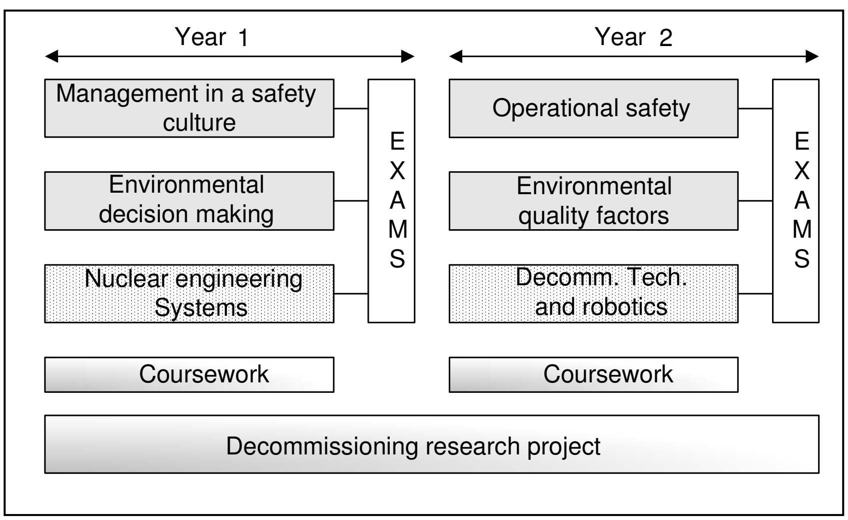


Figure 1: Masters course layout at Lancaster

The Lancaster decommissioning masters is designed exclusively for engineers in full-time work: all students register on a part-time industry-based footing and, if possible, their projects follow a relevant industry-relevant theme too. The scheme is shared with the Department of Environmental Science at Lancaster, to afford the all-important environmental expertise, and is taught at Lancaster and off-site in areas of significant demand: at Plymouth and near to Sellafield, the latter being ~ 2 hours from Lancaster by car.

In addition to lecture-based teaching seminars and coursework study groups, students are encouraged to study practical demonstrations of decommissioning technologies, including the retrieval of low-activity sources from a mocked-up silo. They are also taken on visits to real reactor plant that are both functioning, such as the Heysham site in the north of England, and plant undergoing decommissioning, such as Trawsfynydd in north Wales.

Over the years the course has been running, a great deal of interest has been demonstrated by nuclear sector employers across the UK, including Sellafield Ltd., Shepley Engineering Ltd., Babcock Marine, British Energy, Nexia Solutions and REACT Engineering Ltd., amongst others. The course currently enjoys between 20-30 students per year (see Figure 2), with recent projects including a study of the reclassification of plutonium contaminated material (PCM), dealing with radioactive sludges via a dry route and the design for decommissioning.

Figure 2: Students studying Decommissioning at Lancaster

Some of these projects have stimulated further research at Lancaster into, for example, novel remote manipulator design, see Figure 3. Graduates from the course have gone onto significant roles at a number of the decommissioning sites and, in some cases, their studies at Lancaster have enabled a change of career into the decommissioning business, which is exactly what the course set out to accomplish.

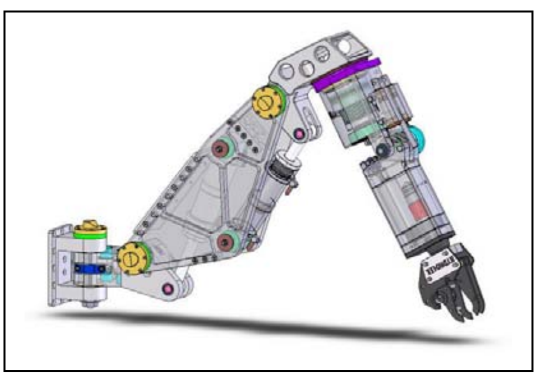


Figure 3: An advanced manipulator design: research stimulated by the Lancaster course

Graduates from the course have gone onto significant roles at a number of the decommissioning sites and, in some cases, their studies at Lancaster have enabled a change of career into the decommissioning business, which is exactly what the course set out to accomplish.

As a result of this success:

- We were awarded a number of bursaries from the NDA in 2006 to assist students from small companies and educational establishments.

- A new Chair in Nuclear Engineering and Decommissioning has been awarded to the Department by the Lloyd's Register Educational Trust. This will substantially accelerate research and teaching activities in this area over the next five years.
- The Engineering Department at Lancaster has recently launched what is currently the only undergraduate degree in Nuclear Engineering in the UK.

These achievements are a sure sign that the renaissance for nuclear is for real!

[1] Managing the nuclear legacy – a strategy for action, HMSO Command Paper 5552, February 2002, http://www.sepa.org.uk/pdf/consultation/current/ilw_conditioning/Managing_the_Nuclear_Legacy.pdf
[2] OECD/NEA report, Nuclear education and training – causes for concern, 2000, http://www.nea.fr/html/ndd/reports/2000/nea2428-education.pdf
[3] HSE/NII report, Nuclear education and training in British Universities, 17 October 2000, http://www.hse.gov.uk/nuclear/ukeduc.doc
[4] HSE/NII report, Nuclear education and training in British Universities, February 2002, http://www.hse.gov.uk/nuclear/edu0202.pdf
[5] Update on nuclear education and training in British Universities, December 2003, http://www.hse.gov.uk/nuclear/education03.pdf
[6] COVERDALE, T., Report of the Nuclear Skills Group, Department for Trade and Industry, Nuclear and radiological skills study, 5 December 2002, http://www.dti.gov.uk/files/file23311.pdf

UNITED STATES DECOMMISSIONING NEWS AND UPDATES

NUCLEAR POWER: FERMI 1 DECOMMISSIONING UPDATE

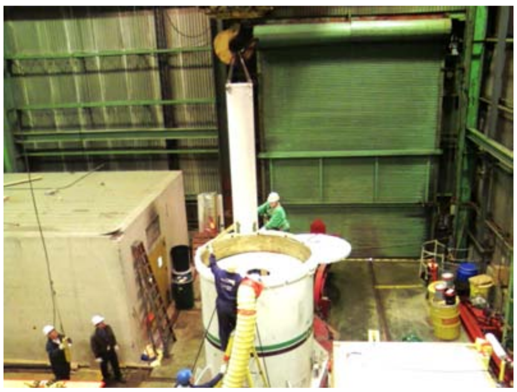
Contributed by: L. Goodman, Detroit Edison

The Fermi 1 project achieved a major milestone in April 2008. Processing the reactor residual sodium with steam to convert the sodium to sodium hydroxide and hydrogen gas was completed on April 13, 2008. This evolution had been 2 years in the planning and setup. The reactor will be filled with liquid, then the liquid will be recirculated to react any remaining trapped sodium. The sodium hydroxide solution will be neutralized to form contaminated saltwater. This is the first known reaction of reactor residual sodium using the steam-nitrogen process. The steam-nitrogen process has been used successfully at Fermi 1 to clean out 20 other large components and tons of small bore pipe containing sodium residues.

The spent neutron source was removed from the reactor in January, processed to remove any residual sodium, and then shipped to Barnwell for disposal in February 2008.

During fall 2007, the removal of the steel encased graphite blocks from the top ten feet of the reactor was completed. Approximately 5000 blocks and 10,000 metal spacers were removed.

One attached picture shows the top of the reactor vessel setup for sodium processing. The top of the reactor was insulated since the vessel was heated to melt the residual sodium prior to initiating the steam processing. The other pictures show removal of the source and loading the source processing and disposal container into the shipping cask.



Top Left: Fermi 1 Reactor Head

Top Right: Neutron Source Removal

Left: Neutron Source Container Transfer to Shipping Cask

NUCLEAR POWER: LaCROSSE DECOMMISSIONING UPDATE

Contributed by: R. Christians, Dairyland Power

The LaCrosse BWR decommissioning project is continuing with the planning and steps necessary to implement an onsite Dry Cask Storage system and transfer the spent fuel into dry storage. Dairyland has evaluated various cask suppliers and has selected NAC International as the cask supplier. The company has also performed various analyses of three potential sites for the Independent Spent Fuel Storage Installation (ISFSI) and has selected a site.

Dairyland is also in the process of analyzing the Reactor Building to see what modifications will be necessary to install a specially built tank adjacent to the Spent Fuel Pool, in which the 5 casks will be loaded.

The schedule currently calls for spent fuel loading in 2010.

NUCLEAR POWER: ZION 1 & 2 DECOMMISSIONING UPDATE

Contributed by: M. Rodriguez & S. Horvath, Zion*Solutions*, LLC

The Zion Nuclear Power Station Units 1 and 2 were permanently shut down by Commonwealth Edison in 1998 and the fuel was subsequently transferred to the spent fuel pool. In 2007, Energy*Solutions* and Exelon, the current Zion licensee, entered into discussions for Energy*Solutions* to provide decommissioning services. On January 25, 2008, Exelon submitted a request to the NRC for a license transfer from Exelon to Zion*Solutions*, LLC, a subsidiary of Energy*Solutions*.

The Nuclear Regulatory Commission's approval of the License Transfer Agreement would transfer the licensed ownership, management authorities, and the decommissioning trust fund of Zion Station to Zion*Solutions*. The title to the site real estate and the spent nuclear fuel would remain with Exelon. Zion*Solutions* would construct an ISFSI, transfer the spent fuel and complete the decommissioning of the two units within approximately 10 years. Following the decommissioning, the license for the spent fuel and the property will be transferred back to Exelon meeting license termination requirements.

Decommissioning planning has been ongoing since 2007. Physical decommissioning is scheduled to begin once ZionSolutions receives NRC approval. In July 2008, EnergySolutions received a favorable Private Letter Ruling from the Internal Revenue Service concerning tax treatment of the decommissioning funds related to the Zion decommissioning project. Final NRC approval is expected in the Fall 2008 timeframe.

DEPARTMENT OF ENERGY: FLOUR HANFORD DECOMMISSIONING UPDATE

Contributed by: Michele Gerber, Flour Hanford

K East Basin D&D Underway

Fluor Hanford is completing D&D of the K East Basin at the U.S. Department of Energy's (DOE's) Hanford Site in southeastern Washington State this spring, with demolition expected to begin in June. Located about 400 yards from the Columbia River, the K East Basin is one of two indoor pools that formerly contained irradiated nuclear fuel, radioactive sludge and tons of contaminated debris. In unique and path-breaking work, workers finished removing the spent fuel from the K Basins in 2004.

In May 2007, workers completed vacuuming the sludge into containers in the K East Basin, and transferring it into containers in the K West Basin. In December, they finished vacuuming the remainder of K West Basin sludge into these containers. The K East Basin was emptied of its radioactive inventory first because it was more contaminated than the K West Basin, and had leaked in the past.

In October 2007, Fluor Hanford began physical D&D of the 8,400-square foot K East Basin by pouring approximately 14-inches of grout into the bottom of it. Grout is a type of special cement used for encasing waste.

Two months later, Fluor Hanford workers completed sluicing contaminated sand from the large filter that had sieved contaminants from the basin water for more than 50 years. Next, they poured grout into the filter housing and the vault that surrounds the filter, as well as into ion exchange columns that also helped filter basin water.

For a six-week period in February and March, personnel drained the approximately one-million gallons of contaminated water from the K East Basin. The effort required more than 200 tanker truck loads that transported the water to an effluent treatment facility for treatment and then release. A thin fixative was also applied to the basin walls as the water was removed to hold residual contamination in place.

Fluor Hanford workers ready a tanker truck to remove a load of the contaminated water being drained from the K East Basin, February 2008.

As soon as the water was out of the basin, Fluor pumped in approximately 18 feet of "controlled density fill" material (somewhat similar to sand) to shield workers to a safe level from the residual radioactivity. Workers then continued preparations for demolishing the structure. Currently, they are isolating utilities, removing asbestos, draining oils, and removing other items not allowed to be disposed in Hanford's Environmental Restoration Disposal Facility (ERDF).

The basin's superstructure will be demolished using a heavy industrial excavator equipped with a shear. This portion of the work is expected to be completed in September, with removal of the basin substructure to follow in 2009. D&D of the K East Basin eliminated the final major radioactive sources there, and made the Columbia River and the adjacent environment safer for everyone who lives downstream.

Retrieving Buried Waste Beats Milestones

For the fourth year in a row, Fluor Hanford's Waste Stabilization and Disposition (WSD) Project met an annual milestone in the Site's Tri-Party Agreement ahead of schedule. (The Tri-Party Agreement, which governs cleanup, is formally called the Hanford Federal Facility Agreement and Consent Order.) In December 2007, WSD had retrieved more than 7,200 cubic meters (9,417 cubic yards) – 36,000 drum equivalents -- of buried waste since beginning retrieval work in late 2003. Today, WSD has retrieved approximately 7,530 cubic meters (nearly 9,850 cubic yards) of buried waste.

The waste was a by-product of plutonium production at Hanford during the 1970s and 1980s. The waste is located in four specific burial grounds, and because it is suspected of being transuranic (TRU) waste, it must be assayed after it is exhumed. If it is TRU waste, it is packaged for shipment to the DOE's Waste Isolation Pilot Plant (WIPP) in New Mexico. If it is low-level waste (LLW), it is treated and repackaged if necessary and re-buried at Hanford.

LLW contains less than 100 nanocuries per gram of alpha-emitting TRU isotopes with half-lives longer than 20 years, and TRU waste contains more than 100 nancuries per gram. Transuranic isotopes are those higher than uranium on the Periodic Table of the Elements. A nanocurie is a unit of radioactivity that is one-billionth of a curie.

The waste in the burial trenches includes contaminated debris, tools, clothing, and other solid materials, and was disposed in 55-gallon drums as well as boxes. Some of the boxes are very large, ranging up to the size of a parcel delivery truck.

Retrieval is difficult because in most cases the waste containers were stacked in trenches in the burial grounds and covered with an overburden of soil and protective systems in various configurations. Protective systems involved asphalt pads, concrete and metal structures, plastic tarps and other materials. Over time, the metal and wood containers have deteriorated to varying degrees.

Retrieving the deteriorated containers requires special handling and innovative approaches to protect the workers and the environment. In addition, the work is being done year-round in weather that varies from frigid and windy to extremely hot. This past year, Fluor Hanford installed large portable shelters to cover the worksites and increase the comfort level of workers and the efficiency of operations. The shelters allow work to continue in some adverse weather conditions.

During the past six months, Fluor Hanford has retrieved 2,715 drum-equivalents of buried waste, and made approximately 35 shipments of TRU waste from Hanford to WIPP. Some of the TRU waste that was shipped was retrieved from Site burial grounds and some of it consisted of other TRU waste generated during cleanup operations. In total, Fluor Hanford has made more than 400 shipments containing more than 3,000 cubic meters (nearly 4,000 cubic yards) – nearly 16,000 drum equivalents -- of TRU waste to WIPP since beginning shipments in fiscal year 2000.

Huge Glovebox Being Cleaned out at Plutonium Finishing Plant

Workers in Fluor Hanford's Plutonium Finishing Plant (PFP) Closure Project are achieving success as they remove process equipment from a large, historic glovebox in the main process building -- the 234-5Z Building. The nearly 760-cubic foot HA-23S box, weighing 26,000 pounds, is part of the original Remote Mechanical "A" Line -- an interconnected plutonium-processing line installed in the 234-5Z Building in 1951. The "A" Line was the first production-scale line of its kind in the world, and operated to change liquid plutonium nitrate into solid metal plutonium for weapons.

HA-23S, a storage box, could hold more than 350 containers of plutonium in a safe configuration during its production mission. It has four levels, each with a conveyor belt that snakes through the level in carousel fashion. An elevator inside the box was also capable of moving product jars to each of the four levels.

The ergonomics of accessing and size-reducing process equipment inside this box are extremely challenging. Equipment is large and heavy, bolts have been stuck in place for more than 50 years, visibility is poor, and positions are so awkward that two workers often have to reach into the box while holding and coordinating the same tool.

The Fluor Hanford team carefully studied the box in an extensive planning process, and drained and removed eight, heavy, water walls that surrounded it last summer. The walls were 12 feet tall and a foot thick, and had been used to shield radiation. Next, team members drained and removed the elevator and supporting hydraulic system. They began removing the equipment from Level II in November. Level II was closest to "eye level," and cleaning it out created space to facilitate accessing equipment in Level I. Cleanout of Level I finished in January. Next the crew placed scaffolding to remove equipment from Levels III and IV. The HA-23S process-removal project is 40 days ahead of schedule, and is expected to complete in June. Approximately 30, 55-gallon drums of waste are expected to result from cleaning out glovebox HA-23S.

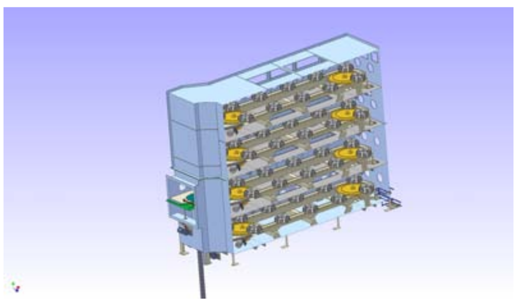
Three-Dimensional Modeling Tools Developed to Aid Cleanup Projects

One of the unique methods Fluor Hanford used in planning to safely and efficiently clean out glovebox HA-23S was three-dimensional (3D) modeling. Although 3D modeling is becoming standard in the engineering and construction worlds, Fluor uniquely adapted the modeling to D&D work. The effort first involved an extensive records search to identify the parts, materials, dimensions used, and modifications made, inside PFP's aged gloveboxes and hoods. The records search itself was exhausting, because some records had been lost, many were classified and compartmentalized, many vendors were no longer in business, and photos were scattered.

Piecing together minute facts and figures, designers built a data base of the components inside these formerly classified gloveboxes. Then they painstakingly loaded each dimension, air-space, part, thickness and component into computer programs and produced 3D views of the insides of the gloveboxes. The images could rotate, zoom in or out, and print out lists of parts with exact weights, materials and dimensions.

The planning teams found the 3D views extremely helpful, because they could see and plan how to dismantle, lay down and remove each piece of equipment. They could brainstorm the best methods to use in cleaning out each specific box. In addition, the views could be updated as the project moved along, showing which equipment had been removed and how much extra work space was now available. Time, radiation dose and money were saved by accessing the 3D images during the project planning and execution phases.

Fluor Hanford designers also adapted the 3D technique to produce models of air space and pathways inside aged filter systems that were critical for safely removing radioactive contaminants from the air from building air and glovebox exhausts. They produced models that “talked” to the analysis program, saving time and budget in producing analyses of the systems.



Three-dimensional graphic of glovebox HA-23S in Hanford’s Plutonium Finishing Plant, developed by Fluor Hanford designers to aid workers cleaning out contaminated process equipment from the massive box.

Other D&D News at Fluor Hanford

Fluor workers at the Fast Flux Test Facility continued to deactivate systems as part of facility shutdown by removing combustibles, draining liquids, isolating water and sewer systems, and deactivating support systems. They also removed an additional transformer that contained polychlorinated biphenyls (PCBs), and began shipping remaining fuel to the Idaho National Laboratory for final disposition.

Fluor Hanford’s Soil and Groundwater Remediation Project (SGRP) once again exceeded its goals in drilling new wells and decommissioning older, non-compliant wells. It collected more than 1,250 well samples, a record for any previous year at Hanford, and improved sampling efficiency and reliability. It expanded two pump-and-treat systems, tripling the capacity of one of them, and engaged in innovative tests to explore new ways of containing and treating contaminated plumes in groundwater. In addition, it delivered two large work plans required under the Comprehensive Environmental Response, Compensation and Liability Act.

DEPARTMENT OF ENERGY: IDAHO CLOSURE PROJECT DECOMMISSIONING UPDATE

Contributed by: CH2M-WG Idaho; News Release, June 23, 2008

Agencies propose to commence exhumation in third buried waste retrieval area

The U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency and the State of Idaho are proposing to expand the removal of buried waste to a third retrieval area at the Idaho National Laboratory Site's Radioactive Waste Management Complex (RWMC). There are currently two adjacent excavation areas at the RWMC where crews are retrieving buried targeted radioactive and hazardous wastes, repackaging the material and sending the transuranic components to DOE's Waste Isolation Pilot Plant (WIPP) in New Mexico.

The agencies have outlined their plans in an engineering evaluation/cost analysis document, which is available for public review and comment through July 23, 2008. The document is available at the following link: https://idahocleanupproject.com/Portals/0/documents/ARP-III_EE-CA_DOE-ID-11349.pdf.
Hard copies of the document may be viewed at an Administrative Record location in Idaho Falls at the INL Technical Library or in Boise at the Albertson Library on the campus of Boise State University.

In this latest action, the agencies are proposing to expand and continue targeted waste retrieval efforts in Pit 6 while the agencies prepare to issue the Operable Unit 7-13/14 Record of Decision (ROD) that will designate future retrieval areas. Excavation in the third retrieval area is expected to commence in Fall 2008.

Since early 2005, crews have been retrieving plutonium-contaminated filters, graphite and process sludge, oxidized (depleted) uranium, and solvent wastes from an area of the RWMC's Subsurface Disposal Area (SDA) called Pit 4. These materials originated at the Rocky Flats Plant near Denver, Colorado, during nuclear weapons production activities in the 1960s and were packaged in drums and boxes and sent to Idaho for disposal in the SDA over a period of 20 years, the last shipment of which arrived in the 1970s.

In 2007, the targeted waste retrieval effort was expanded to the eastern portion of Pit 4 and west end of Pit 6. These co-located pits contain some of the highest densities of radioactively-contaminated waste and solidified solvents in the SDA.

To date, the Department has excavated more than 11,000 cubic meters of waste material from Pits 4 and 6. These wastes have been repackaged into more than 6,600 waste containers. The radioactive wastes classified as transuranic wastes are prepared and shipped to DOE's WIPP facility for permanent disposal, while other classes of radioactive waste are sent to other appropriate off-site treatment and/or disposal facilities.

For a briefing or to request a copy of the engineering evaluation/cost analysis, citizens are encouraged to call the Idaho Cleanup Project at (800) 708-2680.

Comments may be mailed to:
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Name	Organization	Joined
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Mr. Mark S. Adams, P.E.	UNIVERSITY AT BUFFALO	5/8/2008
Mr. Jim Bolon	USEC, INC.	2/5/2008
Mr. Roy A. Boyd	SECURED TRANSPORTATION SERVICE	4/15/2008
Mr. John W. Brister, Jr.	CH2M HILL	4/3/2008
Mr. Joshua C. Brooks	DUFRANE NUCLEAR SHIELDING INC.	3/19/2008
Mr. James B. Buckley, Jr.	ENERGYSOLUTIONS	2/5/2008
Mr. Jason R. Casey	OREGON STATE UNIVERSITY	1/17/2008
Mr. Juan F. Castillo	OHIO STATE UNIVERSITY	4/18/2008
Mr. Randolph L. Chatfield	U.S. DOE CONTRACT	6/23/2008
Mr. James J. Christian	WESTERMAN COMPANIES INC.	1/9/2008
Ms. Lisa B. Clark	U.S. NRC	5/7/2008
Ms. Elaine M. Colston	NORFOLK NAVAL SHIPYARD	3/3/2008
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Mr. Douglas A. Davis	LOCKHEED MARTIN - KAPL	1/21/2008
Mr. Les J. Dugay	ANATA MANAGEMENT SOLUTIONS	5/12/2008
Mr. Don A. Edling	CROFT INC.	1/18/2008
Mr. Thomas J. Flaherty	BOOZ & COMPANY	6/17/2008
Mr. Spencer Fox, P.E.	E.S. FOX LTD.	1/28/2008
Mr. Thomas Gallagher	N/A	4/30/2008
Mr. Christopher A. Geiser	RENSSELAER POLYTECHNIC INSTITU	1/28/2008
Ms. Jacquelyn C. Gillings	ECOLOGY & ENVIRONMENT, INC.	2/28/2008
Ms. Donna M. Grant	SAP	5/12/2008
Dr. Giuseppe Grossi, P.E.	N/A	4/7/2008
Ms. Tara S. Hackel	UNIVERSITY OF MICHIGAN	1/29/2008
Mr. James A. Haried, Sr.	ERNST & YOUNG	2/22/2008
Mr. Phillip A. Harmon	N/A	5/12/2008
Mr. Mikio Izumi	TOSHIBA CORPORATION	4/1/2008
Mr. Aziz A. Jamaluddin, P.E.	EPCON INDUSTRIAL SYSTEMS, LP	4/18/2008
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Mr. David C. Jones	DUKE ENERGY	3/27/2008
Mr. Stephen Joyce, P.E.	JARDAR SYSTEMS, INC.	1/7/2008
Mr. Eric S. Keyes	N/A	2/25/2008
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Mrs. Lee B. McGetrick	UT-BATTELLE, OAK RIDGE NATIONA	1/4/2008
Mr. Gregory L. Morgan	DOMINION ENERGY KEWAUNEE, INC.	5/14/2008
Mr. Andrzej Nycz	UNIVERSITY OF TENNESSEE	1/16/2008
Mr. Tomohiro Ogata	MITSUBISHI HEAVY INDUSTRIES, L	2/25/2008
Mr. Rob Owen	PAR SYSTEMS, INC.	5/13/2008
Mr. James W. Phillips	N/A	1/14/2008
Mr. Jeremy Rasmussen	INDUSTRIAL AUDIT CORP	6/6/2008
Mr. Carl W. Rau	BECHTEL	6/6/2008
Ms. Maria D. Rodriguez	ZION SOLUTIONS	6/9/2008
Miss Dannelle P. Sierra	SANDIA NATIONAL LABORATORIES	2/8/2008
Mr. Jeff A. Thompson	ENVIRONMENTAL MANAGMENT SVCS	5/19/2008
Mr. Keith A. Vincent	TENNESSEE VALLEY AUTHORITY	3/17/2008
Ms. Valerie Winschel	NORFOLK NAVAL SHIPYARD	5/22/2008