

## International Deep Repository Progress

For nations that do not have a solidified nuclear waste management strategy or have repository plans in place, they need look no further than Europe for guidance. According to Irena Mele of the International Atomic Energy Agency (IAEA), “Europe is really making good progress in this area.” On Wednesday, an expert panel representing waste management agencies within the Netherlands, Belgium, Spain and Slovenia highlighted their milestones and successes in their continuous quest to develop collaborative strategies with realistic goals, timelines, deliverables and even budgets.

In The Netherlands, although its citizens do not yet have a repository, they have interim storage solutions, and a framework that will allow for a “dual-track” program for repository planning. Hans Codee, a chemist with CONRANV, the Dutch waste management agency, explained that the two tracks consist of a national agency aligning with a regional organization to investigate and develop novel solutions. “You have to think beyond nations,” he advised, because borders can always change. “You have to set up a credible, robust

program that shouldn’t change [according to politics]. Waste management is a long-term management scheme and you have to be reliable and 100% transparent.” Funds should be allocated now, he added, so that future generations will already have everything in place when the interim solutions are no longer viable.

He and his team are looking at myriad options for deep repository in clay and salt reservoirs, beneath the land of the Netherlands, as well as beneath the North Sea. “In principle, this is normal mining,” he described, “It is funny that you restrict yourself to ‘on land’ situations. Why would you do that when there’s more water than land?”

Mele stressed that outside of Europe, very few countries have operating repositories. In fact, in Africa, only South Africa has a repository program in place. One of her major concerns is related to “newcomer countries” (nations that are just beginning to establish a nuclear energy program), where disposal of waste is a big challenge. “Their main focus has been on power needs and NPP construction,” she said.

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## IAEA Advises On Pre-Disposal Aspects

Wednesday’s panel on the International Atomic Energy Agency (IAEA) focused on several important and evolving strategies regarding unique or problematic waste forms. The IAEA supports pre-disposal aspects.

Christine Langdon, SRS, discussed one of the IAEA Coordinated Research Programs (CPR) addressing cementitious materials being utilized for waste forms. The CPR is being finalized in a draft report after 4 years of participation that will discuss findings on conventional as well as novel cementitious materials. Topics that are discussed in the draft report include waste conditioning, testing, advanced characterization techniques and performance modeling.

Dr. Anthony Wickham, UK Technology Consultancy discussed the need for a new CPR on treatment of irradiated graphite. This CPR was formed about a year ago due to the wide range of options, regulations and methods in place which deal with graphite reactor dismantlement and disposal

world-wide. The UK has about 80,000 tons of irradiated moderator or reflector graphite materials from 47 reactors, principally from the Magnox or Advanced Gas-cooled Reactors AGRs. It is the AGRs that have the pressing issues, because the graphite in their cores were in contact with coolant, which could transport materials into the core.

Several graphite core reactors have successfully been dismantled though the techniques used in the dismantlement were very different. The techniques ranged from dismantling under water, under air, or by employing viscous sprays followed by mechanical recovery. Disposal is also problematic and several options exist, ranging from shallow land burial to deep geologic disposal. During disposal the radionuclides of interest are <sup>36</sup>Cl and <sup>14</sup>C (if mobile), due to their very long half-lives. Russia has recently conducted research that shows that the global dose from <sup>14</sup>C from irradiated graphite is actually lower than the global dose received from naturally occurring <sup>14</sup>C produced in the atmosphere.

## Hazardous Work at Washington Closure Hanford 618-10 Burial Ground



*The 618-10 Burial Ground on the Washington Closure Hanford project, contains some of Hanford's most hazardous waste.*

Washington Closure Hanford is making progress cleaning up the 618-10 Burial Ground, one of the most complex and hazardous burial grounds at the Hanford Site in southeastern Washington state.

Washington Closure manages the \$2.3 billion River Corridor Closure Project for the U.S. Department of Energy (DOE). The River Corridor is a 220-square-mile area located along the Columbia River. It is DOE's largest environmental cleanup closure project.

"The burial ground is one of the most complex projects we have tackled to date," said Rob Cantwell, director of Field Remediation for Washington Closure

From March 1954 through September 1963, the 618-10 Burial Ground received low- and high-activity radioactive waste from Hanford laboratories and reactor fuel development facilities. Low-activity wastes were primarily disposed in the burial ground's 12 trenches, while moderate- and high-activity wastes were disposed in 94 vertical pipe units (VPUs). The VPUs were constructed by welding five bottomless drums together and buried vertically about 10 feet apart.

From information obtained through research of historical records, Washington Closure estimates the burial ground contains at least 2,000 drums containing everything from mildly contaminated clothing and debris to highly radioactive laboratory equipment and liquids.

In 2011, Washington Closure began excavating the waste trenches. So far, it has unearthed about 130 drums. Some contain radioactively contaminated shavings and oil, and miscellaneous debris. Others are concrete-lined, which typically were used to dispose of radioactive liquids.

The solid waste will be disposed at the Hanford Environmental Restoration Disposal Facility (ERDF), while the drums containing oil and depleted uranium chips will be shipped to an offsite treatment facility. The oil, which may contain heavy metals and PCBs, will be drained and incinerated. The shavings will be stabilized and returned for disposal at ERDF.

## Sellafield Plan

In August 2011, Sellafield site owners, the Nuclear Decommissioning Authority (NDA), site operators, Sellafield Ltd, and Sellafield Ltd's parent body organisation, Nuclear Management Partners (NMP), published a ground-breaking plan that sets out the long term future of the Sellafield site.

The Sellafield Performance Plan represents the start of a new era for the Sellafield site in the UK.

Compiled over the first two years of NMP's contract, it is the first credible and underpinned lifetime plan for the Sellafield site and details the forward programme of operations, construction projects and decommissioning.

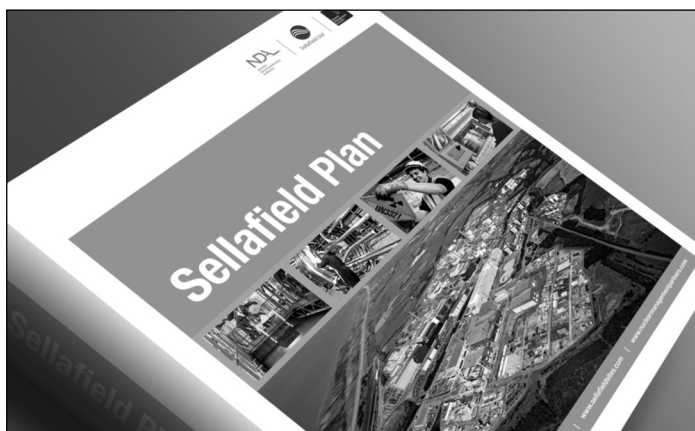
The plan is a major milestone for the Sellafield site and the nuclear industry in general. NMP applied the combined experience of URS, AMEC and AREVA to producing the plan. They spent the first two years of their contract learning the site and identifying issues so that they could give the NDA a true picture of its operations and plant closure dates.

By working much more efficiently and effectively than has historically been the norm at Sellafield the team will achieve true value for money to their customer, to the UK government and to the UK taxpayer.

The document represents the first fully underpinned plan for Sellafield, both technically and in terms of capability and it is against this plan that the NDA will judge the performance of NMP.

The Performance Plan also provides crucial information to the economic development of West Cumbria. Acceleration of the decommissioning programme at Sellafield means higher levels of employment than would otherwise have been the case.

Acceleration of the decommissioning plan also provides opportunities for the local supply chain and increased prospects of inward investment for West Cumbria.



## Britain's Energy Coast

It would be hard to imagine what West Cumbria, a remote area in the North West of England, would look like without the huge Sellafield nuclear complex.

The site is owned by the Nuclear Decommissioning Authority (NDA) and managed by Nuclear Management Partners (NMP), an international private partnership consisting of URS from the United States of America, AMEC from the UK and AREVA from France.

Today some 10,000 people work at Sellafield with many more employed through the site's supply chain, a large percentage of which is located directly in West Cumbria.

The Government, through the NDA, has committed around £1.5 billion a year for the next three years as NMP bring their vast global expertise and experience to deliver substantial improvements to the clean-up mission there.

Of this total budget, more than £800 million a year is spent in that supply chain and around 30 percent of that goes directly to firms in West Cumbria.

But the dependency on the nuclear industry is immense and, with the site now entering an extensive decommissioning programme, the threats to jobs, and therefore the local economy, is severe. While Sellafield provides wealth, there are areas of deep deprivation and unemployment.

Consequently, Sellafield Ltd, NMP and NDA have partnered with the local community leaders and politicians to form Britain's Energy Coast, a strategic regeneration body driving economic improvements and projects to deliver a vibrant economy for West Cumbria, long into the future.

While the threats to the West Cumbria economy are real, the opportunities are potentially transformational. The UK is on the brink of a nuclear renaissance and, if successful through the Energy Coast programme, West Cumbria will become the hub, not only of the nuclear industry, but also of green energy production in the UK, with obvious benefits to the local economy.

But to achieve this, Sellafield and its new owners need to change the opportunistic ways of the past to provide a new strategic mode of socio-economic contribution to deliver a sustainable future for the local community.

The results so far have been impressive, with over £56m being committed to socio-economic projects, but the long term aim is to achieve £116m investment through public/ private partnership. Sellafield is fundamental to this goal.

## Washington Closure Hanford Treats Chromium-Contaminated Soil

Washington Closure Hanford continues to make tremendous progress cleaning up the River Corridor, a 220-square-mile stretch of land along the Columbia River on the 586-square-mile Hanford Site in southeastern Washington state.

Washington Closure manages the \$2.3 billion River Corridor Closure Project for the U.S. Department of Energy (DOE). The River Corridor is equivalent in area to the city of Chicago and is DOE's largest environmental cleanup closure project.

As part of the project, Washington Closure manages the Environmental Restoration Disposal Facility. ERDF is Hanford's landfill for low-level, radioactive and hazardous waste.

In 2011, ERDF began receiving shipments of chromium-contaminated soil from Hanford's B/C and D reactor areas. By the time treatment is completed in August 2012, ERDF will have treated more than 153,000 tons of chromium-contaminated soil.

The original formula to treat the waste was a mixture of 15 percent ferrous sulfate by weight and Portland cement. However, Waste Operations engineers were confident the formula was conservative and thought the amount of ferrous sulfate could be reduced. So they conducted new bench-scale tests to prove their theory.

"We're treating about 36 containers of chromium-contaminated soil waste per day," said Jeff Armatrout, Director for Waste Operations for Washington Closure. "The new formula saves us about \$1,000 per container."

The River Corridor was home to Hanford's nuclear reactors and fuel development facilities. The reactors were used to produce plutonium for atomic weapons for America's defense program during World War II and the Cold War.



*Backhoe removed contaminated soil at Hanford*

# Double Duty: Hanford Waste Removed from Two Tanks at Once

For the first time in two decades, the Hanford Tank Operations contractor, Washington River Protection Solutions (WRPS), is retrieving waste simultaneously from two underground waste storage tanks. In December, crews began retrieving waste from

C-112, a single-shell tank containing 104,000 gallons of radioactive and chemical sludge. Workers are also soaking the 10,000 gallons of concrete-like solids remaining in tank C-108 so they can be broken down into a liquid and pumped out.

“This is the first time we’ve delved into multiple tanks at the same time in quite a while,” says WRPS Single-Shell Tank Retrieval & Closure Manager Kent Smith. “This is going to become the new norm as we accelerate our pace to meet the consent decree commitment of having all 16 of the tanks in the area known as C Farm emptied by the end of 2014.”

WRPS is using a new technology known as enhanced-reach sluicing to remove waste from tank C-112. A high-pressure stream of liquid is being sprayed at about 100 gallons per minute through a telescoping arm onto a hard waste layer several inches thick covering the mud-like waste beneath.

Tank C-108 is undergoing a three-phase chemical dissolution process to break down the solid waste so it can be pumped from the tank. Roughly 7,000 gallons of waste remains in the tank.

Hanford’s 177 underground waste tanks contain 56 million gallons of radioactive and chemical waste leftover from the manufacturing of plutonium for nuclear weapons.



*Hanford workers install a modified sluicer into Tank C-112, one of two tanks currently undergoing waste retrieval. The Enhanced Reach Sluicing System shown here fires a high-pressure stream of liquid via a telescoping arm that extends further down into the tank than more traditional sluicing methods.*

## MOX Project Converts Plutonium Into Fuel

How do you permanently remove excess nuclear weapon-grade plutonium from the U.S. nuclear stockpile?

The solution the U.S. National Nuclear Security Administration (NNSA) is implementing is the Mixed Oxide (MOX) Fuel Fabrication Facility. Now under construction at the Savannah River Site in Aiken, S.C. by Shaw AREVA MOX Services, LLC, the MOX project is a key component in NNSA’s non-proliferation program.

Slated for completion in 2016, the MOX facility will convert at least 34 metric tons of U.S. plutonium into MOX fuel for use in commercial nuclear power reactors.

During aqueous polishing, the first of a two-step process, plutonium powder is converted into a liquid form, purified to remove byproducts and converted back to a powdered oxide form.

The second process, fuel fabrication, is a three-level mechanical assembly process where production of the fuel takes place. The plutonium and uranium oxide powders are mixed together, formed into pellets, manufactured into rods and then packaged to produce MOX fuel assemblies for nuclear power plants.

Each MOX fuel assembly can provide enough electricity to power nearly 9,000 homes for an entire year.



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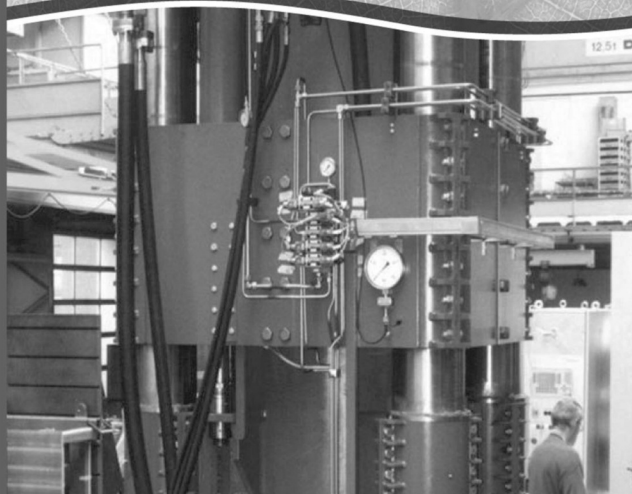
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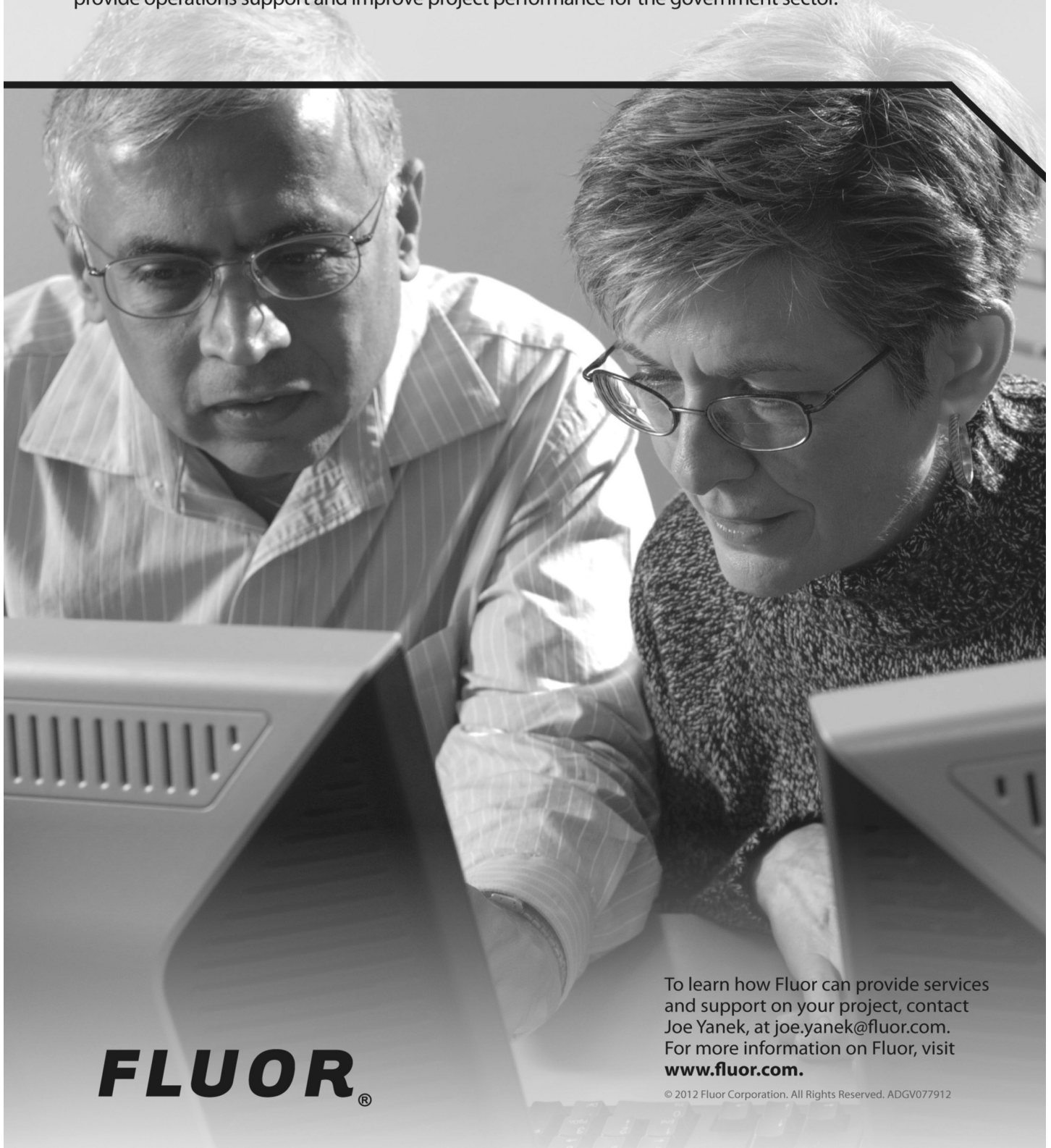
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## South Carolina Firm Awarded \$1.1 million Recovery Act Contract by Savannah River Site

A \$1.1 million dollar contract for up to 460,800 gallons of low sulfur diesel fuel has been awarded by Savannah River Nuclear Solutions, the SRS management and operations contractor, to a Leesville, S.C. firm. The fuel will be used in support of American Recovery and Reinvestment Act projects at the U.S. Department of Energy (DOE) facility.

"I'm pleased that the bid by Havird Oil Company of Leesville offered the best value in support of the Recovery Act here at SRS," said Vince Adams, DOE-Savannah River Recovery Act Portfolio manager. "The contract adds another South Carolina company to the list of small businesses benefiting from the economic stimulus packaging through our SRS activities."

"Thus far, the Recovery Act has retained or created more than 2,800 jobs with approximately 70 percent of the workers coming from South Carolina and Georgia," said Adams. "Through December, more than \$260 million in Recovery Act contracts have been awarded to companies with over \$110 million in contracts awarded to businesses in the Central Savannah River Area (CSRA.) More than \$195 million in small business contracts have been awarded which exceeds the original goal of procurement officials to help stimulate small businesses."

The contract is for the supply and delivery of the fuel in anticipation of hauling more than 250,000 cubic yards of concrete to decommission two old nuclear reactors. The contract will cover fuel purchases and deliveries during a one-year period.

For more information about the SRS Recovery Act Project, please visit [www.srs.gov/recovery](http://www.srs.gov/recovery) and for contracts awarded visit [www.srs.gov/recovery/procurement-contracts](http://www.srs.gov/recovery/procurement-contracts)

The Savannah River Site is owned by the U.S. Department of Energy. The management and operating contractor is Savannah River Nuclear Solutions, LLC.

## Plan to Attend the EFCOG Roundtable

The roundtable, set to begin at 8:30 AM Thursday in Room 105C is an official meeting of the Energy Facilities Contractor Operating Group (EFCOG).

The purpose of EFCOG is to seek out and promote the best management and operating practices, cost effective technologies, and disposal options for all waste streams generated at US DOE facilities whether destined for DOE or commercial facilities.

The WM Task Group will be focused on complex-wide integration and technology transfer while supporting cost effective and efficient waste options. This will be achieved in a way that enhances complex-wide communications and maintains a priority on safety, environmental stewardship and security.

During the session EFCOG will conduct its normal business, including a DOE-HQ update, transportation issues, plans for a high-level waste WIR workshop, DOE Order 435.1 update status, and waste classification issues. In addition, each site representative will provide a radioactive waste management accomplishments and lessons learned briefing.

### ***Insight Newsletter***

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# Looking Toward the Future – Students and Young Professionals Panels

At this year's Waste Management Symposia (WM 2012), students, young professionals, government and industry had the opportunities to share their views and exchange ideas and concerns about employment opportunities for students and young professionals. This forum provided a great opportunity for our young colleagues to understand the future waste management employment landscape and challenges of this industry.

At Session #44, Graduating Students and New Engineers – Wants and Needs – Are Companies Even Listening, presenters explored the question of future opportunities from the perspective of universities, federal government, and students.

Desi Crouther of DOE-EM's Human Capital Office explained that the challenges facing his organization include an aging workforce, continued growth in mission work, and the various new internships and career opportunities for students and young engineers. DOE-EM is addressing this challenge through the Office of Personnel Management Pathways Program that was initiated to recruit and retain EM employees.



*Young Professionals, included presentations by representatives from the UK and American Young Generation Nuclear (YGN) organizations.*

Mr. Crouther described federal programs such as the Interns Program, Recent Graduate Program, and the Presidential Management Fellows Program that will be available to students in a near future. Ms. Susan Salter of the Nuclear Regulatory Commission's Outreach and Recruitment Office explained the various NRC's programs available for young professionals and NRC's employee advancement and training programs. Ms. Salter also reported that the average age of NRC employees is 49 year old which is a little lower than average age at DOE, reported by Mr. Crouther to be 51 years old.

*In our efforts to be more sustainable, the WM2012 attendee list will be available online through out the conference and will remain posted until March 31st. Attendees can log into the database which is located under the "Login" tab and will be able to access the attendee list. The attendee list will be in PDF format and organized as a directory in alpha order by last name.*

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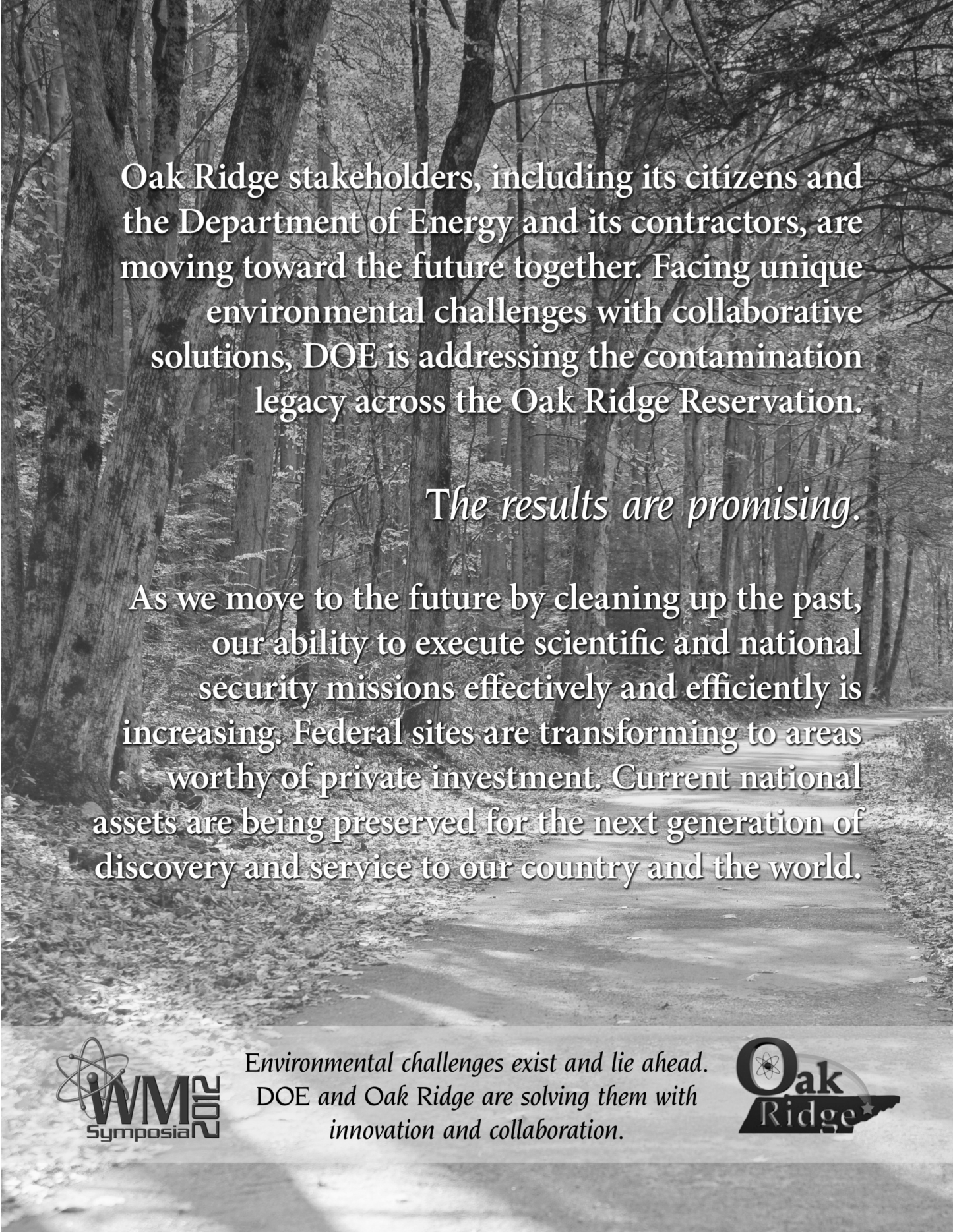
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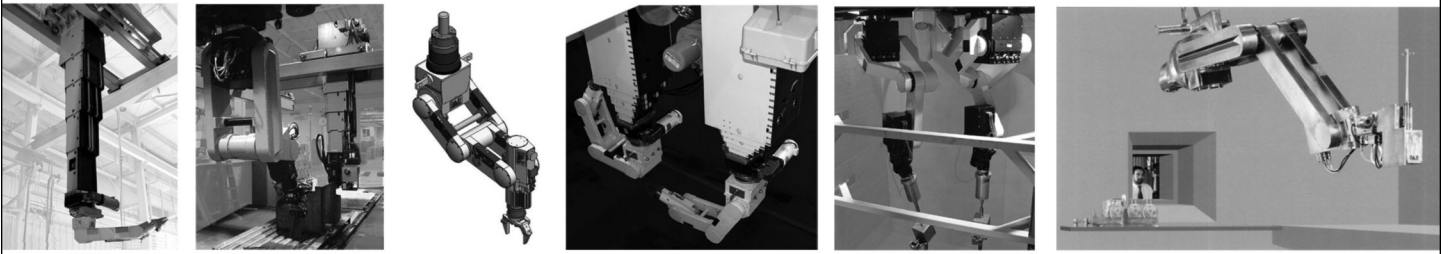
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