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Government Accountability Office: Modernizing the Nuclear Security Enterprise: NNSA's Budget Estimates Increased but May Not Align with All Anticipated Costs.

U.S. GAO

March 4, 2016

U.S. GAO recently released a report regarding NNSA and its efforts to modernize the nuclear security enterprise. Please find a copy of the full report here.

Highlights: http://www.gao.gov/assets/680/675623.pdf

Office of Inspector General: Security Clearance Vetting at the Portsmouth Site

DOE-IG

March 3, 2016

The Office of Inspector General has issued a report titled “Security Clearance Vetting at the Portsmouth Site," (OAI-L-16-07). A full copy of the report can be found here.

Paducah DOE Site Modernizes Equipment to Treat Off-Site Groundwater Contamination
DOE-EM
March 4, 2016

PADUCAH, Ky. – The Department of Energy recently completed upgrades to modernize a key facility that reduces off-site groundwater contamination at the former Paducah Gaseous Diffusion Plant site.

Equipment at the C-612 Northwest Pump-and-Treat Facility that had reached the end of its service life or no longer had available replacement parts was replaced with newer equipment to allow the facility’s continued operations.

“By modernizing the C-612 pump-and-treat operations, our goal is to reduce our maintenance cost and increase worker efficiency for this cleanup effort,” said Paducah Site Lead Jennifer Woodard with the Portsmouth/Paducah Project Office.

In August 1995, operations began at the facility to reduce off-site groundwater contamination by pumping groundwater to treatment equipment in a process called air stripping. Air stripping traps the resulting contaminants, mostly trichloroethene (TCE), and separates them from water pumped into the facility. TCE was used to clean equipment used in the uranium enrichment process when the gaseous diffusion plant operated. The use of TCE was discontinued in the early 1990s.

More than 2 billion gallons of water have been treated since operations began at the northwest groundwater contamination plume. An additional 1.5 billion gallons of water have been treated from another part of the plume at a separate pump-and-treat facility at the northeast side of the plume. Overall,

these operations have removed almost 4,200 gallons of TCE. Pump-and-treat operations, optimized in 2010 with the installation of additional withdrawal wells, and other efforts to remove contamination sources have reduced the plumes offsite by more than 20 percent.

Workers begin removing nuclear waste from Hanford tank
AP: Oregon Live
March 4, 2016
LINK

KENNEWICK, Wash. (AP) — Workers have started removing nuclear waste from a leaking tank at the Hanford Site just one day before a state of Washington deadline.

The Tri-City Herald reports that Hanford workers began pumping waste from the nuclear reservation's oldest double-shell tank Thursday afternoon.

The tank is leaking radioactive waste into the space between its inner and outer shells.

The tank contains about 150,000 gallons of radioactive sludge covered by about 650,000 gallons of liquid waste. The liquid could be removed by early next week if things go smoothly, but removing the sludge is more complicated.

The Washington Department of Ecology had ordered the U.S. Department of Energy and its contractor Washington River Protection Solutions to begin emptying the waste by March 4 and finish the work within a year.

Officials discuss funding forecast for Savannah River Site
Augusta Chronicle
March 3, 2016
LINK

LANGLEY — Despite plans to shutter the mixed-oxide fuel plant at Savannah River Site, President Obama's fiscal year 2017 budget should signal to area residents that the nuclear facility's importance hasn't gone unnoticed, site manager Jack Craig said.

In a forum held by the Savannah River Site Community Reuse Organization at Aiken Technical College on Thursday, he pointed to the budget breakdown for the Department of Energy's environmental management sites, particularly the line item that showed Obama's proposal requested more than $111 million in additional funding for SRS in 2017.

"I think it's telling that headquarters has recognized the actual positive progress being made at the site," Craig said. "The fact that we have operating nuclear facilities that are actually treating waste is something unique in the EM program, whereas other sites are facing challenges with just having their facilities constructed."

In all, Obama's proposal calls for $2.1 billion in funding for SRS, $1.44 billion of which would go toward environmental management efforts including the stabilization of nuclear material and site cleanup measures. According to the SRS Community Reuse Organization, an additional $618 million is earmarked for the National Nuclear Security Administration's nonproliferation programs at the site, which boasts a workforce of more than 11,400.

Though Obama's budget has been in the public eye for close to a month, Thursday's meeting was held to give residents a snapshot of how the requests would affect the site moving forward.

"The SRS budget is important to every citizen of this region," said David Jameson, the Aiken Chamber of Commerce's president. "We count heavily on SRS to sustain and spur economic growth through this region."
Officials used the opportunity to celebrate milestones achieved last year and to discuss efforts underway at SRS.

There was talk of progress on the nuclear material and spent nuclear fuel front. Last year the site processed Canadian liquid highly enriched uranium, which is expected to continue in fiscal year 2016. The site also disposed of more than 5,000 cubic meters of low-level solid waste and produced 93 canisters of vitrified high-level waste through the Defense Waste Processing Facility.

Another structure designed to handle liquid waste – the Salt Waste Processing Facility – is expected to be complete by next month, project director Pam Marks said.

Though MOX was mentioned, Craig said officials were unable to comment in detail on it because of pending litigation, alluding to a lawsuit filed by South Carolina Attorney General Alan Wilson last month.

In the lawsuit, Wilson asked that the Energy Department immediately remove one metric ton of weapons-grade plutonium from SRS and pay $1 million for each day the terms of its agreement with the state is not met. The material was supposed to be removed by Jan. 1 if MOX wasn't operational.

New Savannah River National Laboratory program will harvest material from aging nuclear assemblies
Augusta Chronicle
March 2, 2016
LINK

A new National Nuclear Security Administration program at Savannah River National Laboratory aims to recover material from nuclear assemblies at the South Carolina site for future use.
Assemblies that have been at Savannah River Site for more than three decades contain material that can be harvested.

Assemblies that have been at Savannah River Site for more than three decades contain material that can be harvested.

Savannah River National Laboratory could benefit from Grid Modernization Initiative

Director: National lab at Savannah River Site driven by innovation
USC Aiken, Savannah River National Laboratory sign scholars agreement

Savannah River Site lab achieves international accreditation
According to a Department of Energy news release issued last week, the assemblies have been stored at Savannah River Site for more than three decades and contain roughly 80 percent of the world's heavy curium and plutonium-244 inventories, the latter considered an "economically irreplaceable" material.

Plutonium-244, according to the Energy Department, is used as a reference material for analysis of other materials while curium is used to produce californium.

Over the next seven years, nuclear assemblies will be shipped to Savannah River National Laboratory to be dissolved and captured on an "ion exchange resin column" and sent to Oak Ridge National Laboratory for further purification.

The 65 assemblies at SRS are believed to be the only economic way to harvest plutonium-244 and heavy curium as the closing of weapons production reactors ended the country's ability to produce new material.

How robots are becoming critical players in nuclear disaster cleanup
Science Mag
March 3, 2016
LINK

Watch Honda's Asimo humanoid robot up close, and you may fall under its spell. As it walks gracefully across a stage, sometimes opening bottles or serving tea, the elegant mechatronic man seems at home anywhere. So after a 9.0-magnitude earthquake and tsunami waves struck Japan's Fukushima Daiichi plant on 11 March 2011, it was no wonder that one of Asimo's fans tweeted, "Can't Asimo be dispatched to survey the interior of Unit 4, where radiation is too high for human workers?"

If only. In the early days of the crisis, engineers were desperate to learn about the damaged reactors' cores and the radiation levels inside the buildings, data that robots should have been able to provide. Alas, neither Asimo—designed to navigate sedate offices—nor any other of Japan's vaunted robots was up to the challenge of navigating Fukushima's complex, debris-strewn interiors. The plant's operator, Tokyo Electric Power Company (TEPCO), had to turn to U.S. military-grade robots, such as iRobot's 510 PackBot, to get its first glimpses inside the facility. Only in June 2011, 2 months later, did a modified Japanese rescue robot called Quince enter one of the ruined complex buildings.

"When Fukushima occurred, I was astounded that Japan had no robots to help out in any significant way," says Frederik Schodt near San Francisco, California, author of Inside the Robot Kingdom: Japan, Mechatronics, and the Coming Robotopia. "It practically brought me to tears."

Five years after the accident, however, robots are finally ready to enter the ruined reactors en masse. They are now expected to play an essential part in the daunting task of decontaminating and dismantling the reactors. Roboticists are making halting progress in developing machines for specific tasks, such as decontaminating and removing melted nuclear fuel masses, but they know that their creations need to be adaptable. "We must prepare for unforeseen situations beyond the scope of expectation and imagination," says Satoshi Tadokoro, a roboticist at Tohoku University in Sendai, Japan, who led development of Quince.

The struggles of Japanese roboticists came despite a national program in the 1980s to develop robotics for nuclear power plants.

One of the first was AMOOTY, which Toshiba and University of Tokyo researchers built in 1985. The radiation-hardened crawler could climb stairs and manipulate objects in mock power plants. But in 1999, when an accident at a uranium reprocessing facility in Tokaimura killed two workers and contaminated the plant, AMOOTY was still considered too experimental to use.
We must prepare for unforeseen situations beyond the scope of expectation and imagination.

Satoshi Tadokoro

In the years after Tokaimura, Japan developed other nuclear disaster robots and imported Menhir, a large mobile unit built by France's Cybernetix that's equipped with radiation shielding, cameras, and a manipulator. But well before the Fukushima disaster, TEPCO and other industry testers judged them to be too big, slow, and ineffective. Government funding ran out, and Menhir is now on display at Tohoku University. The other machines were mothballed or cannibalized for parts, according to The Asia-Pacific Journal: Japan Focus; misplaced faith in the safety of nuclear plants and lack of long-term funding scuppered the program.

After the catastrophe of 11 March 2011, the first task for robots was to survey damage, radiation, and variables such as temperature and humidity in areas that were too hazardous for workers. The PackBot droids explored the ground floors of the Unit 1 and Unit 3 reactor buildings, and found maximum radiation levels of tens of millisieverts (mSv) per hour. Workers exposed to such levels for less than a workday would exceed their emergency safety limit for an entire year, 250 mSv. The radiation and temperature maps made by the PackBots and two iRobot 710 Kobra bots allowed TEPCO workers to plot paths for quick forays into the reactor buildings with the least radiation exposures, says iRobot Vice President Tim Trainer in Bedford, Massachusetts.

But the complex structure of the reactor buildings' ground and upper floors, with many staircases and thick concrete walls, challenged robot mobility and wireless communications. The iRobot bots couldn't climb slippery stairs or turn corners easily. Once it was clear that more capable machines were needed, TEPCO and the government contacted roboticists at Chiba Institute of Technology and Tohoku University. They hastily modified Quince, a survey droid on caterpillar treads that climbs stairs and debris, by equipping it with two cameras, a dosimeter, and a power and communications cable that stretched hundreds of meters. Quince explored the upper floors of the Unit 2 reactor building. More sophisticated versions, dubbed Rosemary and Sakura, were also sent into the reactor buildings. Sakura acts as a communications relay, and Rosemary is equipped with a U.K.-developed system that combines radiation meters, a fisheye camera, and a laser rangefinder to produce 3D radiation maps.

By now, nearly a dozen robots have been developed to get closer looks at the heart of the plant. Some float or swim through pools that have formed in the building's bowels because of the constant need to inject water to cool the damaged cores. Two snakelike robots crawled through a pipe leading into the 48-meter-tall primary containment vessel in the Unit 1 reactor to ascertain the state of melted fuel masses. Although one got stuck, the machines returned valuable video and dose information, according to TEPCO. In the dark and vaporous interior, the robots measured radiation in one area as high as 25 sieverts per hour—enough to kill a person in minutes.

Makers are now developing robots that can tackle specific decommissioning chores. For example, Toshiba has developed machines that decontaminate surfaces with blasts of dry ice, inspect vent pipes for leaks, and cut and remove debris covering fuel rod assemblies in the Unit 3 building, which was damaged by a hydrogen explosion. Honda developed a robot based on Asimo's joint-stabilization technology that can extend 7 meters vertically to inspect upper nooks. "Every robot needed differs according to its purpose and the damage," says Tomohisa Ito, a spokesperson for the International

Research Institute for Nuclear Decommissioning in Tokyo, a consortium of nuclear plant companies that aims to develop new technologies for cleaning up the Fukushima plant.

Robots' slow start at Fukushima holds a broader lesson, says Gill Pratt in Boston, an engineer who led the Defense Advanced Research Projects Agency Robotics Challenge from 2012 to 2015 before joining Toyota to head its new artificial intelligence lab. Roboticists, he says, need to develop emergency robotic equipment that can be deployed immediately without the need for additional training or adaptation. "The great lesson of Fukushima," Pratt says, "is that disasters are often fast moving and difficult to predict events, where the window of time for effective intervention is small." In the immediate aftermath of a future nuclear accident, robots, and their masters, will have to be far nimbler. But at least at Fukushima, they are evolving.

House Passes Texas-led Bipartisan Nuclear Energy Bill
Texas Insider
March 1, 2016
LINK

Texas Insider Report: WASHINGTON, D.C. – The House of Representatives today unanimously approved the *Nuclear Energy Innovation Capabilities Act* (H.R. 4084), a bipartisan Texas-led bill to support federal research and development (R&D) and stimulate private investment in advanced nuclear reactor technologies in the United States. The bill was introduced by Energy Subcommittee Chairman Randy Weber (R-Texas) along with Full Committee Ranking Member Eddie Bernice Johnson (D-Texas) and Chairman Lamar Smith (R-Texas).

Chairman Smith: "Advanced nuclear energy technology is the best opportunity to make reliable, emission-free electricity available throughout the modern and developing world. Nuclear power has been a proven source of safe and emission-free electricity for over half a century. Now, America's strategic investments in advanced nuclear

reactor technology can play a more meaningful role to reduce global emissions. Unfortunately, the ability to move innovative technology to the market has been stalled by government red tape."
Subcommittee Chairman Weber: "America must maintain our nuclear capabilities, and continue to develop cutting edge technology here at home. Without the direction provided in this bill, we'll lose the ability to develop innovative nuclear technology and be left importing reactor designs from overseas. Today, we have the best nuclear engineers and manufacturing capacity in the world at home. We can't put that expertise at risk. Even more importantly, this bill will maintain America's capability to influence security and proliferation standards around the world as more developing nations look to nuclear energy to grow their economies. As a member of the Foreign Affairs Committee, I am constantly reminded of the need for American leadership in a dangerous world."

H.R. 4084 enables the private sector to partner with national labs for the purpose of developing novel reactor concepts, leverages DOE's supercomputing infrastructure to accelerate nuclear energy R&D, and provides statutory direction for a DOE reactor-based fast neutron source that will operate as an open-access user facility. In addition, this bill requires DOE to put forth a transparent, strategic, ten year plan for prioritizing nuclear R&D programs.

The Nuclear Energy Innovation Capabilities Act has received letters of support from several Universities and organizations, including: the American Nuclear Society, American Security Project, U.S. Nuclear Infrastructure Council, Bipartisan Policy Center, American Council for Capital Formation, Clear Path Action Fund, University of Texas System, Texas A&M, University of Michigan, University of Wisconsin, MIT, General Atomics, TerraPower, GE-Hitachi Nuclear Energy, UPower, TriAlpha, Transatomic Power, Advanced Reactor Concepts, and Dr. Burton Richter, who won the Nobel Prize in Physics in 1976.

Additional statements endorsing the bill can be found HERE.
For additional information on the legislation, please visit the Committee website.