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State fines DOE thousands over missed cleanup deadline

Idaho Statesman

January 8, 2015

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IDAHO FALLS - State environmental regulators are cracking down on the U.S. Department of Energy over continued delays in the treatment of 900,000 gallons of liquid radioactive waste located at the department's desert site.

Idaho Department of Environmental Quality officials said Wednesday that the agency will fine DOE \$3,600 per day for missing a state-mandated Dec. 31 cleanup deadline. If the liquid

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waste still isn't treated or removed from three 50-year-old stainless steel tanks by July 1, the amount will increase to \$6,000 per day.

"Although DOE has had many years to complete this milestone, DOE has failed to initiate and complete treatment of the liquid wastes in the tanks or construct new tanks," said a Tuesday letter from DEQ to Richard Provencher, manager of DOE's Idaho Operations Office.

"Completion of this work is a priority of the (DEQ), and further delays are of critical concern," said the letter, signed by DEQ's Hazardous Waste Compliance Manager Natalie Clough.

The Integrated Waste Treatment Unit was built more than five years ago in order to treat the liquid sodium-bearing waste stored in the tanks. The treatment process is supposed to turn the liquid waste into a more manageable powder, similar to laundry detergent.

But the first-of-its-kind treatment facility has encountered numerous problems and has yet to get beyond the testing phase.

So the liquid waste - leftovers from reprocessing of high-level radiation spent nuclear fuel - continues to sit in the aging tanks, which are located inside a concrete vault at the Idaho Nuclear Technology and Engineering Center.

As of Dec. 31, the tanks no longer were supposed to be used for waste storage, according to a 1992 consent order.

DOE must pay daily fines retroactive to Jan. 1, Clough said Wednesday, and will continue to pay every day until the tanks are emptied.

Clough said the aging tanks do not meet current regulatory standards, such as a secondary containment system in case of a leak. An empty fourth tank is available nearby in case something happens.

Still, Clough said there is no immediate concern about the tanks leaking into the soil, or potentially contaminating the Snake River Aquifer below, despite their old age.

It's not the first time DOE has missed state deadlines related to the Integrated Waste Treatment Unit and the tanks of radioactive waste. The department missed three deadlines in 2012, and another in September.

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Two out of the three 2012 deadlines eventually were extended to 2014. The third, a treatment deadline of the 1995 Settlement Agreement, never was renegotiated.

The DOE notified the DEQ on Dec. 22 that it would not meet the latest deadline. Clough said DOE officials requested another extension, "but did not propose a date by which they could complete treatment."

DOE spokeswoman Danielle Miller said the department is reviewing DEQ's notice of violation.

DOE challenges state fines for Los Alamos lab, WIPP over leak

Albuquerque Journal

January 9, 2015

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The U.S. Department of Energy on Friday challenged the state's decision to levy \$54 million in fines for permit violations at Los Alamos National Laboratory and the nuclear waste repository WIPP, calling the penalties "arbitrary" and "capricious."

In its legal responses to the New Mexico Environment Department's latest compliance orders, DOE claims the state "improperly imposed penalties for violations which did not occur" and claims the fines are "grossly disproportionate" to those levied against other entities.

Yet both DOE and NMED said in separate statements Friday that "settlement discussions" are underway.

Last month, the state Environment Department slapped DOE with the largest-ever civil penalties levied by the state against the federal government in connection with a radiological release at the Waste Isolation Pilot Plant: \$36.6 million against Los Alamos and \$17.7 million against WIPP.

This photo shows the aftermath of a leak from a Los Alamos radioactive waste drum at the Waste Isolation Pilot Plant in Carlsbad. (Courtesy DOE)

NMED cited numerous violations of the facilities' permits in connection with the radiological release at WIPP in February that contaminated nearly two dozen workers with low levels of

radiation. The offending waste drum -- plutonium and americium escaped after at least one ruptured -- had been improperly remediated and packaged at Los Alamos.

The state agency said in a statement that it "is always willing to consider settlement options in an effort to avoid excessive taxpayer expenses involved in litigation," but added that "our top priority is correcting the problems that ultimately caused the release at WIPP and ensuring the long-term success of New Mexico's federal facilities."

"However, we will not agree to back down on any of the problematic issues we identified in the compliance orders," NMED said.

DOE also issued a statement on Friday, saying, "We look forward to addressing the underlying causes that led to the compliance orders and to developing a positive path forward for the re-opening of WIPP and the resumption of transuranic waste operations at LANL."

While DOE formally denies many of the violations, NMED said its findings are backed by an accident investigation board convened by DOE to investigate the release at WIPP, as well as an underground truck fire that occurred the same month. The violations include safety and maintenance problems at WIPP and the mishandling of legacy defense nuclear waste at LANL.

DOE in its legal response formally requested a hearing.

Under a 1992 federal law allowing the U.S. government to open the nuclear waste repository in the state nearly 16 years ago, New Mexico secured authority to issue environmental permits and the ability to fine the federal government in the event of violations.

The DOE countered in its legal response that the penalties assessed by the state "unconstitutionally limits operations of the Department in violation of the Supremacy Clause of the United States Constitution." It also says the state has no jurisdiction for regulating the "radiological components" of waste disposed at WIPP.

"We did not overreach at all," Environment Secretary Ryan Flynn said in a telephone interview this week. "I'm very confident in how the legal process will move forward. We had a productive initial round of settlement discussions and we're going to continue them."

NMED said in a statement that while it "is not in a position to comment on the specifics of any settlement discussions, NMED feels its compliance orders represent an accurate and dispassionate application of its penalty policy and procedures and we are very confident that we will prevail in any legal challenge to the compliance orders."

Don Hancock, a longtime WIPP observer with the Southwest Research and Information Center in Albuquerque, said the state "clearly has authority."

"This is an absurd legal argument and it's an affront not just to the citizens of New Mexico but to citizens of the United States as a whole," Hancock said.

NMED has also indicated that the \$54 million in fines represent a first round of penalties and that its review of permit violations in connection with the WIPP radiation release is ongoing.

Los Alamos lab contractor loses \$57 million over nuclear waste accident

Los Angeles Times

January 11, 2015

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The contractor managing the nuclear weapons laboratory at Los Alamos, N.M., was slapped with a \$57-million reduction in its fees for 2014, largely due to a costly nuclear waste accident last year.

The contractor, Los Alamos National Security, saw its fee reduced 90% because of the accident, in which a 55-gallon drum packaged with plutonium waste from bomb production erupted after being placed in a 2,150-foot underground dump in the eastern New Mexico desert.

The Department of Energy determined that the contractor had a "first-degree performance failure" and cut its fee to \$6.25 million -- a pittance compared with the \$63.4 million that the contractor could have earned if it had met all of its 2014 contract incentives.

"The size of the cut was astounding," said Jay Coghlan, director of Nuclear Watch New Mexico, a group that scrutinizes operations at Los Alamos National Laboratory. "It is a step in the right direction."

Coghlan said the Energy Department also reduced the duration of the management contract by one year for the consortium, which was selected in 2007 to help restore order to the lab's operations after more than a decade of security lapses, management errors and accounting scandals.

The consortium includes San Francisco-based Bechtel Corp., the University of California, Charlotte, N.C.-based Babcox & Wilcox Co. and San Francisco-based URS Corp.

Charles F. McMillan, director of the Los Alamos lab, sent a memo to his 6,000 employees last week that stressed the positive, despite having received one of the worst fee reductions in the department's history.

"Although this was a very tough year for the laboratory, I am optimistic that next year will be better," he wrote. "I am determined to do all that I can to make it so."

Outside analysts and watchdog groups said the reduction in profits was surprisingly tough, especially given the history of the Energy Department allowing its contractors to escape accountability for errors and failures.

This was supposed to be one of the top research laboratories in the nation, but they lost classified documents, couldn't manage their plutonium inventories and failed to control costs on major projects," said Peter Stockton, a senior investigator for the Project on Government Oversight and a former advisor to the office of secretary of Energy. "The new management team was supposed to fix all of those problems, but it looks like it's the same old story out there."

The accident with the a 55-gallon drum occurred last February at a facility near Carlsbad, N.M., known as the Waste Isolation Pilot Plant, or WIPP. It is likely to cause a shutdown of at least 18 months and possibly several years.

Now, if the Federal Government would cut each federal department's budget to 10% for each lapse on service, we might finally be getting somewhere.

The exact causes of the chemical reaction are still under investigation, but Energy Department officials say a packaging error at Los Alamos caused a reaction inside the drum. The radioactive material went airborne, contaminating a ventilation

shaft that went to the surface.

The release gave low-level doses of radiation to 21 workers on Feb. 14. The cost of the accident, including likely delays in cleanup projects across the nation, will approach \$1 billion, according to a Times analysis.

New Mexico's Environment Department fined the lab \$36.6 million in early December, finding it had violated two dozen rules and regulations. Late last week, the U.S. Energy Department and the Los Alamos consortium asserted that the state lacks legal jurisdiction to issue the fine.

Don Hancock, director of the nuclear waste program at the environmental watchdog group Southwest Research and Information Center, said the refusal to pay the fines amounts to a serious political confrontation between New Mexico's Republican Gov. Susana Martinez and Energy Secretary Ernest J. Moniz.

Martinez hand-delivered notice of the fine to Moniz, Hancock said. "It tells you that the Energy Department and the contractor don't believe they have to comply with laws and permits," Hancock said.

While watchdog groups applauded the tough sanctions, some nuclear weapons scientists said it was an overreaction.

"It was a mistake by an individual -- a terrible mistake -- and Washington now wants to punish a lot of people," said James Conca, a scientific advisor and expert on nuclear waste management. "Denying Los Alamos National Lab 90% of their profit doesn't fix anything. They want to bleed them to death."

"The amount of radiation that was released was trivial," he said.

"As long as you don't lick the walls, you can't get any radiation down there. Why are we treating this like Fukushima?" he said, referring to the 2011 nuclear reactor disaster in Japan.

Officials concerned over WIPP ventilation

The Aiken Standard

January 7, 2015

[LINK](#)

Concerns have heightened over the ventilation system at the Waste Isolation Pilot Plant, or WIPP, in Carlsbad, New Mexico, as the

Savannah River Site and other sites in the DOE complex continue holding onto waste shipments intended for the plant.

A new federal report about safety conditions at the WIPP was recently released by the Energy Department's Office of Enterprise Assessments, an entity responsible for performance of assessments on behalf of the Secretary and Deputy Secretary.

The office wrote in a Dec. 29 report that WIPP recovery - after February's radiation exposure incident to 22 workers, causing officials to shut down the plant - will be more extensive after officials recognized that ventilation will be a significant challenge because of the significantly reduced airflow.

Officials commended workers for their attention to developing the WIPP Recovery Plan for Operating Diesel Equipment with Available Underground Airflows and to the long-term plan to upgrade the ventilation systems. Still, there are concerns with the plan and the work scope of the Nuclear Waste Partnership, or NWP, the contractor for the effort.

"The current version of this Recovery Plan is not sufficient to ensure safe conditions," officials wrote. "The most significant concern is that NWP does not have a sound engineering approach for determining the minimum ventilation rates that will ensure safe conditions for underground workers."

They added that the plan does not reflect current conditions and is missing some information necessary for managing safety.

"The identified deficiencies need to be addressed before WIPP begins to use diesel engines underground. Although operation of diesel equipment at WIPP under the current conditions will be challenging, it can be accomplished safely underground if appropriate safety controls and restrictions are developed using a sound engineering approach."

Reports surfaced in October that the WIPP might stay closed until 2016. The WIPP takes in shipments of transuranic waste, solid waste consisting of clothing, tools, rags, residues, debris and other items contaminated with plutonium - including shipments from the Savannah River Site. In 2001, SRS began shipping more than 15,000 cubic meters of the waste to the WIPP. Currently, waste shipments to the WIPP are on hold.

Nuclear Regulatory Commission schedules public meeting on MOX facility at Savannah River Site

The Augusta Chronicle

January 9, 2015

[LINK](#)

The Nuclear Regulatory Commission has scheduled a public meeting on the mixed-oxide fuel fabrication facility at Savannah River Site, according to a news release.

During the meeting on Jan. 15, NRC staff will review changes made to inspection procedures for the facility, which is under construction to convert weapons-grade plutonium into commercial nuclear fuel. It is intended to dispose of 34 metric tons of plutonium to fulfill a nonproliferation agreement with Russia.

Changes to the inspection program primarily concern safety regulations, said NRC spokesman Roger Hannah. Oversight of project cost and schedule does not fall within the NRC's inspection purview, he said.

Inspectors review construction of major structures, systems and components for consistency with the facility's construction application and regulatory requirements, Hannah said. The NRC revised the facility's inspection procedures in May.

"We do that frequently with all of our inspection procedures," he said. "Because there's no other facility like this in the country, there are inspection procedures we wouldn't have at any commercial facility."

The MOX facility, which is about 60 percent complete, has become increasingly expensive and behind schedule. About \$4 billion has been spent so far building the plant, and in 2013, the cost estimate to finish it was revised to \$7.7 billion.

The NRC issued the facility's construction authorization in March 2005. In November, the construction deadline was extended an additional 10 years to March 30, 2025.

The public meeting begins at 5 p.m. at the Hydrogen Research Center at the Savannah River Research Campus, 301 Gateway Drive, New Ellenton, S.C. Entrance to the meeting center does not require security screening.

Y-12, Pantex now in compliance with DOE order

Frank Munger's Atomic City Underground

January 12, 2015

[LINK](#)

The Y-12 and Pantex nuclear weapons plants are now in compliance with Department of Energy Order 350.1, contractor spokesman Jason Bohne confirmed today.

DOE Order 350.1 establishes parameters on how much can be spent on benefits for contractor employees and other human resource programs, and Consolidated Nuclear Security reportedly achieved compliance by cutting benefits at the two plants, effective at the first of the year.

Y-12 and Pantex had been out of kilter with the order for years, perhaps dating back to 2008, with benefits funded above the allotted amount. Enforcement of the order was reportedly put on the shelf for the past couple of years because of the extended contract competition that combined the management of the two plants.

CNS, a partnership headed by Bechtel National, took over management of the National Nuclear Security Administration facilities on July 1, 2014, and benefit reductions were a part of the changes enacted by the new contractor. Not all Y-12 and Pantex employees were affected by the changes. Benefits for hourly workers are covered by collective bargaining agreements that are subject to negotiation.

The rules require that a contractor spend no more than 5 percent above the average amount spent by a comparative group. In the case of Y-12 and Pantex, their benefits were compared with those at 27 other companies and institutions -- including Oak Ridge National Laboratory and the Tennessee Valley Authority.

In a pre-Christmas interview, CNS President Jim Haynes said the benefit reductions would bring Y-12/Pantex to 4 or 5 percent above the average. "We ended up with this new benefit package getting to 1.04 or 1.05 -- which is right at the top of the range," Haynes said. "So, we're still right at 5 percent above the comparative group, which is well above the average for industry in general in the United States."

Haynes said the key moving forward will be to stay in compliance. "The comparative group is going to constantly change, so you have to constantly monitor it," he said.

Depending on what happens, more benefit changes could be forthcoming, he said.

CNS had to make up for lost time, and that made it more difficult, Haynes said.

"I know it's difficult for all of us to swallow. It's my benefits as well as all the employees' benefits," the CNS executive said. "It's a tough pill for anyone to swallow because you get accustomed to a certain level of benefits . . . But it's part of the financial discipline that we have to meet, and employees are adjusting.

"We will adjust to things, we will be compliant and create a more sustainable future for this place by doing so," Haynes said. "And that's the key, to make sure 20, 30 years from now, people standing here . . . will say Y-12 has a bright future for the next 20, 30 more years because we practiced financial discipline, we've got our benefits in compliance, we got a new set of missions, all the stuff that you want to see."

Oral history website opens window to Manhattan Project

Union-Bulletin

January 5, 2015

[LINK](#)

During World War II, Phil Gardner traveled more than 100,000 miles to recruit workers for the secret project at Hanford, having not the slightest idea what was being built there.

He and other recruiters scattered across the nation would get Western Union telegrams at the start of the week from Pasco forecasting the new labor requirements at Hanford, a key site in the U.S. effort to produce an atomic bomb before Germany developed one.

On one fall week early in the war, that included 600 laborers, 200 carpenters, 35 auto mechanics, 25 experienced crane oilers, 67 typists, three physicians, 142 firemen and 101 surveyors.

"It sounds ridiculous," particularly given the wartime worker shortages, he said in a 1965 interview. But recruiters "had to do whatever you could do to get the job done."

He told his stories to Stephane Groueff, who interviewed dozens of

people who worked on the Manhattan Project for the first comprehensive history written for the general public. Now the Atomic Heritage Foundation has made Gardner's interview and dozens of others available for the public to hear.

Two years ago, the nonprofit foundation started a website with the Los Alamos Historical Society to post the oral histories of those who worked on the Manhattan Project or were affected by it.

Since then, it has acquired permission to post the interview tapes of three authors whose books are among the best known works on the frantic effort to develop an atomic bomb during World War II. The foundation is working to process the 180 interviews in the collection as creation of a new Manhattan Project National Historical Park at the end of 2014 brings increased interest to the topic.

More than a half-million people worked on the Manhattan Project at top-secret sites around the country, including Hanford, which would produce plutonium for the world's first nuclear explosion in the New Mexico desert and the bomb dropped on Nagasaki, Japan, helping end the war.

The interview tapes being made available to the public range from the memories of top officials who made the key decisions to create an atomic bomb to the recollections of the hard-working laborers who left homes and families to work in the then-barren and dusty Eastern Washington desert.

"I knew it was an impossible task to start with but my feeling was that while I very much disliked the assignment that as long as that was my assignment, we were going to make it go," said Gen. Leslie Groves, head of the Manhattan Project, in an interview with Groueff.

"Every outward appearance was this is going to succeed, it's got to succeed, and we're going to make it succeed," he said.

The Atomic Heritage Foundation worked with the Boston University Howard Gotlieb Archival Research Center and Groueff's son to make the little-known recordings collected for Groueff's book *The Manhattan Project* readily available to the public.

The collection being posted online also includes interviews conducted in 1985 by journalist S. L. Sanger. He took a sabbatical from the Seattle Times and traveled 11,000 miles to interview

former Hanford workers and their families for his book *Working on the Bomb: An Oral History of WWII Hanford*.

Richard Rhodes, the Pulitzer Prize winning author who spent the late 1980s recording in-depth interviews for his nuclear history works, is the third author represented after giving exclusive permission to include his recordings on the Voices of the Manhattan Project website.

The recordings bring the history of the Manhattan Project to life, said Cindy Kelly, president of the foundation.

Hearing Leona Marshall Libby, one of the few women scientists on the Manhattan Project, speak emphatically about the fear of Hitler helps people understand the times, Kelly said.

"We were terrified," Libby told Sanger. There was a persistent and ever-present fear that the Germans were ahead of the Allies in the race to build an atomic bomb, fed by the fact that scientific leadership on the Manhattan Project had gone to school with German scientists at leading universities, she said.

"They led then the civilized world of physics in every aspect -- at the time that the war set in, that Hitler lowered the boom," she said. "They led, not we. Very frightening time."

Libby, who worked for a time at Hanford's B Reactor, had no regrets about helping develop the atomic bomb, she told Sanger.

Her brother and brother-in-law surely would have perished in battle if plutonium at Hanford had not helped bring the war to an end, she said.

"In wartime, it was a desperate time," she said. "I think we did right and we couldn't have done differently."

Libby came to Hanford in 1944 with her physicist husband John Marshall and worked at B Reactor, where a separate bathroom was designated for her as the only woman. She made clear, talking with Sanger, that she could not wait to move on from the bleak landscape of Hanford and work elsewhere.

Essentially, it was the nation's plutonium factory, she said. Other interviews in the Voices of the Manhattan Project collection tell of the tough working and living conditions there and the even tougher workers recruited as 50,000 workers were needed to build the

complex at Hanford.

Gardner described traveling from small town to small town in the South, arranging job interviews in any space available from courthouses to, in one instance, a mortuary. He would scramble to arrange last-minute transportation across states amid gasoline rationing as word came that other projects or companies were laying off workers, making them available as possible recruits for Hanford.

He once had a conversation with Col. Franklin Matthias, the officer in charge at Hanford, who asked if it was true that recruiters would hire a man as a carpenter if he could identify a hammer.

"Well, no," Gardner said he answered. "We're not quite that tough. If he could convince us that his father would have known what the tool was, well, we'd probably just take him."

If a man said that he was a carpenter, there was no time to check, he said.

He remembered that the project paid about \$1 an hour for common labor, which was good money at the time.

"In fact, the man who was head of the War Manpower Commission down in Arkansas said, 'For Lord's sake, don't put out any posters saying that you're paying \$1 per hour up in these little towns in Arkansas or you'll get the mayor and everyone else.' "

Gardner might hire 30 or 40 men a day, then go to the railroad station to buy their tickets to Pasco. Once the new hires were ready to board the train, they'd be given some money to buy meals on the trip "because the majority of them didn't have anything," Gardner said.

Because of the limited housing available, most came without their families.

Willie Daniels would tell Sanger that he and his brother together made \$19.20 their first day of work at Hanford, Labor Day 1943, which was more than his brother made in a month of work before.

Daniels was enterprising and doubled his income some weeks by selling clothing and toiletries after 12-hour work days. "At night when we come in for dinner, I'd get my little bag and go to the mess hall and recreation rooms and get some sales," he said.

By July 1944, the project had almost 1,400 patrolmen as part of a workforce of about 50,000. Bob Bubenezer told Sanger of trying to control the gambling and filling the on-site jail with workers accused of fighting and drinking. The next morning they would be back on the job, each worker too important to the wartime effort to justify keeping them locked up.

Hanford workers and William Sweeney, who was a young priest during WWII, told Sanger about two bad accidents at Hanford during the war. In one, two trains collided head-on on a foggy morning. "It was really a morbid scene," Bubenezer said, according to Sanger's transcript of his interview.

In the second, workers were "chipping on a big tank" and it fell, Sweeney said.

"There was almost panic up there, with women from the trailer camp coming into the construction camp hospital to see if their husbands were hurt," he said. He remembers that five men died. Their bodies "were as black as coal," he said.

The scientists and engineers on the project, who were among the few people who knew what was being built and the goal of the project, worried about what would happen when plutonium began to be produced at B Reactor.

"The commitment was made as to the kind of reactor we would do before we had any pilot experience," said Crawford Greenewalt, a chemical engineer who acted as a liaison between physicists working on the project in Chicago and Wilmington, Del., in an interview with Groueff.

One of the first decisions made was whether the world's first full-scale reactor, Hanford's B Reactor, would be helium-cooled or water cooled, Greenewalt said. A separations process, to remove plutonium from irradiated uranium fuel pieces, also had to be picked.

"What you had to do was to decide on something that you were sure would work and then put all your effort on it ... and to hope that you were right," he said.

But leaders of the Manhattan Project had doubts.

"At the time we actually started up our operations at Hanford, I

suppose that we had 50,000 people there on the property," said Walter Carpenter in an interview with Groueff. Carpenter was a corporate executive at government contractor DuPont and oversaw the company's work.

DuPont had made arrangements with all the communities within 100 miles to evacuate residents by automobile in case of a chain reaction that could not be controlled, he said. "We didn't know how fast this calamity might arise," he said.

No evacuation would be needed. B Reactor would irradiate fuel not only during WWII but also the Cold War. It is the centerpiece of the Hanford portion of the newly created Manhattan Project National Historical Park, and looks much the same today as it did when it started up 70 years ago.

Hear the Voices of the Manhattan Project and read transcripts of interviews at <http://manhattanprojectvoices.org>.

Westinghouse, Bechtel form alliance on nuclear decommissioning services

Pittsburgh Business Times

January 5, 2015

[LINK](#)

Westinghouse Electric Co. LLC has struck up an alliance with engineering and construction firm Bechtel, allowing the two to provide a "comprehensive" range of decommissioning services to domestic nuclear power plants.

Westinghouse gave no details of the alliance announced Monday, but said it leverages each company's decades of nuclear experience and allows them to offer a comprehensive set of services related to plants that have reached the end of their operable lives.

Those services include decontamination, licensing, demolition and waste handling.

"Westinghouse is pleased to join with Bechtel to bring about the most fully integrated range of decontamination, decommissioning and remediation services available to the U.S. nuclear energy market," said Mark Marano, Westinghouse president of the Americas.

"The deployment of consolidated, proven technologies and

processes from this alliance will meet the needs of U.S. nuclear power plants that are coming off-line, ultimately allowing the opportunity to return the land to useable property," he said.

Westinghouse said Bechtel has more than 30 years of experience in cleanup and decommissioning. That experience was gained through work at more than 500 sites, including Three Mile Island following the 1979 accident, it said.

Can an Advanced Nuclear Reactor Design Ever Be Approved in the US?

Greentech Media

January 8, 2015

[LINK](#)

This week, Oak Ridge National Laboratory in Oak Ridge, Tenn. announced that it has entered a collaboration with Canadian firm Terrestrial Energy to develop the firm's Integral Molten Salt Reactor technology to the engineering blueprint stage -- and perhaps to regain some North American technological leadership in advanced nuclear power.

Oak Ridge National Laboratory (ORNL) built and operated the first molten salt reactor (MSR) in the late 1960s. It was a 7.4-megawatt (thermal) test unit, and its design was being considered for a nuclear-powered bomber. Terrestrial Energy's reactor is based on ORNL's denatured MSR design.

Since then, R&D in this advanced nuclear technology, in the U.S. at least, has been scant, even as this country's light water reactor nuclear fleet has continued to age. The nation's technological and market edge in nuclear may have been lost to countries such as China, Japan, Russia, India and France.

The MSR is an advanced breeder design, in which the coolant is a molten salt, typically a fluoride salt mixture. In some designs, the nuclear fuel can actually be dissolved in the coolant itself. MSRs run at higher temperatures and higher efficiencies than water-cooled reactors.

Terrestrial Energy (TEI) hopes to begin commercial deployment of its proprietary molten salt reactor technology by early next decade. The company claims that MSR technology provides improved safety and better control of waste and proliferation. TEI's CEO Simon Irish claims in an enthusiastic Forbes article that the reactor

"will cost about the same to build as a coal power plant, but will cost much less to run than a traditional nuclear plant."

Such is the aspirational nature of startup CEO language.

Terrestrial's MSR is a modular design, able to range from 80 megawatts to 600 megawatts, and targeted at remote, military, or industrial sites, both on- and off-grid.

Using the small modular reactor (SMR) concept, reactors can be built in factories and shipped to the site already constructed, rather than being built -- expensively and riskily -- on-site. Rather than engineer and build reactors capable of producing more than 1 gigawatt of electric power, SMRs can produce 10 megawatts to 6,000 megawatts of electricity (or heat).

SMRs are not new. The U.S. Army has built and operated small nuclear power plants in the past, and the military continues to use small reactors to power naval vessels. But the incremental construction scheme of civilian SMRs aims to reduce financial and safety risks, though this has not yet been demonstrated.

Still, one need only look at the tribulations of NuScale to understand the many things that can go wrong with a startup, let alone a nuclear startup. NuScale was founded in 2007 based on research conducted at Oregon State University and had raised \$35 million in VC funds to develop its light water SMR. The company's major shareholder is now Fluor.

As far as MSRs are concerned, this is early days. Hot, radioactive molten salts that are in use for 25 years are likely to be corrosive and to require extremely robust materials and heroic feats of engineering. Very little is known about MSR designs, compared to the knowledge gained from millions of operational hours of light water reactors.

As breeder reactors, MSRs can consume unused fuel and can be more easily switched on and off. With certain modifications, an MSR can produce weapons-grade nuclear material.

But the regulatory challenge of MSRs could be more of an obstacle than the physics or finance. The Nuclear Regulatory Commission has regulated more than 100 reactors in the U.S., none of which are based on this design. It will require an enormous institutional adaptation to get this technology commercialized -- and an enormous amount of funding.

Greentech Media has taken detailed looks at small modular reactors, including those from B&W, NuScale, Radix and Hyperion, fusion technology from General Fusion and Tri Alpha, and nuclear waste disposal from Kurion. We've reported on the Khosla- and Bill Gates-funded TerraPower. We've looked at the thorium fuel cycle, as well as the painful economic realities of nuclear plant construction. We recently reported on the first nuclear plant construction that the Nuclear Regulatory Commission has approved in 35 years. And last month, the Department of Energy announced the availability of \$12.5 billion in loan guarantees for advanced reactor designs or enrichment processes.

Nuclear power is carbon-free in operation, and yes, it's baseload power with a low price per kilowatt-hour, but it's very expensive to build and even light water reactors are already harrowingly difficult to finance.

Nuclear makes up 19 percent of the country's electricity generation. But the vexing issues of safety, unused fuel, and proliferation remain unsolved.

Hanford Site-Specific Advisory Board Meeting Notice

Federal Register
January 13, 2015

[LINK](#)

Date: Wednesday, February 4, 2015, 8:30 a.m.-5:00 p.m.;
Thursday, February 5, 2015, 8:30 a.m.-3:00 p.m.

Purpose and Agenda:

The purpose of the Board is to make recommendations to DOE-EM and site management in the areas of environmental restoration, waste management, and related activities.

Tentative Agenda:

- Potential Draft Advice

Worker Health and Safety Protection Related to Chemical Vapor Exposures

- Discussion Topics

Central Plateau Inner Area Principles

Hanford Advisory Board Committee Reports

Tri-Party Agreement Agencies' Updates

Board Business

