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### **Congress exits as September workload piles up**

E&E Publishing

July 15, 2016

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Lawmakers decamped for their seven-week recess yesterday amid a growing pile of unfinished business that awaits them in September, which includes key energy and environment spending bills, a possible energy conference report, and measures to fight the Zika virus and address the lead crisis in Flint, Mich.

Senate Minority Leader Harry Reid (D-Nev.) accused Republicans of leaving for their national convention in Cleveland next week with a long to-do list, including funding for Zika and Flint, plus proposed gun control legislation and criminal justice reform.

"We'd like to stay here and work," Reid said on the Senate floor.

"I'd like to work for the people of Nevada and work for the rest of the American people. The Republicans, they're not going to hear of this. They want to go. They want to go listen to Donald Trump," Reid added.

Responding to the criticism, Republican Whip John Cornyn (R-Texas), joked: "They don't like being in the minority?"

"You only get to set the agenda if you're in the majority and the reason why we haven't been able to get more done is because of the dysfunction, obstructionism of the Democrats," he said.

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The Senate started slogging through appropriations bills 10 weeks ago, but the effort has been "thwarted by Democratic desire for an omnibus," Cornyn said.

The final outcome could instead be a continuing resolution, Cornyn said, "which nobody likes."

If a CR is necessary, Cornyn would opt for a spending bill that lasts through early 2017, leaving the issue to a new Congress and president.

"I'm not a fan of kicking things into a lame-duck session," Cornyn said. He thinks Democrats see increased leverage in year-end negotiations.

### *Spending*

House Speaker Paul Ryan (R-Wis.) pushed back against charges that the House had done little legislating this year, noting education, opioid, transportation and export control measures have all passed the chamber.

"It's divided government," Ryan said at a press conference yesterday. "It's not easy to get things done when you don't have a lot of cooperation from the other party."

Ryan also said he has "not given up on the appropriations process" for fiscal 2017.

So far, the House has passed five of the 12 annual spending bills. With the new fiscal year set to begin on Oct. 1, lawmakers will have to pass a stopgap funding bill in September.

"I just don't think it's -- it's right at this stage to say, we're done with appropriations, we're going to move on," said Ryan, who declined to say how long a stopgap measure should last.

Conservatives have pressed for a six-month CR to avoid a lame-duck omnibus. Appropriators and moderates say lawmakers should finish their spending work before adjourning for the year rather than leave agencies in funding limbo for months.

Democrats blocked the defense spending bill in the Senate yesterday, but GOP leaders want to bring it back up in September. The fate of the appropriations bills that fund U.S. EPA, and the Energy and Interior departments remains up in the air.

The House yesterday passed its first Interior-environment spending bill in years, top Senate appropriator Lisa Murkowski (R-Alaska) said yesterday it was unclear whether the Senate companion would reach the floor in September.

"I'm hoping so," she said.

The outlook for the energy and water spending bill is somewhat brighter. The Senate passed its \$37.5 billion version in May (E&ENews PM, May 12). The House bill failed after 130 Republicans rejected the measure over a gay and transgender rights amendment (Greenwire, May 26).

Rep. Mike Simpson (R-Idaho), the chairman of the House Energy and Water Appropriations Subcommittee, said the fiscal 2017 energy spending bill could return to the House floor in September.

"There has been some talk of bringing it back under a closed rule," said Simpson, who said the legislation would likely come back with the contentious amendment stripped out.

Rep. Bill Flores (R-Texas), the chairman of the conservative Republican Study Committee, also said he expects the energy bill to return to the floor.

"We'll clean up a couple amendments and bring it back up. It's one we could get up and get done pretty quickly," he said.

A Ryan spokesman said leaders had not made any final decision on spending bills that might be on the floor when Congress returns and before it leaves to campaign for the elections.

Also in September both chambers will try again to come to an agreement on Zika virus funding, after Senate Democrats yesterday blocked -- for the second time -- a GOP bill to appropriate \$1.1 billion to fight the disease. The administration had requested \$1.9 billion (E&ENews PM, July 14).

Senate Minority Leader Harry Reid (D-Nev.) slammed Republicans for including provisions targeting Planned Parenthood and a rider to temporarily exempt pesticides from Clean Water Act permits.

"They took a whack at clean water," Reid told reporters.

Ryan, meanwhile, accused Senate Democrats of putting politics "above the health and safety of the American people."

Top GOP appropriators in both chambers sent President Obama a letter urging the administration to "aggressively" reprogram funds to fight the virus using existing authorities.

### *Energy reform*

Discussions will continue over the recess by staff and members on energy reform legislation after Senate Democrats this week finally blessed a formal conference committee with the House after weeks of hesitation over disputed provisions (E&ENews PM, July 12).

House Energy and Commerce Chairman Fred Upton (R-Mich.) said this week that the tight calendar made it unlikely that a bill could be finalized before the elections.

"Let's face it, that will be hard to do," he told reporters.

Upton added that Republicans "don't have any red lines in the sand" and acknowledged that the final product may be far more narrow than the bills passed by the House and Senate.

"Clearly there are some things we think we can agree on," he said, citing provisions in both chambers' bills to expedite natural gas exports and boost the energy workforce.

Despite the launch of the conference process, there still seems to be some disagreement among key conferees over the bill's scope.

Rep. Raúl Grijalva (D-Ariz.), the ranking member on the House Natural Resources Committee, told E&E Daily this week that he doesn't see any room to negotiate on any of the five "poison pills" included in the House's revised version.

"I don't think there's a lot of comfort with negotiating language on those because we're in the minority here and there, and you could end up with some precedents that would be very, very bad," he said.

Additionally, Grijalva noted that just eight House Democrats supported the lower chamber's effort. "And I don't see that changing," he said.

Natural Resources Chairman Rob Bishop (R-Utah) disputed the notion that any issues had been taken off the table for the conference. Lawmakers from both parties had spoken about only moving forward with provisions the president would sign.

"I was not privy to any conversations when someone made a deal that said this stuff will not be in or will be in," he told reporters yesterday. "A conference is a conference, you handle it in the conference."

Bishop signaled plans to press ahead on some of the disputed issues, including provisions addressing the California drought and wildfires.

"If we do not solve [these problems] in this opportunity we have failed people," he said. "There's no reason those problems should not be finalized. This impacts too many people's lives."

Bishop also said he expects energy talks to drag on past the election as well.

"I expect to be buying Christmas gifts here again," he added.

Offshore drilling, Flint, taxes

While it faces long odds this Congress, lawmakers appear headed toward a fight over legislation by Sen. Bill Cassidy (R-La.) that would expand sharing of federal offshore drilling revenues with coastal states.

Majority Leader Mitch McConnell (R-Ky.) placed the bill on the calendar earlier this month, fulfilling a pledge he made to Cassidy earlier this year after the Louisiana senator's bid to see it attached to the Senate's energy bill faltered (Greenwire, July 6).

Cassidy had been angling to see it become part of the energy conference negotiations but conceded yesterday that path was "unlikely."

"What we're looking at now is what can it move on and what is the best timing of the vote to ensure that we get the maximum number of votes," he told E&E Daily. "But still have it available to be attached to something else that is moving."

An end-of-year omnibus is one likely target, "but it could be something else as well," he said.

Democrats continue to fight to secure funds to help Flint residents cope with the fallout of the city's lead-contaminated drinking water.

Sen. Gary Peters (D-Mich.), who along with fellow Michigan Democrat Debbie Stabenow has led Senate efforts on Flint, said yesterday he was optimistic that federal dollars would flow to Flint when the upper chamber takes up the Water Resources and Development Act this fall.

"We're hopeful it will be taken up when we come back in September," he told E&E Daily, noting widespread support for WRDA, given the bill's broad reach.

Democrats are also angling to see an assortment of renewable and efficiency tax breaks extended, although that push will wait til the end-of-year lame-duck session (E&E Daily, July 14).

Before heading out the door last night, the Senate passed legislation, S. 1935, to support waterfront community revitalization and confirmed Blair Anderson to be Department of Transportation's policy undersecretary.

### **WIPP seeks permit changes ahead of reopening**

Albuquerque Journal

July 17, 2016

[LINK](#)

New Mexico's nuclear waste repository has requested that the state approve changes to its permit that will clear the way for it to reopen more than two years after it closed down due to fire and radiation accidents.

The Waste Isolation Pilot Plant outside Carlsbad has asked the state Environment Department to sign off on permit modifications having to do

with ventilation in the underground repository and changes to its contingency plans in the event of another emergency.

WIPP has spent the past two years trying to recover from two separate events in February 2014: a fire on a salt haul truck and the bursting of a drum of nuclear waste that contaminated the underground facility with radiation. Cleaning up the repository has been a unique challenge, given that WIPP's enormous waste disposal rooms are mined from ancient salt beds 2,150 feet below the surface.

WIPP is asking the Environment Department to drop a requirement in its hazardous waste facility permit that requires waste disposal rooms to have a ventilation rate of at least 35,000 cubic feet of air per minute when workers are present. WIPP is asking for the flexibility to implement its own safety measures when the ventilation rate falls.

Ventilation has been a challenge ever since the radiation release contaminated a key exhaust shaft, forcing the facility to run its air system in filtration mode, meaning far less air can be pulled in from the surface and circulated underground than before. Ventilation rates are a seventh of what they were before the 2014 incident.

Don Hancock, a longtime and frequent WIPP critic, said the ventilation requirement is meant to protect workers from volatile organic compounds, or VOCs – colorless, odorless chemicals that can be harmful when inhaled. VOCs are vented from drums of nuclear waste so they don't cause potentially explosive buildup; also, running diesel equipment underground produces VOCs in vehicle exhaust.

Under the modification requested, "The permit goes from having a strict regulatory requirement to essentially having no real measure to determine whether it's OK or not," Hancock said. "They are getting out of any ventilation requirements in the active disposal rooms, which means they are unregulated."

WIPP spokesman Tim Runyon said in an emailed response to questions, “The proposed change would allow WIPP to implement compensatory measures in situations where the active room ventilation rate of 35,000 standard cubic feet per minute, currently required by the permit, could not be met.”

Those measures include “use of respiratory protection equipment, would provide an equivalent level of protection to what is currently afforded” under the ventilation requirement, he said.

“The most important thing at WIPP is worker safety and DOE takes that very seriously,” said John Heaton, chairman of the Carlsbad Mayor’s Nuclear Task Force. “As we all know, there is reduced ventilation in the mine. If workers are in Panel 7 working, they will not only be monitoring for air quality but those workers will actually be suited up and they will have air supply masks on them.” Panel 7 is the location of the radiation release and also where waste emplacement will restart.

WIPP is hoping to reopen its doors to partial waste emplacement operations by year end, and the permit modifications are one of several hurdles that still need to be cleared before it can do so.

An interim ventilation system that is expected to nearly double the amount of air underground has taken longer to install than WIPP officials expected. From a target of mid-2015, officials now say it may be ready next month.

The House of Representatives Appropriations Committee addressed the ventilation issue in an April report recommending a \$292.7 million fiscal 2017 budget for WIPP.

“Operating WIPP at substandard ventilation rates for an extended period of time is not acceptable and full recovery needs to remain a high priority

for the Department,” according to an April report by the House Appropriations Committee.

The other permit modification requested of the state is less contentious and would incorporate new emergency response requirements that are the result of lessons learned from the 2014 events.

The comment period ends Aug. 8 and a decision by the Environment Department is expected in September.

### **Debate is on over making more nuke triggers at Los Alamos lab**

Albuquerque Journal

July 15, 2016

[LINK](#)

SANTA FE, N.M. — The National Nuclear Security Administration is under orders from Congress to produce as many as 80 new nuclear weapons triggers a year by around 2030, and Los Alamos National Laboratory is the only place in the country that is equipped to make them now.

The plans for a higher-capacity plutonium pit production facility make Los Alamos key – some call the lab “ground zero” – as the Obama administration and Congress have moved forward to upgrade and modernize the nation’s nuclear weapons force, a plan that the Congressional Budget Office has estimated will cost \$350 billion in the next decade.

But ramping up pit production is a huge undertaking – the United States, after mass producing pits during the Cold War at the defunct Rocky Flats Plant in Colorado, hasn’t made any new ones since 2011, when LANL completed the last of 29 plutonium cores for Navy submarine missiles. The most ever made at Los Alamos in a year is 11. For the moment, the lab can’t

resume pit production until safety issues are addressed, possibly by the end of this year.

More pits would mean more radioactive materials at Los Alamos and more leftover waste that must be handled and safely stored, most likely at the temporarily closed Waste Isolation Pilot Plant near Carlsbad.

Critics of the plan say it's unnecessary for maintaining the nation's nuclear weapons stockpile and way too expensive, particularly in today's tough budget times.

In addition to pits currently installed in nuclear warheads, 10,000 or more previously manufactured pits are in storage and a few thousand more are said to be "strategic reserve." A 2006 study for the government that was undertaken by scientific experts, supporting work by the national labs, and that NNSA touted at the time, found that the existing pits installed in warheads can last for many decades to come, with "credible lifetimes" of more than 100 years.

Supporters of increasing pit production see it as a hedge against possible future technical problems and unforeseen "geopolitical risk" – or military threat – and as a way to maintain pit production skills.

Skeptics of increased pit production extend beyond anti-nuclear advocates in New Mexico.

U.S. Rep. John Garamendi, a California Democrat on the House Armed Services Committee, said in a statement that he strongly disagrees with ramping up pit production "in Los Alamos or anywhere else."

Garamendi said the NNSA, the lab's parent organization within the Department of Energy, "hasn't even told us why they feel the need to increase pit production when we already have an unused stockpile of 10,000 pits."

He noted that he tried to amend the 2015 defense spending bill to require the NNSA “to submit a report on the rationale and cost of expanding pit production ... . I don’t understand the reasons for spending billions on a new pit production facility when we should be spending that money here at home.” The bill mandated building more pits and calls for demonstrated capability to build 80 pits per year in 2027.

Greg Mello of the local Los Alamos Study Group research and advocacy organization said that the 2006 study supporting the long life of existing pits has never been impugned.

“What it all boils down to is that the generals are not happy that we don’t have a pit factory,” Mello said. “All the other details are unimportant ... . They seem to want it for its own sake, and that is not going to work well.”

Jay Coghlan of Nuclear Watch New Mexico notes that the wording of the 2015 National Defense Authorization Act that calls for making 80 pits annually asserts that the need is not driven solely by “life extension programs” intended to keep current weapons in good shape.

“It’s not about simple maintenance,” Coghlan said. “It’s about advancing weapons designs ... . I assert that that’s a blank check for them to do what they want to do.”

He added: “They are seeking to divorce expanded pit production from the technical necessities of the stockpile.”

#### *Basis for pit-making goal*

A pit is the grapefruit-size plutonium core of the first stage of a nuclear bomb. Imploded by high explosives, it becomes compressed, resulting in a nuclear explosion that detonates the weapon’s main stage.

The 2015 defense spending bill's language sets out the basic argument for increased pit production.

It says that "delaying creation of a modern, responsive nuclear infrastructure until the 2030s is an unacceptable risk to the nuclear deterrent and the national security of the United States" and that timelines for creating pit production capacity "must be driven by the requirement to hedge against technical and geopolitical risk, and not solely by the needs of life extension programs" for existing weapons.

A 2014 memo from then-Defense Secretary Chuck Hagel sent to the Armed Services Committee chairman in January 2014 elaborates. It says a Nuclear Posture Review found need for "some modest capacity to surge the production (of pits) in response to significant geopolitical surprise," a concept called "responsive infrastructure," according to the memo.

In 2003, when now-discarded plans for what was to be called the Modern Pit Facility were under consideration, a wide range of pit production capacities, from 100 to 450 pits per year, were considered. But, in 2008, the memo continues, "the Nuclear Weapons Council (NWC) agreed on a strategy to balance cost, risk and stockpile needs and established the requirement of 50-80 pits per year."

One factor was capacity at Los Alamos, including its existing plutonium facilities and a then-proposed new "big box" structure, which was killed off by the Obama administration after estimated costs skyrocketed to near \$6 billion

The 50-80 pits-per-year capacity is consistent with "the central limits of the New START Treaty (the arms control agreement Obama signed in 2011), and our commitments to Allies," the document states. The nuclear arsenal modernization plan now underway, and that more pits would support, was part of the Obama administration's deal with Congress over ratification of New START.

Despite the pit-longevity studies cited by critics of expanded pit production, Hagel's DOD document refers to "aging concerns" and "the impacts of aging plutonium" in establishing requirements for new pits. It also says that "maintenance of critical pit manufacturing skills may be at risk" without increased capacity.

The memo states that the mandated larger pit-making capacity will require new building space at LANL. For the time being, that requirement would be met in the form of two proposed underground "modules" with an estimated cost of \$2 billion.

The proposed pit capacity would also be sufficient to support a planned "interoperable warhead" – for use by both submarines and land-based missiles – according to the Hagel document. Proponents say the multi-use warhead would make the U.S. arsenal more flexible, while billions of dollars in projected costs have raised concerns in Congress.

An NNSA spokeswoman provided the Journal with a statement saying that "pit production is essential to NNSA's programs to extend the life of the U.S. nuclear weapons stockpile so that the Nation's deterrent remains safe, secure, and effective ... . It should be noted that the current rate of production is only a fraction of production capacity during the Cold War, and reflects the nation's reduced reliance on nuclear weapons." Rocky Flats, closed in 1992 after a scandal over environmental problems, used to make 1,000 to 2,000 pits a year.

*Critics: Still no specifics offered*

Critics still say nothing has been offered to specifically justify up to 80 pits a year. "You see the stated need and then there's no solid justification," said Coghlan.

He cites a 2008 interview with former Republican House member David Hobson of Ohio, who helped fight off the Modern Pit Facility. When Hobson questioned the need for 450 pits annually after years of being told that the weapons stockpile was in good shape, NNSA came back with a new offer of 250 pits, Hobson told Mother Jones magazine. “These were nuclear weapons we were talking about and they hadn’t given it more thought than that?” said Hobson, who served in the House from 1991 through 2009.

The increased production of pits would create “tens of billions of dollars” of construction and new program work at the lab, said Mello. “It’s a tremendous rainmaker,” he said.

And the threat of unforeseen “geopolitical risk”? Mello sees that language as code for gearing up for another Cold War. “Making more weapons won’t make us safe,” he said.

Mello says the labs are already being paid billions to avoid any future technical issues with nuclear weapons under the current stockpile stewardship program, and that maintaining pit-making skills can be done without higher production levels.

“We have long contended that not only is it possible to do pit production at a small scale,” Mello said, “but if NNSA attempts to maintain a larger scale than can be rationally justified, it will backfire again and undermine the ability to do anything.” He said DOD’s pit production goals are based only on “what size building they can put on TA (Technical Area) 55 at Los Alamos.”

He refers to a 2014 report on pit production options by Jonathan Medalia, a nuclear weapons policy specialist for the Congressional Research Service. Citing comments by NNSA and Department of Defense officials, Medalia wrote that the 50-80 pits per year goal was based “on LANL’s presumed pit production capacity” and “not on a strategic analysis of military needs.” Medalia did quote a DOD official as saying NNSA wanted as many as 125

pits a year and that the 50-80 pit level, “while the best that could be done,” was a “significant risk” in NNSA’s view.

Medalia’s report also said that there may be ways to reduce capacity to below 80 pits a year and still meet the Department of Defense requirements, including by reusing retired pits.

#### *DOD responds*

On Thursday, Patrick Evans, a Department of Defense spokesman, provided a statement that reiterates many of the points from the Hagel memo. “To continue meeting DOD requirements for deployed nuclear weapons, nearly every warhead in the U.S. stockpile requires either significant maintenance or life extension in the coming decades,” the statement said.

“Consistent with these requirements, the 2010 Nuclear Posture Review and multiple National Defense Authorization Acts reaffirmed the concept of a responsive nuclear infrastructure capable of producing pits, as well as other components and materials, that is designed to hedge against uncertainty in both geopolitical events and technical failures.

“The current strategic plan approved by the Nuclear Weapons Council provides for the long-term life extension of the current stockpile to address modernization needs regarding aging warheads. To produce enough pits to support the NWC strategic plan prior to end-of-life of the existing stockpile (including qualification and surveillance units), and to retain critical plutonium skills throughout this modernization process, the ultimate goal is to achieve a capacity to produce up to 80 pits per year.”

Coghlan and Mello dispute the need to replace or retire weapons that have ostensibly been well-maintained over the years and with the 2006 report supporting a long life remaining for existing pits. Coghlan cites a study by Sandia National Laboratory from 1993, just after the U.S. stopped real-world nuclear weapons test explosions, that found no example of “a nuclear

weapon retirement where age was ever a major factor in the retirement decision.”

Some commentators supporting more pits have noted that Russia makes at least hundreds of pits a year. Mello says Russia and western nuclear powers have different weapons stockpile plans. “Russian pits don’t last very long, and their philosophy is to redo the arsenal all the time,” said Mello. “The U.S. is like the French and the British – make it well with high standards and it lasts a long time. Rocky Flats, a lot people gave their lives for that, but they did really good work.”

U.S. Sen. Tom Udall of New Mexico, a Democrat with a seat on the Appropriations Committee, on Thursday provided a statement saying he supports LANL’s mission of pit production.

“Our nation’s goal – which I strongly believe in – is to work toward a world with no nuclear weapons through negotiated international agreements,” said Udall. “But until that is realized, an important part of maintaining our deterrent is verifying the safety and security of the remaining weapons through the stockpile stewardship program.

“Ensuring the reliable supply of plutonium pits is an important part of this effort. Currently, the only place in the nation capable of doing that work is Los Alamos National Laboratory. And, as a member of the Appropriations Committee, I will continue to support this important national security mission.”

**DOE: Demo and cleanup date for Hanford plutonium plant pushed back 1 year**

KEPRtv.com

July 14, 2016

[LINK](#)

HANFORD, Wash. - There's a change to the demolition and cleanup of the Plutonium Finishing Plant, the most hazardous facility on the Hanford site according to the Department of Energy, (DOE.)

After reconsideration, the DOE determined that the September 30th finish date can't be met.

Officials say unaccounted-for hazards have pushed the finish date back by a full year. The new deadline is now set for September 30, 2017.

The Plutonium Finishing Plant at Hanford produced two thirds of the nation's plutonium stockpile.

### **Drones Over Nuclear Site Could Pose Security Threat**

WLTX

July 14, 2016

[LINK](#)

Columbia, SC (WLTX)- The U.S. Department of Energy officials overseeing a nuclear weapons complex in Aiken say drones that flew over the site for two weeks could have obtained sensitive information.

At the vantage point the seven drones had from June 19th till July 5th, the Savannah River Site said they could have obtained information that would be a threat to security.

Director of External Affairs at SRS James Guisti said they still don't know who the remotely controlled flying devices belonged to.

"We are going through an effort to try to have the airspace over the site restricted it if possible," Associate Deputy Manager Thomas Johnson said. That effort has started."

Johnson, who was presenting to the Governor's Nuclear Advisory Council, said they are still trying to understand what the 3 foot by 3 foot drones were doing.

"Is it taking photos of facilities? Is it taking photos of security forces on the site? Is it testing the reaction of the site's security policies? There are a number of concerns in trying to deal with the drones." >

The Federal Aviation Administration has not established the Savannah River Site as a no-fly zone, although there is a 2,000 foot fly limit over the site.

"A lot of people think when they say there's a restriction over an area, that means that you can't fly over it, and that's not necessarily the case," Guisti said. "There are various types and various degree of penalty for violating those restrictions within the FAA."

Guisti also added that the D.O.E. can't impede on the drone if it is not a known threat.

Sen. Tom Young, who initially asked for an update on the matter said he is concerned about the threat to national security.

"The times that we live in now in 2016 with all the stuff that's going on in the world, I thought it was very important for the people of South Carolina and the people that live in my district of Aiken to know what the answers are."

Young said he will be looking into what can be done policy wise from the state level in the meantime to protect the nuclear site.

The D.O.E is asking anyone with information to come forward.

## **Touring B reactor at Hanford nuclear waste site**

NBC K5

July 17, 2016

[LINK](#)

Hanford is America's most contaminated nuclear waste site, but how did it get that way?

The tours given by the Manhattan Project (now in partnership with the National Parks Service) might not answer that question directly, but gives you insight into the largest construction project in US history.

I took a tour of B reactor, one of nine on the site. I thought that I would be bored, as I'm no nuclear physicist, and we would have two hours to explore the site. It was the only one of three tours that fit within my schedule, and I was determined to learn more about the site that is now causing so many to get sick.

I learned DuPont (the company that invented nylon), had to be convinced to take on the project, as the government thought that it was the only company with the expertise and knowledge to bring online a nuclear facility in a short time. Remember, we were very, very afraid of what technology the Germans may or may not have had during WWII. DuPont relented and agreed to construct Hanford, under the terms it must be completely in charge and that six months after the war ended, it would be relieved of duty. In addition, it would only profit from this project by \$1. The materials and labor cost, of course, was provided for — and it today's standard, I believe cost in the billions of dollars.

The world's first plutonium production nuclear facility was intended to be built in Tennessee, but was rejected by the General in charge due to it's proximity to Nashville. So, another site was chosen, which lead the government to the desert of Washington State. Three towns were evicted

to make way for the sprawling facility (in fact, there's a separate tour just for show this!)

I could go on and on about the facts I learned on the tour, most of which was refreshing my high school-level chemistry, but I'll try not to.

After driving the 40 minutes from the tour base to the reactor, you can understand why this desolate location was so desired: miles from anywhere, if something were to go wrong, harm would be minimized. Turns out I also passed by Hanford on my drive into town — I was wondering what those factories were, but now I knew: reactors B and C (now entombed in concrete), the separation facility, the electrical plant, and on the mesa above everything, the site where hundreds of contractors work every day to attempt clean up . There are now more people working on the cleanup than were ever employed at Hanford during its heyday.

B reactor was built in complete secrecy, so much so that work was done in parts: bricklayers hired to place the granite blocks to hold the uranium, welders sometimes blindfolded while shuttled from their home to the work site. When you walk through the doors and into the reactor's main chamber, you are simply dumbfounded: it's massive. When I think all that work was done with only a handful of people knowing it's true purpose, I'm once again speechless. Apparently one girl told her teacher at the time she knew what was going on at the site: a toilet-paper factory, she said, because her dad came home with two rolls every night. In reality, it created the materials that would end up in the bomb dropped Nagasaki, Japan.

Built in only 11 months, the reactor was supposed to stay online for only three years. However, it ended operations in 1968 after 24 years of service and has been decommissioned ever since. As part of an international agreement, Russians come to Hanford every year to inspect the site, to make sure it says that way. This means that even the lids on the giant water tubes must stay unhinged. While the Russians don't think after all these years we'd put the reactor back in service, they continue to visit: this past

year, they remarked on the 'new railing' put on as part of the new National Parks guidelines.

Touring with graduate students studying nuclear security was a pretty interesting experience in and of itself: not only did I get mistaken for one, I think the science portion was taken up a notch. I now know more about uranium 235 and 238 than I did just a few days ago!

For every ton of material taken out of the reactor, only 1/2 lb of it was plutonium. Depending on the 'recipe' for that batch, the uranium would 'cook' in the reactor for approximately 11 weeks (I believe), before the product was released out the back, dropping 20 feet into a tub, where it would rest 90 days before being shipped to the separation facility a few miles away on the site in specially designed rail cars. It truly was a feat of engineering, especially considering it stemmed from a small mock up at the University of Chicago and was brought to production on such a large scale so quickly. As the docents repeated so frequently, 'it worked.' While most of us wanted to see where the nuclear material went after it was released from the machine, I guess it's better we didn't: locked behind a gate and several locked doors, all I could see was an alleyway. Workers couldn't even get back there due to radiation concerns, so why should I?

There was a lot of science and engineering lessons learned, but amidst all the cool designs, I just couldn't help but imagine what the site would've looked like in 1944, bustling with people, packed onto the Hanford Energy Works site. While likely a dozen or so people might've worked at B reactor, it must've been loud: the roar of the fans to cool the reactor combined with the rush of the water needed to cool it (I was told at least the amount in an Olympic sized pool every five minutes), you'd be lucky to hear yourself think. However, workers didn't get to experience the awe that I saw upon seeing the reactor, as a curtain was drawn while it was operating, to help with the flow of air.

I also learned that according to legend, the Northwest's tie to the reactor wasn't just its location in Washington: SCRAM, which means a nuclear reactor must be shut down immediately, has its origins from an Oregon logger. The term stands for safety control rod axe man, and as it has been told, while doing the original experiment at the University of Chicago creator Enrico Fermi hired an experienced logger from Oregon to swiftly cut the control rods in case something were to go wrong at the plant and it needed to be stopped. The moniker has stuck ever since.

While the docents expertly glossed over the complexity of the cleanup, I was given insight into what makes this site so different and so much more complex than similar sites across the country.

When someone asks you why you're headed to Hanford, don't ever feel bad to say 'for fun!' Sure, you might get some funny looks, but you'll learn a lot about US nuclear history. Just don't bring too much radiation back with you as a souvenir.

While I could go on and on with what I learned (I apparently talked about my trip for 20 minutes without interruption earlier), I'll end it here. Meanwhile, I'll still be making up stories for the cool tools I saw on display.

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