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More Contamination to Come

A healthy sense of skepticism is necessary when making decisions that will impact Idaho's water and health for generations to come, writes Tami Thatcher in the Idaho Falls Post Register.

My friend John Tanner made an important point in his recent guest column: There is no credible progress being made toward a permanent spent fuel repository.

Nevertheless, he dismisses Utah's rejection of "temporary" spent fuel storage as unrelated to "honest safety concerns," despite there being no place for final disposal.

Regarding the Moab mill tailings, Tanner wrote that strong opposition was based "on somewhat speculative hypotheses about a gradual shift in the Colorado River."

The Department of Energy has conceded there were too many uncertainties associated with the long-term stability of the tailings on the floodplain. My point was that it required a skeptical opposition to achieve this.

Regarding the proposed replacement facility for remote-handled low-level waste at the Idaho National Laboratory: It is not "if" but "when" the proposed RH-LLW facility will trickle out contaminates to our aquifer in significant amounts and for hundreds of thousands of years - longer than the geologic ages of much of the basalt rock and soil at INL.

This toxic and long-lived waste, which would be characterized as greater-than-class C waste appropriately requiring a deep geologic repository, is generated at INL or imported via the Naval Reactors Facility.

This waste stream has been disposed of at INL's Radioactive Waste Management Complex, the Superfund dump slated for closure, and is currently being taken to a DOE waste facility in Nevada. This waste could continue being shipped out of Idaho to Nevada where DOE predicted "no groundwater impacts." Contaminants that enter the aquifer are shared downstream to Thousand Springs and beyond. Estimates of radiation dose from the vaults count on dilution, not containment.

Numerous unverified assumptions whittle down the dose estimates, including ignoring episodic flooding. The peak concentrations, as well as peak times cannot be accurately predicted. DOE knows there are too many scientific unknowns, especially over such long time spans and carefully avoided candid uncertainty estimates in its NEPA Environmental Assessment.

Problems with the comparison of background external radiation dose with radiation protection standards are many. Cancers are caused by background radiation and radiation protection standards consider only cancer mortality and not cancer incidence, genetic effects, birth defects or other adverse health effects. The fact that children are 6 to 8 times more vulnerable to fatal cancer from radiation is ignored.

The vaults will trickle out significant portions of the maximum contaminant levels: about 20 percent of the MCL for Iodine-129. Upon gaining experience with hexavalent chromium, California passed a law reducing their MCL by a factor of 10. A toxic brew of contaminants staying below the MCLs may be palatable to regulators but is not protective of human health.

The INL RH-LLW facility, while small in contrast to the nation's spent fuel inventory, will unnecessarily undermine Idaho's water and human health for generations. And in the absence of a healthy skepticism from our state leadership, we can expect more contamination to come.

Post Register November 12, 2014. Thatcher is a former nuclear safety analyst at INL and a nuclear safety consultant.

Planned Contamination of the Aquifer is a Grave Mistake

Misleading Statements about the Proposed INL Replacement RHLLW Facility made in a December 12 Post Register guest editorial, writes Tami Thatcher. . .

The proposed waste facility at the Idaho National Laboratory for remote-handled low-level waste (RH-LLW) will accept a long list of radionuclides, but the radiation dose results for ingestion are dominated by carbon-14, iodine-129, and technetium-99 during the first 10,000 years and uranium isotopes afterward. [1]

The half-lives of these relatively non-sorbing radionuclides are C-14, 5730 years; I-129, 17,000,000 years; and Tc-99, 213,000 years. This waste meets the criteria for Greater-Than-Class C waste that has long been recognized as needing disposal in a deep geologic repository.

[1] US Department of Energy, "Environmental Assessment for the Replacement Capability for Disposal of Remote-Handled Low-Level Radioactive Waste Generated at the Department of Energy's Idaho Site," Final, DOE/EA-1793, December 2011. http://energy.gov/sites/prod/files/EA-1793-FEA-2011.pdf

The facility will trickle out contamination for hundreds of thousands of years in amounts that are significant portions of maximum contaminant levels for various radionuclides. The rate at which the contaminants will trickle out depend on water infiltration rates, which were non-conservative and assumed to remain constant. No precipitation or flooding variances were used in the analysis despite the recognition that expected variances at least every 500 years would likely increase the infiltration rate 3-fold. [2] [3]

So, both of John Tanner's statements [4] that many of the contaminants have short half lives and that the facility is outside the 10,000 year flood plain are meaningless in terms of aquifer contamination and calculated radiation dose.

Tanner points out that no credit is taken for the steel cans and concrete vaults. But the reason for this is that the cans corrode and the concrete vaults are designed with holes in the bottom to prevent water build-up. So, he's made another meaningless statement in terms of aquifer contamination and radiation dose.

The study he cites as explaining uncertainties,[5] insufficiently in my view, was not published until months after public comment on the Environmental Assessment closed.

Soil adsorption, the key process relied upon to prevent or slow the adsorbing contaminants from reaching the aquifer, is poorly understood. The non-conservative selection of soil adsorption parameters were based on scant data and limited similarity to actual INL characteristics.[6]

While the aquifer beneath the INL has been and continues to be extensively studied, the non-homogeneity of the water pathways make it difficult to predict which wells will be hot and which ones will not. Wells miles further from the source of contamination may be more radioactive than nearby wells. And with new multi-level wells, we've learned that contamination can vary significantly with depth.[7]

Tanner describes the often repeated mythology that "only traces of waste radioactivity were ever found just outside the INL boundary, even when it was being put directly into the aquifer by the

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[2] "Evaluation of Groundwater Impacts to Support the Natural Environmental Policy Act Environmental Assessment for the INL Remote-Handled Low-Level Waste Disposal Project," INL/EXT-10-19168, Rev. 3, August 2011. http://www.osti.gov/scitech/servlets/purl/1032018

[3] Idaho National Laboratory, "Assessment of Potential Flood Events and Impacts at INL's Proposed Remote-Handled Low-Level Waste Disposal Facility Sites," INL/EXT-10-18191, September 2010. http://www.inl.gov/technicalpublications/documents/4633207.pdf

[4] Post Register guest editorial by John Tanner, "No reason for scare tactics," printed December 12, 2014.

[5] Annette L. Schafer, A. Jeffrey Sondrup, and Arthur S. Rood. May 2012. "Performance Assessment for the Idaho National Laboratory Remote-Handled Low-Level Waste Disposal Facility." doi:10.2172/1044201. http://www.osti.gov/scitech/servlets/purl/1044201.

[6] Idaho National Laboratory, "Assessment of Geochemical Environment for the Proposed INL Remote-Handled Low-Level Waste Disposal Facility," INL/EXT-10-19385, Rev. 1, 2011. p. 59 and Tables 15 and 16.

[7] US Geological Survey website link: http://id.water.usgs.gov/projects/INL and INL bibliography at http://id.water.usgs.gov/INL/Pubs/INL_Bibliography.pdf

injection wells." Assuming for now an elevated 100 pCi/L as background level (which should actually be almost zero), well #14, over 12 miles from INTEC and over 5 miles outside the INL boundary, measured 90 times background back in 1965. Still call this a trace amount? [8] [9] [10]

I wish that folks who think the MCLs are adequate protection would volunteer to start ingesting MCL levels daily so that they can be the guinea pigs, not someone else.

The International Commission on Radiological Protection was populated mostly by weapons and nuclear industry promoters. Despite the mathematical elegance of their cancer mortality predictions, important independent critiques show the grave flaws in ICRP's under-prediction of health impacts. [11] [12] [13]

This waste already has other disposal options and it is unnecessary to place this waste above our aquifer.

Thatcher is a former nuclear safety analyst at INL and a nuclear safety consultant.

America's only Nuclear Reactor Operator Deaths

By Tami Thatcher

OK, I know how weird it is that I would be spending time during the holidays studying a nuclear "excursion" that happened back in 1961. But as I was looking at the written descriptions of first responders to the accident including fireman Egon Lamprecht, I kept trying to understand what really happened. And I kept coming across inconsistencies in the numerous official and unofficial descriptions of the accident.

[8] Using http://maps.waterdata.usgs.gov/mapper/index.html, the data for USGS well 14, about 12 miles south if INL facility INTEC can be viewed. Data from parameter code 07005 from 1965 shows tritium at 9000 pico Curies/Liter.

[9] Between 1952 and 1988, approximately 30,900 curies of tritium were discharged in waste water from Idaho National Laboratory's INTEC and Test Reactor Area facilities. See USGS June 1990 report 90-4090.

[10] Background levels of tritium in Idaho were estimated to range from 75 to 150 pico Curies/Liter, see USGS report 93-102, or USGS report 91-4015, and the EPA maximum contaminant level for tritium is 20,000 pCi/L. Various background estimates exist but background levels of tritium are currently stated as being below 150 pCi/L and many well measurements are considerably below 150 pCi/L.

[11] Rosalie Bertell, PhD, GNSH, "Limitations of the ICRP Recommendations for Worker and Public Protection from Ionizing Radiation," February 1998. http://www.ccnr.org/radiation_standards.html

[12] Stewart AM, Kneale GW, A-bomb survivors: factors that may lead to a re-assessment of the radiation hazard. *Int J Epid* 29:708-14, 2000, and Stewart AM, A-Bomb data: Detection of Bias in the Life Span Study Cohort. *Environ Health Perspect* 105(Suppl 6):1519-21, 1997).

[13] John W. Gofman, MD, PhD and Egan O'Connor, ICRP recommendations – Consultation Comment, December 26, 2004, (This link contains numerous links to related reports.) http://www.ratical.org/radiation/CNR/RMP/CommentsDRICRP.html

Everyone who's heard of the SL-1 reactor accident that killed the three men at the Idaho National Laboratory on the evening of January 3rd has heard that the accident was caused by manually pulling the center control rod too far during the reassembly of the control rod drives.

After the accident, calculations would reveal the rod height necessary to cause the "prompt critical" condition that would create such rapid heating of fuel that it caused a steam explosion—about 17.6 inches.

The center control rod would be found withdrawn 20 inches. Numerous accounts would say it was greater than this distance, including the Department of Energy's "Proving the Principle" which incorrectly states it was manually withdrawn 26 ½ inches.

Of the 20 inches it was withdrawn, it was initially already withdrawn by at least 2 inches. The operator needed only to bend down, clasp the vertical shaft and ease the 84 lb rod up an additional inch or two, wait for his co-worker to remove the c-clamp, and then lower the rod back down.

There was plenty of time for speculation about the accident as the investigation took months. Each of the victims would initially be misidentified until autopsy. The two operators on the reactor top had previously quarreled. It has been widely believed that operator with marital problems had lifted the rod deliberately despite autopsy conclusion that he had not: his hands were not damaged and contaminated enough to have pulled the rod.

It was the third victim, the supervisor of the crew, found impaled on the ceiling above the reactor, who had pulled the rod. And despite persistent rumors, no evidence of any "love-triangle" was ever found despite the extensive investigation of their personal lives.

The issues with stuck control rods at the SL-1 were downplayed in numerous Department of Energy reports. It was officially emphasized that the high reactivity worth center control rod had performed better than any of the other rods. They failed to mention, however, that the center control rod had stuck on 7 occasions, while the other rods had each stuck between 8 and 12 times. And they never mention the increased frequency of control rod problems in the prior month's operation.

The control rods could and did stick and for a variety of reasons. But little emphasis is given to the sticking prevalent in the shutdown position when a portion of the control blade extended below the core and the shroud. As the lower portion of the control blade was pulled up into the shroud, there was evidence of pre-accident "scouring" marks on more than one blade.

The Department of Energy's predecessor, the "AEC" made a film in the 60s describing the SL-1 accident that can be viewed on youtube. It stated: "Direct cause of the accident clearly appears to have been manual withdrawal of the central control rod blade by one or more of the crew

members —considerably beyond the limits specified in maintenance procedure. However, there was insufficient evidence to establish the actual reason for such abnormal withdrawal."

It was stated that simulations indicated that freeing a stuck rod would only withdraw the rod about 10 inches—again, insinuating that the 18 inch rod withdrawal had to be deliberate. But, their studies also showed that it did not require maximum effort for the rod to be moved 18 to 20 inches, and that it would take less than a third of a second for this travel—fast enough to cause the reactivity insertion for the resulting accident that was later found to have the vessel to jump 9 feet.

The careful omissions and downplaying of a multitude of serious design, operational, and oversight problems with the SL-1 reactor are revealing. It's time to acknowledge that the rod stuck, it was jerked free by a tired worker, and much of what has been said about the accident may be nearly as twisted as the damaged core.

A nuclear power plant near Howe?

Luke Ramseth reports in the Post Register 12/9/14; "A local investment group has picked a location for development of a commercial nuclear power plant in Butte County, just north of Idaho National Laboratory's desert site.

In an announcement late Monday, the group, called Twin Buttes Enterprises LLC, said it has spent three years examining "environmental, water, land, transmission, electrical demand and other regulations and requirements" for the site.

The group plans to pitch the location and its key attributes to prospective nuclear developers early next year, said Bob Skinner, a retired INL executive and member of the Twin Buttes group.

The proposed 1,840-acre property, owned by the Pancheri family, is located east of Howe and is flanked by INL's desert site on two sides.

Twin Buttes representatives presented the plan to the Butte County Commission on Monday afternoon. That was the first Commission Chairman Seth Beal had heard of it.

"Butte County's been comfortable for decades with nuclear energy because of the INL site," Beal said Tuesday. "So, it's not foreign to us, but it's difficult to really evaluate anything yet. It's just an offering."

The Commission agreed to draft a letter that would show broad support for the nuclear energy industry in Butte County, Beal said, but "we can't support any project, because right now, there isn't one."

Major contributors to the Twin Buttes effort include Skinner, Reed Nord, a local real estate agent, Ted Sorensen, an Idaho Falls engineer, and Christopher Hope, who has worked on several

international commercial nuclear power plant projects, according to a PowerPoint presentation made to the commission. In all, Skinner said there are about eight investors involved.

Twin Buttes LLC was approved for a certificate of organization by the Idaho Secretary of State on Nov. 21, records show.

But Skinner said the group of investors has been working on the idea informally for more than three years.

So far, Twin Buttes has secured an option on the land to build a power plant. It also has examined water access, and completed environmental and seismic background research. It also studied potential economic effects such a power plant would have on Butte County.

Skinner hopes all the preliminary legwork being done on the property will attract a nuclear developer, who will buy it.

One possible suitor could be the UAMPS Carbon Free Power Project, a proposed 600-megawatt small modular reactor plant working its way through the federal regulatory process. The project includes NuScale Power, which developed the reactor design, Utah Associated Municipal Power Systems, or UAMPS, which would own the plant and use the power, as well as Energy Northwest, the company that would operate the plant.

In October, NuScale Chief Commercial Officer Mike McGough told the Post Register that officials associated with the project still were scouting possible sites in Idaho, but said a site near INL site was a strong possibility.

As of Tuesday, Skinner said he had not been in touch with NuScale or UAMPS representatives. He said he planned to start reaching out next month.

“We recognize it’s just the first step in them trying to move forward,” Beal said. “It’s pretty preliminary.” lramseth@postregister.com

Radioactive Waste Cleanup Unit Takes Step Forward

Luke Ramseth reports in the Post Register 12/19/14; “The Integrated Waste Treatment Unit is meant to treat 900,000 gallons of liquid radioactive waste stored at the Idaho National Laboratory desert site, though it has struggled for years to get past the testing phase.

The Denitration Mineralization Reformer is one piece of machinery inside the first-of-its-kind Integrated Waste Treatment Unit at Idaho National Laboratory’s desert site. The facility, built to treat 900,000 gallons of liquid radioactive waste, has struggled for years to get past the testing phase.

Operators of a radioactive waste treatment facility at Idaho National Laboratory's desert site are hopeful that a highly complex, first-of-its-kind machine might finally be ready to do its job.

The 53,000-square-foot Integrated Waste Treatment Unit was constructed in 2007 to treat 900,000 gallons of liquid sodium-bearing waste and turn it into a powder similar to laundry detergent. It was supposed to be up and running two-and-a-half years ago.

But every time the unit fires up for testing, something breaks. Or clogs. Or loses pressure. Four times this year, the unit has begun testing and had to shut down for extended periods while repairs were made.

State-mandated deadlines regulating radioactive waste treatment have been missed repeatedly, and another will be missed at the end of this month. Government contractor CH2M-WG Idaho, or CWI, has been forced to spend tens of millions in cost overruns. Recent murmurs from experts outside the site have speculated the facility might never be able to treat the waste.

But this week, officials with CWI said major progress is finally being made. Still, it could still be several months before real radioactive waste starts circulating through the system.

"To see it get to this point has been extremely encouraging," CWI spokesman Erik Simpson said Thursday. "It's been a real shot in the arm to people associated with the project."

On Nov. 11, the unit's operators started bringing the plant up to the correct temperature and pressure, and did not encounter any issues. Then, in late-November, they successfully introduced steam to the system as a test.

On Dec. 2, operators started introducing "simulant," a material that mimics real radioactive waste.

They had never reached the simulant step before, Simpson said.

Some 22,000 gallons of simulant have pumped through the system so far, at 2.5 gallons per minute, he said. A total of 50,000 gallons eventually will be circulated through the system before officials are confident the unit is operating effectively.

Then, the facility will shut down for a month while a planned round of inspections are made. Several permit modifications also are needed from the Idaho Department of Environmental Quality.

After those steps are completed, simulant once again will pour into the system for a little while before operators start mixing in real radioactive waste. Simpson said he didn't want to speculate how far off treatment might be. Once treatment begins, however, the 900,000 gallons will take approximately 10 months to treat.

Treated waste will be packaged in stainless steel canisters and stored at the site until an underground repository can be found somewhere outside Idaho.

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