

Citizen Contributions to the Closure of High-Level Waste (HLW) Tanks 18 & 19 at the Department of Energy's (DOE) Savannah River Site (SRS) -13448

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ABSTRACT

Citizen involvement in DOE's decision-making for the environmental cleanup from DOE's management of its nuclear wastes across the DOE complex has had a positive effect on the cleanup of its SRS site, characterized by an acceleration of cleanup not only for the Transuranic wastes at SRS, but also for DOE's first two closures of HLW tanks, both of which occurred at SRS. The Citizens around SRS had pushed successfully for the closures of Tanks 17 and 20 in 1997, becoming the first closures of HLW tanks under regulatory guidance in the USA. However, since then, HLW tank closures ceased due to a lawsuit, the application of new tank clean-up technology, interagency squabbling between DOE and NRC over tank closure criteria, and finally and almost fatally, from budget pressures. Despite an agreement with its regulators for the closure of Tanks 18 and 19 by the end of calendar year 2012, the outlook in Fall 2011 to close these two tanks had dimmed. It was at this point that the citizens around SRS became re-engaged with tank closures, helping DOE to reach its agreed upon milestone.

Introduction: History of HLW Tank Closures at SRS

The first permanent closures of radioactive high-level waste (HLW) tanks in the world, closed under regulatory oversight and criteria (viz., the Department of Health and Environmental Control with the State of South Carolina, or DHEC, and the U.S. Environmental Protection Agency, or EPA), occurred in 1997. The closures began with a presentation to the Waste Management Committee of the Savannah River Site's Citizens Advisory Board (SRS CAB) in 1996 by Department of Energy (DOE) managers and SRS scientists and engineers. Subsequently, the SRS CAB recommended to DOE, DHEC and EPA, the three agencies with operational and regulatory responsibility for SRS, respectively, that "criteria be established to close the tank farms" [1]. The response by the three agencies to the recommendation by the citizens was signed jointly by all three agencies:

"We are pleased to receive ... Recommendation No. 15 ... We agree that establishment of closure criteria and the subsequent development of a tank closure plan is important and have initiated the process to determine acceptable closure criteria that is protective of human health and the environment. ... [The three agencies added that] The development of the tank criteria will be a coordinated effort and will involve experts from our agencies. Additionally, other U.S. Department of Energy sites ... will be involved ... [and that] DOE is also performing an Environmental Assessment ... [and will] conduct public meetings ... [to] answer any questions and address any concerns that may exist."

Lawsuit by NRDC interrupts progress on new tank closures

For its efforts to close the first two HLW Tanks across the DOE complex, DOE-SR won the prestigious U.S. Vice President's Hammer Award in 1998.¹ However, no additional tanks would be closed for some time, despite new recommendations by the SRS CAB (e.g., [2]). As DOE was preparing to close additional tanks, Natural Resources Defense Council (NRDC) and others had sued DOE:

"It's stunning that the Energy Department is trying to cut corners when dealing with a substance as dangerous as high-level nuclear waste. The agency says it would like to accelerate cleanup," [NRDC attorney] G. Fettus added. "We would like the cleanup to take less time, but not by stashing thousands of tons of the nation's most radioactive waste under a concrete cap in leaky tanks and hoping no one notices."²
[3]

NRDC had petitioned the Federal court to prevent DOE from using DOE's own criteria to determine when HLW tanks were sufficiently cleaned, meaning that a HLW residue would be left behind that DOE planned to reclassify as "wastes incidental to reprocessing" (WIR), i.e., effectively redefined as low-level radioactive wastes. NRDC's lawsuit was successful.

Progress Resumes, and Halts. New Technology and Interagency Squabbles Derail Progress

By precluding DOE from reclassifying its HLW tank residuals as WIR wastes [4], the court order effectively stopped DOE from closing additional HLW tanks. In 2004, however, Congress passed the National Defense Authorization Act (NDAA) of 2005 [19]. Section 3116 of the NDAA gave DOE the authority it needed to determine whether its WIR residuals were indeed LLW [20]. But at about the same time, new "Mantis vacuum" tank cleaning technology became available to DOE in 2005; as a result, DOE decided to wait for a demonstration of the new technology to determine whether it was effective at reducing the residuals remaining in the HLW tanks.

The new Mantis tank cleaning technology was deployed in 2006-7. It significantly reduced the residuals in the tank.

Try as the SRS CAB might over the years [21],[22],[23], their matters more or less remained unresolved until the Fall of 2011. Part of the delay can be attributed to many years of oscillations between DOE and the Nuclear Regulatory Commission (NRC), given an oversight role by Section 3116, in deciding whether DOE would use its or NRC's models to cleanup the tanks. In a letter to DHEC on the closure of Tanks 18 and 19, Lawless reviewed the problems between DOE and NRC [12]:

... the addition of NRC to the decision process initiated a series of criticism levied by NRC against DOE's modeling techniques that did not end until DOE adopted NRC's models yet without proof of improved public safety. As a result, the closure

¹ Appendix G. Artifact Inventory (1997-2001), http://www.c-n-t-a.com/heritage_files/crmpg.pdf

of Tanks 18 and 19 were postponed from 2007 until 2012 while this debate raged, even though there was to my knowledge no scientific evidence adduced to indicate that closure as had been planned in 2007 by DOE would have harmed the public or environment over a 10,000 year time frame. Nor, to my knowledge, has any benefit to the public been established, despite spending many more millions of scarce dollars in additional cleaning and modeling. Consequently, these additional steps implemented by DOE to clean tanks 18 and 19 with newer tank cleaning technology were taken at great expense in order to assure NRC that closing these tanks presents no threat to the public, the environment or workers at SRS. ... This extraordinary attention to safety leads me to recommend that HLW tank closures should not be interrupted at the same time that a lack of funding is looming. Instead, I recommend that DOE accelerate the closure of tanks 18 and 19 to close them by the end of 2012 or sooner ...

Budget Issues and Lost Momentum. “HLW Tanks 18 & 19 May Never Close”

An informal discussion with Terrell Spears, DOE SR’s Deputy Designated Federal Official (DDFO) for the SRS CAB,² indicated that the closure of the Tanks had lost budget priority and at the same time that their timely closure may have become less important to the SRS CAB compared to other matters. Later, his comment was supported in public at the bimonthly meeting of the SRS CAB in November 2011 by Wilson, DHEC’s Federal Facilities Liaison [7]. She said “that Dr. Moody [the Manager, DOE-SR] mentioned earlier that some of the goals for High Level Waste Tank Closure have been set-back due to budget constraints ...” (p. 14, [7]).

At this same meeting in November 2011, a formal review of HLW tank closures began with a presentation on the NRC’s Technical Evaluation Report (TER; see [6]), by McKenney, NRC (p. 19, [7]). Regarding the Waste Determination for the F-Tank Farm Facility at SRS, McKenney

... reviewed NRC results and recommendations on Tanks 18 and 19, stating that no concerns were identified with respect to the Tank 19 closure; however, Tank 18 is a type four tank, which is a tank without a secondary containment, and it is also located on the corner of the facility. He said it has the highest residual inventory of all the tanks in the tank farm, and explained that type four tanks have the shallowest groundwater underneath them. He then listed a recommendation that stated DOE will evaluate all options for the delaying of closure for Tank 18, and reviewed the reasons for this recommendation.

At this same November meeting, Ross, a manager in DOE-SR’s Waste Removal and Tank Closure Section, said (p. 22, [7])

... there was a mutual decision made by DOE, EPA, and SCDHEC to cease waste removal. She said the regulatory driver was the Federal Facility Agreement (FFA). She explained the decision, stating that waste removal activities may cease for a specified tank or system. She said the three agencies, DOE, EPA, and SCDHEC, must mutually agree, and the agreement is needed by March 2012 in order to

² During a Waste Management Committee meeting (2011, 10/18), Aiken, SC.

support meeting [the SRS site's Federal Facilities Agreement] FFA commitment. ... [SRS] CAB Chair Bridges asked if there was anything that could keep DOE from closing Tanks 18 and 19. Ms. Ross said the Secretary of Energy could decide to not close the tanks at this time.

Wilson, DHEC, commented regarding NRC's TER [6] that (p. 22, [7]):

... when she looked through the TER, and saw the recommendation for the delay of closure of Tank 18, she said what she was looking for in the report was a "red flag." She said she surmised that if the additional information, in terms of the solubility studies, turns out to be unfavorable, and if many things break down at inopportune times in the tank system, there may be an elevated risk of some sort, which would happen 30,000-40,000 years into the future. She said there are a lot of "ifs" and uncertainties, and nothing definite. She explained all of these things come from the use of a predictive model, which she described as a useful tool, but as imperfect. She explained how this tool is imperfect and how different, unforeseen variables, could change the outcome. She said it is not the only tool they use. [SRS] CAB Chair Bridges commented that looking so far into the future is overly conservative. Ms. Wilson said the time frame and measurements are criteria cited in the NDAA for consideration.

Citizens Step In. Letter by W.F. Lawless to DOE-SR and SRS CAB

During the time set aside for public comments, Tom Clements, Friends of the Earth, spoke to the SRS CAB first (p. 10, [7]). Paraphrasing, Clements encouraged the CAB's members to not rush into closing the HLW tanks prematurely. Following Clements, Lawless [5] made the following recommendation in a formal letter that he had submitted to DOE and to the SRS CAB:

The National Defense Authorization Act (NDAA) of 2005, especially Section 3116, authorized DOE to resume closing its HLW tanks. In the past, the SRS CAB has supported the resumption of closing the HLW tanks (e.g., reviewed in 2005, see R#204, "3116 Implementation--High Level Waste Tanks"). Many additional steps have been implemented to clean tanks 18 and 19 with state of the art remediation technology in order to assure the public that closing these tanks presents no threat to the public, the environment or workers at SRS. In addition, various institutions (i.e., the Nuclear Regulatory Commission, the SC Department of Health and Environmental Control, the Environmental Protection Agency, and DOE) as well as scientists (i.e., the National Academy of Sciences and the Defense Nuclear Facilities Safety Board) have overseen the closure process for tanks 18 and 19. This extraordinary attention to safety leads me to recommend that HLW tank closures should not be interrupted at the same time that a lack of site-wide funding is looming. Instead, I recommend that DOE accelerate the closure of tanks 18 and 19; that the agencies and scientists continue to provide updates to the public on closures; and that the agencies and scientists provide to the public a review of lessons learned and improvements to accelerate future closures.

WM2013 Conference, February 24 – 28, 2013, Phoenix, Arizona USA

SRS CAB Re-engages with Tanks 18 and 19

On January 23, 2012, the SRS CAB's WM committee drafted a proposal; its Chair, [SRS] CAB member Burke, presented it to the public for comment and (p. 4, [8]):

... outlined what the CAB recommends concerning the closure progress of tanks 18 and 19. He said the CAB wants to move forward with both of the tanks, as quickly as safety standards permit, keep the public informed, and review the progress in the future to make sure the tanks are closed in an expedient time frame.

The WM committee report on January 23rd was followed by the formal recommendation, approved by the SRS CAB, on January 24th; it recommended to DOE in part that it should [9]:

Take extraordinary measures to meet or exceed the schedule for closure of Tanks 18 and 19 consistent with the FY 2012 closure schedule and not delay closure unless significant safety issues are raised.

DOE-SR replied to the SRS CAB's recommendation that [9]:

... I am pleased to share that the closure of Tanks 18 and 19 is of highest priority not just to the Savannah river Site but also within the DOE Environmental Management Program. As such and in concert with the South Carolina Department of Health and Environmental Control and the Environmental Protection Agency, the tanks are on schedule to close before the end of 2012.

After the SRS CAB recommendation in January 2012, DOE performed a Supplemental Analysis to its EIS [11]. It reviewed existing cleaning technology and the new vacuum technology before deciding that the latter had been effective (p. 7), that the WIR residuals in Tanks 18 & 19 were indeed LLW (p. 8), and that the closure of tanks 18 and 19 could proceed without the need for "further NEPA documentation" (p. 15).

DOE Headquarters Acts Swiftly

While on an overseas trip, Dr. Stephen Chu, DOE Secretary, signed the Waste Determination (WD) document for the closure of Tanks 18 and 19. As a result, DOE-HQ had formally approved the WD determination with the support of the State of SC and EPA regulators and NRC [10]:

... the Secretary of Energy determined that the waste in the FTF: (1) Does not require permanent isolation in a deep geologic repository for spent fuel or high-level radioactive waste; (2) has had highly radioactive radionuclides removed to the maximum extent practical; and (3)(A) does not exceed concentration limits for Class C low-level waste and will be disposed of in compliance with the performance objectives in 10 CFR part 61, Subpart C and pursuant to a State approved closure plan or State-issued permit; or (3)(B) exceeds concentration limits for Class C low-level waste but will be disposed of in compliance with the performance objectives of 10 CFR part 61, Subpart C; pursuant to a State-approved

closure plan or State-issued

Just As Swiftly, DOE-SR Acts to Close the HLW Tanks 18 & 19

SRS initiated the closures of tanks 18 and 19 in March 2012. A news release by DOE-SR made it into the public media on March 29, 2012.³

Savannah River Site contractors have made the most significant dent in decades in efforts to clean up some of the planet's deadliest radioactive waste, according to the U.S. Energy Department. In a conference call Thursday with reporters, Under Secretary for Nuclear Security Thomas D'Agostino said two of the site's remaining 49 underground high level waste storage tanks have been cleared for final closure after a multi-year, \$50 million effort by liquid waste contractor Savannah River Remediation. Tanks 18 and 19—located in the site's F Area—were deemed the most vulnerable to failure and earmarked as the first to be emptied and sealed, he said.

Subsequently, and paraphrasing the informal comments by Terrell Spears, DDFO, "... the decision by DOE-HQ to close tanks 18 and 19 was the fastest action I have witnessed by DOE HQ in my many years of service with DOE."

Celebration Ceremony at SRS

In the spring of 2012, the closure of HLW Tanks 18 and 19 was planned for October 1st, 2012. The closure and its celebration were completed on time and as scheduled.

According to the DOE News Release,⁴

Successful closure of SRS Tanks 18 and 19 signifies the most substantial environmental risk reduction achievement for the State of South Carolina since 1997 when DOE closed Tanks 17 and 20, the first for SRS and the Nation.

An account in the nuclear decommissioning industry's trade journal followed:⁵

"Officials from the U.S. Department of Energy gathered with congressional and state leaders this month to celebrate the closure of two Cold War hazardous waste tanks at the Savannah River Site (SRS).

Closure of Tanks 18 and 19 signified the most substantial environmental risk reduction achievement for South Carolina since 1997, when DOE closed Tanks 17 and 20 at SRS. Those were the first underground radioactive waste storage tanks closed in the nation.

³ The *Augusta Chronicle* (2012, 3/29), "Two SRS nuclear waste tanks cleared for final closure".

⁴ USDOE(2012, 10/1), "SRS Celebrates Closure of Two Additional Radioactive Waste Tanks" (from http://www.srs.gov/general/news/releases/hr12_srs-closes-2tanks.pdf)

⁵ *Nuclear Decommissioning Report* (2012, 10/16), "Commemorating a Historic Cleanup Milestone".

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U.S. Energy Under Secretary for Nuclear Security Thomas D'Agostino congratulated SRS employees for accomplishing the tank closure milestones safely and ahead of schedule. The closures were completed three months ahead of the Dec. 31, 2012, regulatory deadline.”

Theory

Competition leads to better, quicker decisions. But to understand DOE's mismanagement of U.S. military nuclear wastes generated during the production of nuclear weapons, Lilienthal [13], the first chair of the U.S. Atomic Energy Commission (AEC), succeeded now by DOE, recognized that AEC's policy of self-regulation, isolated from competitive challenges, compromised the practices of its scientists.

Until 1983, hidden behind claims of national security, DOE maintained to the U.S. Congress that it was protecting the air, water and soil (p. I-1, [14]). However, after extraordinary environmental contamination across the entire DOE complex was exposed (this occurred in 1985; it was reviewed in [15]), the public and Congress forced DOE to comply with US Environmental Protection Agency (EPA) and State regulations. The estimate today is about \$200 billion just to cleanup Hanford, WA, and Savannah River Site (SRS), SC, the two sites in DOE with the largest budgets.

The DOE cleanup after 1983 has become more competitive and successful. Today, DOE faces competitive threats to its interpretations and its oversight from multiple sources. The National Academy of Sciences, the Defense National Facilities Safety Board, and DOE's Citizen Advisory Boards (CABs) have joined with EPA and State (DHEC) regulators, and with the NRC for the HLW tanks, to challenge DOE's decisions. In this new environment, DOE has made significant strides in cleaning up its complex, especially at SRS (Lawless et al., 2010).

But we also attribute the greater success at SRS to the additional competition generated by the SRS CAB and its community compared to the Hanford CAB and its community. The SRS CAB makes its decisions by majority rule, which generates more conflict but also more information processing as a result; its decisions are also made more quickly. In contrast, at Hanford, its CAB makes decisions based on consensus-seeking, which is slower, makes decisions that produce fewer if any concrete calls for action, and, surprisingly, generates more conflict between it and its DOE sponsor [17].

Future Citizen Plans

At next year's Waste Management conference, we hope to report on a new initiative under consideration by SRS citizens, the SRS CAB and DOE-SR. SRS already transfers vitrified HLW (vHLW) across SRS from its Defense Waste Processing Facility (DWPF) to temporary storage in its second Glass Wastes Storage Building (GWSB#2) in a shielded canister transport vehicle [18]. A new GWSB#3 is needed in 2015-16 at a cost of \$100M to \$150M. If those funds are not available, it could shut down DWPF operations at SRS. Funding for SRS in out-years is threatened, adding to the likelihood that GWSB#3 will not be built. Instead of GWSB#3, an alternative storage pad is under consideration at a significantly lower cost. The CAB should

support this alternative.

Three major barriers exist to shipping the SRS vHLW to a repository such as WIPP:

- A dedicated and very expensive shipment facility is needed at SRS;
- A new and expensive shipment cask is needed for the vHLW; and
- A new and expensive transport vehicle is needed to ship the vHLW from SRS to a repository such as WIPP.

However, a lower cost alternative is possible that saves a significant sum of money over the next three years, builds a shipping facility now, and adapts an existing cask and transport system in order to rid SRS and its citizens of the vHLW in the immediate future. Back-of-the-envelope calculations indicate that a dual-use integrated facility could be built with the funds already planned for the temporary pad storage alternative to GWSB#3. If true, then using an existing TRU transport system for remote handled TRU waste could be adapted for vHLW and included in the significantly reduced overall cost and licensed to ship the vHLW from SRS to WIPP at virtually no extra cost (e.g., a \$1M payment to NRC was mentioned at the SRS CAB meeting by Dr. Dave Moody, 10/29/12).

The citizens and the SRS CAB are considering the following recommendation for DOE, that DOE:

1. Replace the new GWSB#3 with a temporary dual-use storage pad at SRS that can serve to store vHLW temporarily, and then also potentially be used as a dual-use facility to ship the vHLW away from SRS to a repository.
2. Adapt the Remote Handled Tru waste-shipping cask (72B) to carry the SRS vHLW canisters.
3. License the RH 72B to transport the SRS vHLW to a repository.
4. Implement a demonstration at SRS and WIPP of items 1-3.
5. Provide a feasibility and cost benefit analysis of items 1-4.

Conclusion

Citizen involvement in DOE's cleanup of its mismanagement of nuclear wastes across the DOE complex have had mixed effects. While sometimes being harshly critical of operations at both SRS and Hanford, compared to Hanford, citizen involvement in DOE's decision-making for the cleanup of its SRS site has had a much more positive effect on the rate and effectiveness of cleanup at SRS, characterized by its acceleration of the cleanup of its legacy TRU wastes, by the closure of its HLW tanks 17 and 20, and, after a 15-year delay, now by the closure of HLW tanks 18 and 19 at SRS. It is also characterized by the strong show of support of SRS from the SRS CAB, by citizens who make concrete recommendations to DOE-SR, and by citizens and SRS CAB who together make strong demands of SRS to accelerate the cleanup of SRS while at the same time that SRS is being environmentally effective and safe for the employees at SRS and for the public who live around and work near SRS.

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