



Los Alamos Study Group

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Special Report

Draining the Nuclear Swamp LANL's Radioactive Liquid Waste Projects

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In a span of seven years, NNSA and LANL pursued three different designs for liquid waste treatment projects. Fifteen years in the making and after more than doubling or tripling in price, this project is still not finished.

Albuquerque, NM - The Department of Energy (DOE) is [soliciting](#) contractors to take another crack at designing and building the Transuranic Liquid Waste (TLW) operation at Los Alamos National Laboratory (LANL). The TLW, where plutonium and other transuranic liquid wastes are processed, is a dedicated structure associated with the lab's Radioactive Liquid Waste Treatment Facility (RLWTF), located in Technical Area 50 (TA-50), the main radioactive liquid waste management zone. The RLWTF [began service in 1963](#) (p. 5) and has been going through a rocky end-of-life and replacement turnaround.

The [invitation](#) to participate in the TLW project is unusual in that the mission was suspended in September 2017 with 100 percent of its design complete. The new solicitation describes a project that is expected to go back and start over at the 60 percent completion point and go forward from there with a revised design. The halt was attributed to budget problems and schedule conflicts along with competing priorities, according to the Defense Nuclear Facilities Safety Board (DNFSB) in a [Sept. 22, 2017](#) site report.

The proposed restart is especially remarkable in the light of the almost two decades that have been spent trying to hold the RLWTF together long enough to build a replacement. By coincidence, the DOE Inspector General (IG) recently updated a periodic [audit](#) detailing the laboratory's long-term inability so far to complete the overall job. The audit focuses on the twelve years (2006-2018) that LANL was managed by Los Alamos National Security (LANS), a limited partnership led by Bechtel and the University of California (UC), operating under contract with the National Nuclear Security Administration (NNSA), the nuclear weapons arm of DOE.

"Because of the importance of the project, we conducted this audit to determine whether NNSA and LANS effectively managed the RLWTF," the IG wrote. Still unfinished the radioactive liquid waste treatment project has been a spectacular management failure.

A formal *Capital Projects Assessment* ([IG audit, p. 3](#)) conducted by LANS managers in November 2016 summed up LANS performance at that point as having "specific systemic issues in subcontractor bidding, selection, and management," and particular recent problems with cost overruns and schedule delays.

As discussed below, the difficulties encountered by LANS in the course of building a new treatment facility were an important factor in the lab's eventual failure to receive a passing grade in its [FY2015](#) performance evaluation report (PER), a major factor in eventual contract termination.

As of November 1, 2018, LANL and its RLWTF project have been under a new management team, Triad National Security, led by three non-profit organizations – Battelle, Texas A&M, and UC, the original manager and a partner in

the two consortia that have operated LANL since then. Time will tell whether the new management configuration will be able to improve on LANS poor performance.

Dating back to 1963, the RLWTF at Los Alamos has enabled removal of a variety of low-level nuclear materials from LANL's radioactive liquid drain system, including plutonium and other transuranic waste produced in the process of fabricating nuclear weapons. Over time corrosion and age gained the upper hand, causing more frequent failures and requiring or threatening a halt of processing and cleanup operations during periods of repair. A decisive moment occurred when a [leak was discovered](#) in a storage tank at the RLWTF and 300 gallons of a toxic liquid were found in a backup container. Although none of the contents escaped into the environment, it was enough to give the inspectors pause.

"...[C]leaning up after a leak would be radiologically challenging," the DNFSB noted in a [July 30, 2004 weekly site report](#). "Repair or replacement also looks difficult. More time to address the issue could be gained by expediting replacement of the leaking caustic waste receipt tank, but progress on replacement has been glacial." Meanwhile managers were faced with the growing risks that the facility might overflow.

In the ensuing years, employees frequently [remembered](#) the May 2000 Cerro Grande wildfire when the RLWTF had to be occupied around the clock as an extra safeguard during the crisis. It was referred to often over the course of the next fifteen years as a dangerous vulnerability, a "[single-point-failure](#)" for processing nuclear materials at the lab.

Slow start, long delays, safety issues

Preliminary planning and design activities for a replacement facility were formalized by 2004 and construction began two years later.¹ Then, in June 2006, at the end of LANS's first month in charge of the LANL contract, one of the laboratory's more gruesome construction accidents occurred.

Two iron workers employed by a subcontractor were injured, according to the official account, "one seriously, when a metal staircase fell, while being hoisted by a mobile crane during installation ..." The 1500-pound staircase slipped out of an inadequately rigged noose and fell about 55 feet, landing in the lap of one of the workers who was seriously injured.

An official investigation report, "LANL Internal Investigation Report: [LIIR] Dropped Staircase Injures Two Workers at TA-50 Construction Site at Los Alamos National Laboratory on June 28, 2006," LA-CP-06-0722, Aug. 1, 2006, described the incident in medical detail. Labelled "official use only," this report was obtained by the author, a local journalist at the time. "Along with a concussion, fractures of the left tibia, right ankle and pelvis, there was a "right scrotum tear with extrusion of right testicle." The worker spent three weeks in hospitals and faced another 6-12 months of physical therapy and uncertainty about the degree of impairment due to his injuries.

The accident investigation team produced a thorough examination of the event. Lists of causal factors were extracted from the evidence, accident analysis, and eye-witness accounts. Lessons to be learned were drawn up to avoid future occurrences. A major conclusion was that those who participated in the accident had not learned the lessons that were supposedly already known.



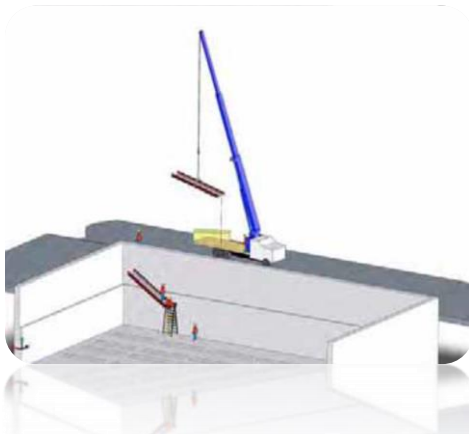
Construction of Radioactive Liquid Waste Treatment Facility (RLWTF), Technical Area 50. LANL Project Overview and Status presentation, April 18, 2016. ([LA-UR-16-23398](#))

¹ There was considerable planning for an RLWTF replacement in the 1990s, which we do not include here. The RLWTF saga is therefore actually much longer, with even more reversals and mistakes than presented here.

For one thing, the investigators said that they thought it was the first time LANL personnel had taken on the role of general contractor for such a large and difficult job (LIIR, p.23). The postmortem revealed a raft of irregularities and ill-advised practices in the subcontracting procedure and employee selection. The main subcontractor struggled to fill lower-tier subcontracts.

Among other problems:

- The person-in-charge, as listed on the work document, had left the company months earlier. Nobody was in charge. (LIIR, p.44)
- LANL failed to identify indicators of prior safety performances, including a work-related fatality in 2003 of the sub-tier contractor (LIIR, p.23).
- The lower section of the stairs was rigged with a sling with only one lift point. The single choke hitch was not enough to secure and control the load. When it started tilting, there was nothing to hold it horizontal, so it went vertical and slipped out.
- No cone of safety was established in which all hands would be clear from danger. The lift began and continued with workers directly under the load.



The load approximately 55 feet above the floor of the tank room. (LIIR)

The specific hazards of hoisting and rigging, moreover, turned out to be a major area of concern, well beyond the crane incident at the RLWTF. Giving the matter a closer look, a LANL team found widespread failures in ensuring adequate inspections and maintenance for operating cranes, hoists and rigging across the site. A follow-up effort used locks and tags to identify non-compliant equipment. Dozens of cranes were removed from service. At about the same time another safety push found hazards stemming from [deferred maintenance](#) of equipment.

Flash forward. As recently as March 2019, a safety inspector at LANL [reported](#) that “workers lost control of a laser table weighing about a metric ton (about 2200 lbs.)” while moving it into an office building. The new Triad management started an investigation after connecting that incident to “a recent trend in rigging incidents.” It might be described more accurately as: “A persistent pattern of rigging incidents.”

The “housekeeping” behavior of the construction contractor was faulted for piles of junk and line of sight obstructions that also suggested a lack of focus. Other dangerous human performance factors were taken into account in the internal investigation report -- an inexperienced crane operator, for example, new to the site and new to the “blind-lift” sling maneuver he had to perform. Incidentally, nobody in the crew spoke up when the crane started dangling the noose with a heavy load in a precarious position, another sign of inadequate training. In conclusion, a phrase from the investigation report sums it all up: “Inaccurate risk perception.” (LIIR, p.92)

To some, the RLWTF accident seemed a metaphor for the laboratory itself. Greg Mello, Los Alamos Study Group executive director, who has studied the institution and its complex issues for nearly 30 years, said, “Rigging incidents seem to be a perennial institutional issue. This one was emblematic of LANL management’s slipshod practices that keep landing in NNSA’s – and New Mexico’s - lap.”

The staircase incident was a shock to the project, requiring extensive self-examination and corrective actions. In conjunction with budget perturbations endemic to an age of appropriation by continuing resolution, changes of scope, bad planning, and poor sensitivity to lessons learned among other challenges, brought the project to a stop for several years.

The RLWTF replacement concept shifted from the original, dual facility containing capacity for both low-level and transuranic liquid wastes to two separate facilities in 2005, back to one in 2006, and back to two facilities again after five more years on a back burner.

On September 10, 2010, the DNFSB issued its first ever periodic “[Report to Congress on Infrastructure Needs in the Department of Energy's Aging Defense Nuclear Facilities](#).” In this report the DNFSB designated the RLWTF, along with LANL’s Chemistry and Metallurgy Research Facility and the Plutonium Facility (PF-4) on the short list of “most significant safety-related infrastructure issues” within the DOE’s nuclear weapons complex.

In a span of seven years, NNSA and LANL pursued three different designs for liquid waste treatment projects. Fifteen years in the making and after more than doubling or tripling in price, this project is still not finished. The RLWTF replacement, in the planning since 2004, was [scheduled for completion in 2017 and the TLW in 2020](#) (p. 2), within a loose cost range of \$202-270 million. The original estimated cost range was \$61-86 million.

DOE/NNSA budget and schedule information has become less informative in recent years, with accounts now split between RLWTF, TLW and other subprojects. Funds are reprogrammed with minimum explanations. A budget request sheet for FY2020 indicates the RLWTF is expected to be completed in FY2019, while the TLW stretches into the following year. The project can no longer be compared to the earlier budget figures and do not appear to anticipate the latest re-design and building for the TLW, currently scheduled to begin in October 2020.

Mello: “Last year they didn’t have very much detail about the projects. What has happened now is that we don’t have a project data sheet for lots of projects, even the big ones.”

The March 2019 IG [audit](#) of the two projects, updates a chronology of poor management, going back to late 2015 and lambasting the design process for a number of overlooked details that, taken together, were disruptive. There were designs modified in execution without modification, an inconsistent design document that caused the construction subcontractor to sit idle while corrections were made. A chunk of time was lost when it was discovered that specialized equipment ordered from the original design no longer existed, because the project had dragged on. Then the substitute equipment was found to be too large for the allotted space.

The March 2019 audit (p.4) pointed to a procurement weakness as a prominent cause of subsequent problems.

LANS’ decision to award the construction subcontract for the LLW facility to the lowest-cost, technically acceptable subcontractor allowed LANS to select a minimally-qualified but technically acceptable subcontractor that proved unable to successfully complete project tasks.

Several passages in the [FY 2015 Performance Evaluation Report \(PER\) for LANS](#), the basis for determining annual incentive fees and contract extension approvals, virtually define a failing project. The project fell behind schedule each month during the previous year, ending five months behind schedule.

On this project, the Laboratory itself has spent more in management and oversight costs (\$3.2M) than the \$2.6M in contract work that has been performed, and this Laboratory oversight spending was not effective in recovering the project’s schedule and cost variance, now at -\$4.5M of work.

The next year, the [LANS PER for 2016](#) expresses a “last-straw” level of exasperation.

[T]he Laboratory repeatedly missed design milestones and the quality of the design effort and deliverables have been inadequate with incomplete or missing design elements....The RLWTF LLW project is above budget and behind schedule....NNSA has repeatedly documented its concerns with the Laboratory performance and the Laboratory response and/or actions have consistently been inadequate and unsuccessful in improving its performance....The RLWTF Transuranic Liquid Waste (TLW)....and the Laboratory performance is also rated at below expectations repeatedly missing design milestones. In addition, the quality of the design effort and deliverables have been inadequate with incomplete or missing design elements.

In a concluding attachment to the March 2019 IG audit, Lisa Gordon-Hagerty, NNSA administrator, accepts the auditors' blistering critique as a compliment for the oversight provided by NNSA project managers in Washington for having recognized and sought resolution for such difficult issues at LANL. Gordon-Hagerty concludes her public response to the IG with something of a non-sequitur: "Notwithstanding the findings on this project, since 2013, NNSA has completed 6 projects at LANL, valued at \$667M, 3.5 percent under their original budgets," she writes, without specifying the projects or what they justify in this context. She also refers to "technical comments" sent under separate cover.

Is LANL up to the test?

The LANL enterprise -- which includes the laboratory itself, newly managed by the Triad Corporation under a contract with the NNSA and DOE -- is approaching four-score years of age. The most recent twenty years have featured a spotty record in management of safety, large project construction and in radioactive waste handling.

The undistinguished safety record of LANL and its waste-handling reputation crashed to a new low on Valentine's Day 2014, when several radioactive containers [inappropriately packaged at LANL](#) (p. ES-6) were found to have erupted at the Waste Isolation Pilot Plant (WIPP) in Southern New Mexico, playing havoc with schedules, cleanup priorities, budgets, storage and logistics across the complex. WIPP did not resume waste deposits until April 2017.

Under certain future scenarios, including a newly proposed, previously unsuccessful role building and operating an infrastructure for manufacturing plutonium pits for a new nuclear weapons modernization program, all of LANL's weak points are likely to be exposed to extraordinary new pressures.

A compelling warning stands out among the last sentences in the most recent IG audit: "Currently, the RLWTF represents a potential single point failure for all Los Alamos programs that generate radioactive liquid waste." It is not the only one.