

Independent Analysis
Tritium R&D Facility Consolidation

October 2008

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Executive Summary

This task originated as an independent business case analysis of the alternatives for locating the tritium R&D facility. The main function of this facility is to support R&D for the weapon gas transfer system (GTS). The important decision on the table is whether or not to close the existing LANL tritium R&D facility (WETF) and establish these R&D capabilities in the tritium facility complex at the SRS. Therefore, the term “consolidation” in the report title refers to the possibility of further consolidating all weapons tritium facilities at the SRS.

After an initial review of the NNSA IPT data, we concluded that our analysis would not fundamentally change the economics of the alternatives for the decision-maker. To first approximation, this conclusion is drawn by looking at the upfront capital investment dollars and potential reductions in FTEs to amortize the investment over time. When this is coupled with the inherent uncertainty of predicting the R&D work well into the future, we concluded that a full independent business case analysis would result in more precision than accuracy and add little value to the decision-maker.

Thus, the objective of the task was changed to provide advice to the NNSA IPT on their business case development in regard to its overall quality and credibility. This includes an evaluation of the programmatic objectives, benefits and risks of the alternatives, and we believe these factors to be more important to decision-making than the economics. Our initial advice on the NNSA IPT business case was provided to the NNSA in briefings conducted for NA-10 and NA-1 in July 2008. For completeness, the NA-1 briefing is attached as Appendix A. The IPT has taken much of our advice and they have made the changes to their report that they believe appropriate.

This report provides a more comprehensive perspective on the decision-making framework for the tritium GTS mission than provided in the July briefings. It is intended to complement the NNSA IPT business case report, not substitute for it. Recommendations are provided for reducing the programmatic risk of implementing changes to the current GTS mission assignments.

Tritium R&D Facility Decision

As a stand-alone decision, we conclude there is no convincing programmatic or economic case for closing down the LANL tritium R&D facility and re-establishing the capabilities at the SRS tritium complex. In the near-term, the move to SRS requires a capital investment to acquire R&D capability that currently exists at LANL. In the longer-term, since the estimated staffing reduction at the SRS is only about half-dozen or so FTEs, there is little opportunity to amortize the roughly \$58M upfront investment in new capital equipment (\$35M) at the SRS and D&D of the LANL tritium facility (\$23M) in less than 20 years.

Since the estimated staffing requirement at either location is approximately the same, the only way to amortize the upfront investment is to consider a half-dozen or so FTEs as free labor “leveraged” from the economies-of-scale of the much larger tritium infrastructure at the SRS. The \$35M investment in capital equipment is not a large number for making modifications in a nuclear facility and the D&D cost for the LANL tritium facility should be reasonably credible

since LANL has actually done this type of work recently. So even if you reduce the \$58M estimate, the investment still has to be amortized by the promise of free labor at the SRS. Nonetheless, it is reasonable for the NNSA to regard the SRS tritium complex as the center of gravity for weapons tritium work in the long-term. Therefore, our recommendations are focused on lowering the risk of transition should the ROD on the SPEIS choose the SRS.

Programmatic Risk of Three Tritium GTS-related Decisions

In the evaluation of programmatic risk for the tritium R&D facility, the NNSA IPT analysis includes two other tritium GTS-related decisions outside the SPEIS process. While this report is not an independent analysis of NNSA decisions to consolidate to one GTS design agency (DA) and transition GTS component production to a new plant site (KCP to KCRIMS), we would be remiss in our assessment if we did not comment on the potential programmatic risk of concurrent implementation of all three decisions. Of the three decisions, the DA decision is the most important because the DA decides what R&D facility capabilities will be needed and the DA must re-qualify the GTS production lines after transition to the new plant site. Our recommendations are focused on lowering the programmatic risk of trying to implement all three decisions concurrently if changes are made to the current GTS mission assignments.

Recommendations

Our recommendations should in no way be construed as an endorsement for changing the current arrangement for executing the tritium GTS mission. The tritium GTS mission is too important to the safety and reliability of the stockpile, too important to NNSA and DOD operations and too successful to change without identifying substantive programmatic or economic benefits to offset the risks.

- If the tritium R&D facility capability is to be established at the SRS, then the WETF facility at LANL should remain fully operational until such time as the R&D capabilities are demonstrated to be fully operational at the SRS.
- If the DA is consolidated to one laboratory, then both DAs should remain fully operational until such time as the GTS production lines have been re-qualified at the new plant site. The original DA should retain complete responsibility for its GTS during this time.
- The original DA should lead the team to re-qualify the production line at KCRIMS and the new DA should be a member of the team. To the maximum extent practical, there should be joint agreement on the technical requirements for re-qualification. This “dual re-qualification” process is deliberately intended to surface and resolve any technical disagreements. It should constitute the formal hand-off of DA responsibility and bring visible closure to the DA knowledge transfer required by the implementation plan.
- The budgets required for transitioning capability from one site to another should not be subject to uncoordinated changes by the NNSA or the individual sites. Budget controls need

to be put in place to protect an integrated implementation plan for all three GTS-related decisions.

Independent Analysis Tritium R&D Facility Consolidation

1. Introduction

Originally, the task was intended to be an independent business case analysis (IBCA) of the tritium R&D facility alternatives. Soon after the task was initiated, the IBCA team reviewed the draft NNSA IPT business case analysis. It concluded that further refinement of the cost estimates or economic modeling by the IBCA team would not present a significantly different economic picture to the decision-maker. It is likely that our calculations of the Net Present Value (NPV) of the alternatives would be different than the IPT calculations, but not different enough to make a difference in decision-making. Our initial review concluded that a thorough evaluation of the programmatic objectives, benefits and risks of the alternatives was far more important than the economic analysis. The evidence supporting this conclusion is provided in Sections 4 and 5 of the report.

Accordingly, the approach was changed from an IBCA to an independent analysis of the NNSA IPT business case for the purpose of providing advice that would enhance its overall quality and credibility. Our initial advice on the NNSA IPT business case was provided to the NNSA in briefings conducted for NA-10 and NA-1 in July 2008. For completeness, the NA-1 briefing with some additional narrative is attached as Appendix A. The IPT has taken much of our advice and they have made the changes to their report that they believe appropriate.

The main body of this report focuses on the key programmatic and economic facts and judgments that relate to the programmatic objectives, risks and benefits of the alternatives.

2. Decision Framework

The NNSA plans to decide the location of the tritium R&D facilities in the formal decision-making process on the Supplemental Programmatic Environmental Impact Statement (SPEIS). The prime focus of the NNSA IPT business case analysis is the comparison between retaining the tritium R&D facility at LANL and re-establishing the LANL capabilities in the tritium facility complex at the SRS. The SRS currently performs tritium loading, unloading, core surveillance and some enhanced surveillance activities on the GTS; it also performs the bulk tritium extraction, purification and storage functions. For the SRS alternative, the D&D cost of the LANL tritium facility is included in the IPT business case.

There are two other tritium-related GTS decisions the NNSA may choose to implement in the same timeframe that are not included in the scope of the SPEIS. One is the consolidation of the tritium GTS Design Agency (DA) function at either LANL or SNL/CA; currently they share this mission. The other is the planned move of the Kansas City Plant (KCP) to a new facility (KCRIMS) to be constructed a few miles away; the KCP is the production agency (PA) for fabricating the GTS that is tritium-loaded at the SRS. KCP fabricates the majority of all the non-nuclear parts in a weapon. All GTS production lines will have to be re-established at KCRIMS and re-qualified by the DA to produce WR quality product.

This report is not an independent analysis of the DA or KCP to KCRIMS decisions; however, the programmatic objectives, benefits and risks of the tritium R&D facility alternatives are intertwined with the timeline of these decisions. One of our main concerns is that programmatic risks may increase substantially for concurrent implementation of these three activities if specific controls are not put in place.

3. Assessment Approach

The NNSA IPT has put a considerable amount of work into their business case and the issues of DA and tritium R&D facility consolidation. This report is not intended to replace or to duplicate the IPT efforts; it is intended to complement the IPT report, provide an independent perspective on the issues and make recommendations for reducing programmatic risk regardless of the specific decisions made.

The economic facts and figures in this report are taken from the NNSA report “Tritium GTS R&D and Design Agent Consolidation Business Case Report – Revision 1” dated August 24, 2008. The other report considered was the “Tritium R&D and DA Consolidation Risk Red Team Report” dated August 14, 2008. There is not complete agreement among LANL, SNL/CA and SRS on everything that is said in these reports but we do not believe complete agreement is necessary. Reasoned analysis and rational judgments can be made using the information in these reports.

The assessment approach in this report is to clearly articulate a set of facts and judgments and then apply transparent reasoning to this information to draw conclusions. The intent is to reduce the “black box” effect of the current risk assessment methodology of “subject matter experts” voting on risk, especially when the risk assessors may be winners or losers in the decision. Our assessment approach is not intended to replace the current practice, but rather to complement it with a different perspective that might be better understood by the decision-maker and the stakeholders. The assessment methodology strives for a clear “weight-of-evidence” in support of a conclusion, not a geometric-type proof.

This independent assessment is based on interactions with the NNSA IPT leader and key staff preparing the business case, an interview of key LANL and SNL/CA personnel, limited participation in the NNSA “red team” risk review and examination of the reports referenced above and their earlier versions. This report was prepared by TechSource team leader Steve Guidice with contributions on the NNSA IPT business case modeling from Dave Gallay and Tony Wenig of LMI. In addition, several TechSource consultants – former high-level weapon program experts from SNL, LANL and LLNL – made contributions by their review and comment on the draft report.

4. Programmatic and Technical Analysis: Key Facts and Judgments

Unless otherwise identified as our judgment, the information contained in this section is considered to be fact. We believe almost everyone with weapon tritium GTS knowledge and experience would agree that the facts are essentially true and the judgments reasonable.

4.1 Reliability and Safety of the GTS is Critical to the Stockpile

- For all intents and purposes, if the tritium GTS does not function properly, the weapon will not meet its military requirements. There is no redundancy.
- The tritium GTS can be the easiest way to improve the performance margin of an existing weapon without extensive rebuilding of the weapon or its nuclear components. Changes to the tritium GTS can sometimes compensate for the potential loss of performance margin due to aging or other phenomena.
- It is our judgment that, if by accident or component failure, the GTS releases more than trace amounts of tritium to its surrounding environment, it will be widely perceived as a major radiological incident. It could also be very difficult and expensive to clean up, especially if it occurs in a missile silo or ballistic missile submarine.

4.2 A Longer Life GTS is an Important Goal for the R&D Effort

- The GTS has a limited life due to the relatively short half-life of tritium; it must be exchanged at defined intervals and the length of the interval affects both NNSA and DOD workload, including the transportation of weapons and components.
- A long-life tritium GTS has always been a prime R&D objective for some weapons. A longer life GTS requires fewer weapon maintenance cycles and this lowers the operational impact on DOD. In addition, fewer maintenance cycles reduce the weapon's exposure to security threats - a much greater concern today than in the past. It is our judgment that it is reasonable to expect that all weapon life extension and replacement programs will have a design goal or MC requirement for a long-life GTS.

4.3 Current DA and PA Arrangement is Very Successful

- The composite of tritium GTS work at the four sites (KCP, LANL, SNL/CA and SRS) is absolutely critical to the safety and reliability of the entire stockpile.
- Data on the current stockpile is testimony to the success of the current DA and PA arrangement for executing the tritium GTS work.
- GTS R&D has made improvements to the performance margin of two enduring stockpile weapons. The two weapons use different GTS technologies and the latest versions of these technologies will be deployed shortly. Stockpile surveillance data to assess the new GTS is not yet available but should become available over the next few years. The GTS R&D on these weapons was done at LANL.
- Both LANL and the SRS have relatively modern (circa 1990 or later) tritium facilities. For their current mission assignments, these facilities will not need major facility

recapitalization soon. Proper maintenance and adequate equipment replacement funding should suffice for the foreseeable future.

4.4 LANL and SNL/CA Tritium R&D Programs Have Different Emphases

- LANL currently puts more emphasis on the evolutionary development of the GTS technologies it has deployed to the stockpile. The focus is less on modeling and simulation and more on tests and experiments that demonstrate GTS performance.
- SNL/CA puts more emphasis on basic science, modeling and simulation. Experiments are smaller scale and focus more on better understanding of the behavior of tritium when compared to elemental hydrogen. This approach has potential broader application outside the weapons program and it may attract non-weapons reimbursable projects that would reduce the weapons program cost to sustain GTS technical capabilities over the long run.
- Given the potential impact of the GTS on the reliability, safety and maintenance of the stockpile, it is our judgment that the differences in approach between the two labs should be viewed as complementing each other and beneficial to future GTS development and peer review. It is our judgment that the course of future GTS development will lead to more complicated long-life designs and that rigorous peer review should be an essential element of the development program. Competition between the DAs for the next best design might even be warranted.

4.5 Judgments on Connections between DA and R&D Facility

- An alternative that retains the LANL tritium R&D facility for the use of SNL/CA as the sole GTS DA does not appear to be a viable alternative. It would not be sensible to ask LANL to operate and maintain an orphan nuclear facility when it has no other reason for maintaining tritium expertise and infrastructure. In effect, a decision to make SNL/CA the sole DA is also a decision to eventually close the LANL tritium R&D facility and put the R&D capabilities in the SRS tritium complex.
- If the LANL tritium R&D facility remains on-line until the SRS R&D facilities are qualified and operating, the programmatic risks should be minimized regardless of the DA decision. If the LANL facility is shutdown before this time, it may be difficult to deal with unexpected stockpile problems or new GTS development requirements.

4.6 Judgments on Connections between DA and KCRIMS

- We assume for the purposes of this discussion that the KCP to KCRIMS transition will occur. It is much larger in Stockpile Stewardship Program (SSP) scope and budget than the tritium-related decisions. However, KCRIMS creates a significant workload on the DA to help re-establish and re-qualify production processes for each GTS in the stockpile. This re-qualification process must rely in part on the DA knowledge and experience base that designed, developed and fielded the GTS.

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- Maintaining both LANL and SNL/CA as DAs through the KCP to KCRIMS transition will minimize the technical, schedule and economic risks of this transition. It is simply a practical matter of the GTS technologies extant in the stockpile and the DA having to re-qualify the production processes to product specifications that are always less than perfect and always subject to interpretation.
 - Programmatic risks of consolidating to one DA can be minimized by a good transition plan, sustained focus on executing the plan and adequate funding. However, no matter how well planned, the most problematic risk is that expert knowledge is simply lost. The experts from the mission “donor” site are not captive to the implementation plan or mission “receiver” site. The fewer the true experts, the more critical this issue becomes.

4.7 Judgments on Connections between DA, R&D Facility & KCRIMS

- Assuming KCRIMS goes forward, the maximum programmatic risk occurs by the simultaneous implementation of additional decisions to make SNL/CA the sole DA and move the LANL tritium R&D facility to SRS. Practically speaking, it would be very difficult to successfully execute a concurrent, technically-based transition plan that involves four independently budgeted and managed sites. Since all three decisions would change the status quo, careful time-phasing and control of their implementation is the most important factor in reducing the programmatic risk. In addition, the budget for transitioning these activities needs to be protected from uncoordinated reductions by the NNSA and/or the four sites.

4.8 Other Stockpile Stewardship Program (SSP) Considerations

- GTS DA Assignment for the Next Major LEP

It is our judgment that the DA selection for the next new GTS should be based on the laboratory judged most capable of meeting the nuclear design requirements and the DOD MC and STS requirements; it should not be based simply on whether LANL or LLNL will be responsible for the nuclear design. For example, SNL/CA was the DA for the original GTS on the W76-0, a LANL nuclear design; but LANL is the DA for the latest GTS designs used on the W76-0 and W76-1. Continued evolution of GTS design for a new LEP or replacement weapon will require a tritium R&D facility capable of conducting full-scale experiments and tests in support of the weapon program milestones.

- NWC Transformation

The GTS work involves few people (about 60 FTEs) and dollars (about \$25M per year) in comparison with other elements of the SSP, yet it has high direct impact on the stockpile and DOD operations. Currently, the GTS work is at most a few percent of the annual SSP “stockpile services” budget and a far smaller percentage of the full SSP budget and manpower levels. To be credible, it is our judgment that NWC transformation

should maintain focus on the many thousands of people currently employed by the SSP, not the net difference of a few tens of people doing GTS work - see Table 1, page 8.

- Sustaining GTS Technical Capabilities for a Smaller Stockpile

There is a legitimate concern that there will not be enough GTS work to productively support two DA laboratories and sustain technical capability as the stockpile gets smaller and less diverse. However, this is a problem that is not peculiar to the GTS work; it is a problem that affects almost all technical elements of the SSP in both laboratory and production work. As noted, the GTS work is a very small part of the SSP with a disproportionately high impact on the program. Thus, it would be our judgment that the GTS work should not be a priority for transforming the NWC.

- US/UK Mutual Defense Agreement (MDA)

The MDA employs a separate review process for release of information so we have elected not to discuss this subject in any detail in this report. Suffice it to say, the NNSA should consider the effects of GTS decisions on the UK interests and investments in NNSA technology and products.

- Emergency Back-up Tritium Loading/Unloading Facility

In the past, the LANL tritium R&D facility (WETF) was considered an emergency backup location for an outage at the SRS loading/unloading facility – an outage that might be caused by a man-made accident or natural phenomena such as a tornado or earthquake. WETF could not replace the SRS capacity, but it could prevent a limited number of weapons from going “red”. It is our judgment that contingency measures should be re-studied in light of today’s threat matrix. However, it is important to note that a backup loading/unloading facility is not the only contingency measure available.

- Environment, Safety and Health

A case can be made that shutting down the LANL tritium R&D facility reduces radiological safety risk; however, this argument is substantially muted by simply reducing the tritium inventory to the minimum necessary to perform the R&D work at LANL. This decision would have to be weighed against the results of the study on contingency measures discussed in the preceding bullet.

5 Economics: Key Facts and Judgments

The key facts and judgments in this section are based on the NNSA IPT business case report referenced in Section 3. We believe the IPT report provides a sufficient basis for drawing conclusions.

5.1 Tritium R&D Facility Only

- While the NNSA IPT estimates for the staff needed to man the tritium R&D facility at LANL and SRS are difficult to compare exactly, they do not appear to be significantly different. The range is upper-bounded by about 17 FTEs at SRS. In the IPT business case analysis about 7 of the 17 FTEs at SRS are not counted because they are considered “leveraged” from the large SRS tritium facility infrastructure. These potentially free FTEs constitute the annual operating cost reduction available to amortize the roughly \$58M needed for new capital equipment at the SRS and the cost to D&D the LANL tritium R&D facility. Forecasting and cost estimating an R&D activity has too much inherent uncertainty to put any faith in these small differences, especially when projected over 20 years.
- Even if reasonable changes are made to the estimated investment versus the FTEs saved, it is our judgment that there is no convincing economic case for moving the tritium R&D facility to the SRS.

5.2 Tritium R&D Facility and DA Consolidation

- The NNSA IPT business case considers the combination of decisions to consolidate to one DA and/or to relocate the tritium R&D facility to the SRS. Again, the differing categorization of staffing between the sites blurs exact FTE comparison of the alternatives; however, the total staffing for all but one alternative is in the range of 56 to 60 FTEs as shown in the table below; the table is excerpted from the IPT business case report referenced in Section 3.
- The only alternative that stands apart economically is the LANL-only alternative - the sole DA using its existing tritium R&D facility. It stands apart because there are no new capital investment or D&D costs incurred and the LANL FTE estimate is significantly less than the SNL/CA estimate. LANL estimates they would need a total of approximately 28 FTEs in comparison to the other alternatives that require 56 to 60 FTEs. This difference is more than we would expect, but there are several factors that help explain this significant difference. First, LANL is the DA with the most diversity of GTS types in the stockpile; therefore, SNL/CA needs more staff to assume the LANL GTS DA responsibility than vice versa. In addition, the two laboratories have a difference in the R&D approach and long-term R&D objectives as noted in Section 4.4.
- The estimates for the 20-year NPV and cash flow of the alternatives are found in the table and figure below. They are taken from the IPT report referenced in Section 3. It is our judgment that the deltas on the high side of status quo (costs \$86-95M more) appear more reasonable than the delta on the low side (costs \$137M less). The high side delta appears more reasonable because it requires change and an upfront investment with little prospect of a real return through reduced operating expense. On the low side, if one considers the SNL/CA and LANL R&D approaches to complement each other to the benefit of the SSP, the LANL FTE estimate as sole DA is almost certainly too low. More FTEs would

need to be added for science, modeling and simulation; but even so, the LANL-only alternative would remain the lowest cost alternative.

GTS FTE Counts	No Action		Preferred Alternative	R&D to SRS DA at Status Quo	Consolidate All at LANL
LANL			R&D to SRS DA at SNL		
WETF - Auth Basis	5.4	*			5.4 *
WETF - Other	8.2				8.2
GTS R&D	9.4			9.4	9.4
GTS DA	3.1			3.1	5.1
Enhanced Surveillance					0
Non-GTS Missions at TA-55			8.3	8.3	
* Assumes 4 FTE net savings for removal of bulk tritium					
SRS					
GTS R&D			7.1	7.1	
Enhanced Surveillance	2.4		2.4	2.4	
Leveraged-SRS (Non-Adds)			5.3	5.3	
Leveraged-SRNL (Non-Adds)			1.6	1.6	
SNL-CA					
GTS-DA (Current Mission)	29	**	29	**	29
GTS-DA (Add'l Tail #s)			10	**	
** (Updated/revised SNL/CA FTE Estimates)					
	57.5		56.8	59.3	28.1

Table 1 – Staffing of Alternatives by Full Time Equivalent – FTEs (excerpted from IPT report)

Site Functions	NPV FY07 \$M 2010-2030 Timeframe			
	No Action (Status Quo)	Preferred Alt R&D to SRS; DA to SNL; Non-GTS at TA-55	Move R&D to SRS; Keep DA Status Quo; Non-GTS at TA-55	Consolidate ALL at LANL
LANL R&D	\$132	\$58	\$58	\$132
LANL DA	\$16	\$4	\$53	\$36
SRS R&D	\$13	\$84	\$101	\$2
SNL DA	\$169	\$225	\$169	\$22
Retain Non-GTS Missions at WETF	\$0	\$44	\$44	\$0
Totals NPV \$M	\$329	\$415	\$424	\$192
Compared to Status Quo (NPV):	\$0	-\$86	-\$95	\$137

Table 2 – NPV of GTS Consolidation Alternatives (excerpted from IPT report)

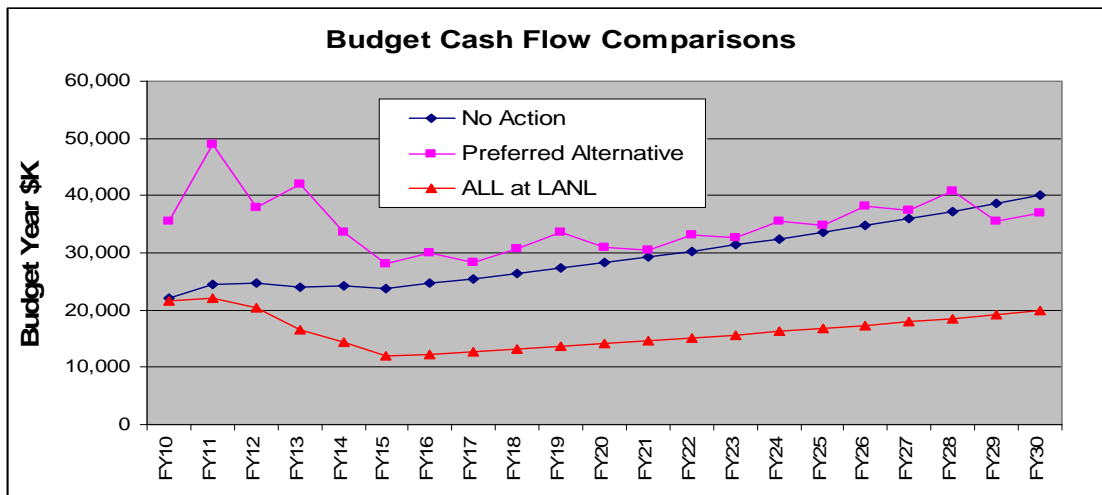


Figure 1 – Cash Flow for GTS Consolidation Alternatives (excerpted from IPT report)

6 Conclusions

The conclusions that follow are based on the key facts and judgments in Sections 4 and 5. We believe the key facts to be essentially true statements and the judgments to be reasonable based on SSP and GTS knowledge and experience. A few key facts and judgments are deliberately omitted for classification reasons; however, we do not believe these omissions diminish the weight of evidence supporting the conclusions made.

6.1 Tritium R&D Facility

- In the context of the current decision-making framework, we find no substantive programmatic or economic reason to close down the LANL tritium R&D facility and establish the LANL R&D capabilities at the SRS. The upfront investment required only puts more stress on near-term SSP budgets with little potential to recover the investment over the long-term – see Figure 1, page 9.
- Complete shutdown of the LANL tritium R&D facility would result in one less tritium facility in the NWC. But if cost saving is not a significant factor as we believe it is not, the only potential benefit would be less environmental, safety and health risk. However, this potential benefit is substantially muted by simply reducing the on-site tritium inventory at LANL to the practical minimum for R&D work.
- Nonetheless, it is still reasonable to view the SRS tritium complex as the center of gravity for all weapons tritium work in the long-term. Therefore, our recommendations are focused on lowering the risk of transition should the ROD on the SPEIS choose the SRS.

6.2 Programmatic Risk of Three GTS-related Decisions

- While this report is not an independent analysis of NNSA decisions to consolidate to one GTS DA and transition GTS component production to a new plant site, we would be remiss in our assessment if we did not comment on the potential increased programmatic risk of concurrent implementation of all three decisions. Of the three decisions, the DA decision is the most important because the DA decides what R&D facility capabilities will be needed in the future and the DA must re-qualify the GTS production lines after transition to the new plant site. Our recommendations are focused on lowering the programmatic risk of trying to implement all three decisions concurrently if changes are made to the current GTS mission assignments.
- Even though the IPT economic analysis clearly points to consolidation of the DA and tritium R&D facility functions at LANL as the lowest cost alternative, it is our judgment that the SSP is best served by two independent DAs for the purposes of competing new GTS technology development and peer review.

7 Recommendations

The recommendations that follow are intended to reduce programmatic risk associated with transitioning capabilities from one site to another and they are independent of the specific decisions made.

- If the tritium R&D facility capability is to be established at the SRS, then the LANL tritium R&D facility (WETF) should remain fully operational until such time as the R&D capabilities are demonstrated to be fully operational at the SRS.
- If the DA is consolidated to one laboratory, then both DAs should remain fully operational until such time as the GTS production lines have been re-qualified at the new plant site. The original DA should retain complete responsibility for its GTS during this time.
- The original DA should lead the team to re-qualify the production line at KCRIMS and the new DA should be a member of the team. To the maximum extent practical, there should be joint agreement on the technical requirements for re-qualification. This “dual re-qualification” process is deliberately intended to surface and resolve any technical disagreements. It should constitute the formal hand-off of DA responsibility and bring visible closure to the DA knowledge transfer required by the implementation plan.
- The budgets required for transitioning capability from one site to another should not be subject to uncoordinated changes by the NNSA or the individual sites. Budget controls need to be put in place to protect an integrated implementation plan for all three GTS-related decisions.

Overall, our recommendations should in no way be construed as an endorsement for changing the current arrangement for executing the tritium GTS mission. The tritium GTS mission is too important to the safety and reliability of the stockpile, too important to NNSA and DOD operations and too successful to change without identifying substantive programmatic or economic benefits to offset the risks.

Appendix A

July Status Briefing to NNSA

The team leader provided a status briefing on our task to NA-10 and NA-1. Attached are the viewgraphs used for the NA-1 briefing on July 17, 2008. The content is the same as briefed to NA-10 on July 11, 2008; only non-substantive formatting was changed. Four general areas of concern with the NNSA IPT business case were identified:

Definition of the Scope of Tritium R&D Work

It appears from the disparity in the proposed laboratory FTE counts that LANL and SNL/CA have different scopes of R&D work in mind. Since the scope of work for the tritium R&D facility has to be derived mainly from the laboratory-defined R&D scope, the difference between the two laboratories needs to be explained better to assure that tritium R&D facility costs are properly identified and captured in the analysis.

In addition, although not related to the disparity in laboratory FTE counts, there is a difference of technical opinion between the two laboratories as to the need for some experiment and test capabilities at the tritium R&D facility and the differences need to be plainly visible in the analysis.

Connections between DA Consolidation and Tritium R&D Facility Consolidation

If the decision is made to consolidate the DA mission assignment to SNL/CA then the decision is “de facto” already made to put the tritium R&D facility at SRS. While one could argue that LANL could maintain its tritium facility for the SNL/CA user, it would not be sensible for them to be responsible for an orphan nuclear facility with no attendant LANL mission to maintain the requisite expertise. In reality, the two decisions are not totally independent of each other and the aggregate risk of both decisions should be weighed against the aggregate benefits at the same time.

Approach to Risk Assessment – Technical Capability and Stockpile

As one might expect, the LANL and SRS risk assessments appeared to reflect the natural bias of a mission “donor” versus “receiver” site. Initially, no risk assessment was provided by SNL/CA because the DA decision was not in the scope of the SPEIS. Since then, SNL/CA has provided a risk assessment and the IPT leader convened a “red team” to take another look at programmatic risk.

Fair Portrayal of Potential Cost/Benefit from Tritium R&D Facility Consolidation

Over time, as the IPT business case was iterated, the economic analyses started to drift from clearly not supporting the “preferred alternative” (SRS) to weakly supporting the preferred

alternative. (This was the case at the time of the July briefing). However, the impression of a drifting bias towards the preferred alternative comes mainly from what gets excluded from the cost comparison. The most significant indicator is the exclusion of an appreciable fraction of the FTEs needed at SRS from the cost comparison; these FTEs are considered to be “leveraged” and paid for by the existing NNSA investment in other SRS tritium capabilities and facilities. Also prompting concern is the exclusion of some technical capabilities currently in LANL facilities that would otherwise be costly to transfer to SRS. Whether one agrees or disagrees with these exclusions, it would be prudent to explain them more fully to the decision-maker. Without better explanation they create the impression of bias. But an even better approach would be to express the cost comparison as a range whose end points either include or exclude these key assumptions.

**Tritium R&D Facility Consolidation
IBCA Status Report**

July 17, 2008

**Steve Guidice
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Tritium R&D Facility Consolidation – IBCA Status

Prologue...

- The approach for this IBCA effort has been to let the NNSA IPT business case develop and mature with informal interaction and then formally critique it at the appropriate time
 - The relatively low economic value of the NNSA decision to be made did not appear to justify a full IBCA effort in parallel with the IPT effort
 - The intent of IBCA is to make recommendations that would strengthen the credibility of the IPT analysis
- The IBCA Team Leader's comments that follow are a work-in-progress based on review of IPT work products and discussions with the IPT Team Leader, SNL, LANL and NNSA support staff

Tritium R&D Facility Consolidation – IBCA Status

General Areas of IBCA Concern...

- Definition of the scope of the future Tritium R&D work
- Identification of connections between separate decisions on Design Agency (DA) consolidation and Tritium R&D facility consolidation
- Approach to programmatic risk assessment - risk to technical capability at the laboratories and risk to stockpile
- Fair and balanced portrayal of potential costs and benefits from Tritium R&D facility consolidation

Tritium R&D Facility Consolidation – IBCA Status

Definition of the Scope of Future Tritium R&D Work...

- The estimate of the personnel required for the DA function that includes R&D varies considerably between LANL and SNL
- This indicates that the DA function scope of work is not adequately defined or at least not adequately explained
- In turn, this would call into question the basis for cost estimates of the work to be done in the consolidated Tritium R&D facility

Tritium R&D Facility Consolidation – IBCA Status

Identification of Connections between Separate Decisions on DA and Tritium R&D Facility Consolidations...

- Practically speaking, the assumption to consolidate the DA mission to SNL/CA makes the decision to consolidate the Tritium R&D facility to SRS almost a given
- Further, this assumption can be viewed as counter-intuitive given:
 - The demonstrated technical success of the current DA arrangement
 - The relatively low number of FTEs associated with the DA function
 - The high-leverage impact of the DA function on stockpile reliability and DOD maintenance requirements
- The rationale and objectives for the consolidation of the DA function should be fully explained to provide proper context for the decision to be made on consolidation of Tritium R&D facilities

Tritium R&D Facility Consolidation – IBCA Status

Programmatic Risk Assessment...

- While the methodology is common, in this particular case, the IPT risk assessment does not appear to add value to the decision-maker
 - It simply reflects the natural biases of “donor” and “receiver” sites
 - The absence of a separate SNL DA risk assessment is unexplained
 - Simply averaging donor and receiver site risk assessments leaves a question as to the NNSA role in evaluating and managing risk

- It is more useful and credible to explain in simple narrative form the facts and logic the NNSA used to reach conclusions about risk

Tritium R&D Facility Consolidation – IBCA Status

Fair and Balanced Portrayal of the Costs and Benefits of Tritium R&D Facility Consolidation...

- The current IPT business case appears biased toward “receiver” site promises versus “donor” site experience
 - While not the sole reason, this impression is enhanced by the giving the receiver site credit for leveraged labor (read free labor) that essentially tips the balance to a slightly favorable NPV for the preferred alternative
 - Better explanation of this credit is necessary, including the logic behind when labor is free and not free

- Credibility would be enhanced by always displaying the range of NPV calculations in discussion of the economics of alternatives

Tritium R&D Facility Consolidation – IBCA Status

Fair and Balanced Portrayal of the Costs and Benefits of Tritium R&D Facility Consolidation...(continued)

- There are details of the IPT business case and modeling that could possibly benefit from further discussion with the IPT
 - Treatment of leveraged FTE's
 - Use of the SRS vs. LANL estimate for the WETF maintenance cost
 - Capability investment cost at SRS
 - How cost estimate uncertainties are treated in the modeling

- However, NPV changes that may result are not likely to significantly alter the basic economic picture put in front of the decision-maker

Tritium R&D Facility Consolidation – IBCA Status

Epilogue...

- The foregoing comments are aimed at a moving target of IPT work products
 - With deadlines approaching, the IPT changes are more frequent
 - Some of the issues we have identified may already be in work
 - Some new issues may be emerging in changes we have not yet seen

- On our current course, we need to freeze-frame the IPT documents that will be the basis for our formal critique - if we are to brief you on our conclusions near the end of July and provide a formal report by the end of August

- There are possibly other things we could do of more value to you than our current course of action and we should discuss them next week

- One course we do not recommend is that we be tasked to perform our own independent business case analysis because, in this case, we do not believe it would provide value to decision-making in proportion to cost