July 3, 2007

Mr. Kenneth Wade, Federal Project Director
U.S. Department of Energy
Office of River Protection
P.O. Box 450 MSIN: H6-60
2440 Stevens Center Place
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RE: CRESP LAW Alternatives Review Team Letter Report 2

Dear Mr. Wade:

This letter is the second in a response to your request that CRESP review the process that is being used to evaluate business cases for alternative treatment strategies for low activity waste (LAW alternatives review). The scope of the requested CRESP review was provided as an Appendix A in our previous correspondence: CRESP LAW Alternatives Review Team Letter Report 1. The CRESP LAW review team for both reports consists of David Kosson (lead), James Clarke, Kathryn Higley and Charles Powers; brief biographies for each were previously provided to you.
As we noted in our first report, we recognize that the LAW alternatives review has been on an extremely short schedule. As a result, the CRESP review team has been asked to provide input to a process that is in progress. This second stage of the CRESP review focused on the following document that describes the evaluation process:

> DOE, Office of River Protection. Hanford River Protection Project Tank Waste Treatment Mission Completion Study, Volume 1: Business Case Analysis (June 15, 2007) HQ Review Draft

In drafting this report we have restated several of the same 9 points that were contained in Report 1. However we have revised several of our comments based on 1) input from your response to those recommendations in Report 1, and 2) specific content provided in the document cited above. The following are our observations and recommendations regarding the evaluation

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process in general, and the Business Case Analysis in particular:

1. Again, we wish to state that overall, we are very impressed and supportive of the carefully structured process for the LAW alternatives review that is taking place. We strongly believe that this type of structured review is extremely crucial in that the issues addressed are both very important to the future of the ORP mission and to the Department in general as it continuously seeks approaches to improve the efficiency of its waste management program.

2. We would like to reiterate that the current phase of these LAW alternatives review is being carried out on an extremely short time schedule, to meet certain time-sensitive programmatic needs. In addition, the technologies and programmatic assumptions underlying the analysis are continuously evolving. Thus, we believe that the current report should (i) clearly state the objectives and intended use of the outcomes from the analysis, as well as fundamental underlying assumptions and limitations, and inappropriate uses of the analysis, and (ii) be viewed as one step in an on-going iterative process with periodic updates consistent with programmatic needs and decision points. This will also allow an opportunity to more fully develop the prioritization metrics, cost estimates, technology readiness assessments, weighting issues, and other factors in response to the lessons learned about the evaluation process as well as evolution of the technology and external factors.

3. The LAW alternatives review includes evaluation of three primary business cases, each with 3-5 sub-cases representing variations on the respective primary business cases. These have been evaluated with 11 main assessment metrics, with each metric reflecting multiple considerations. Again, as we noted previously, this makes for a very complex evaluation matrix. The current report does not yet, and probably should not be expected to provide a basis for ordering, prioritizing and weighting these 11 metrics. We are particularly concerned that none of the current metrics should be seen as a summary of the other metrics, because the basis for such a synthesis has not been established. We strongly believe that clarity in the process is essential to making defensible and correct decisions that must evolve in this on-going multi-faceted decision process.

   More specifically, our current review has observed, the “confidence in business case viability” metric seems to have (intentionally or otherwise) taken on the function of integrating and/or summarizing the other metrics in the report. This is an example where clarity is absolutely needed. If for the purposes of the current report, this business case viability criterion is a judgment call (assumedly among a group of experts) to provide an overarching assessment, then that metric should be called out and explained more completely. We suggest that diagrams or other graphics ought to be developed to show how the several factors are expected to flow into the decision makers’ thought process. Alternatively, this metric should be deleted because it may easily be misinterpreted.

4. Similarly, we have some concerns about actual values assigned to metrics – such as total costs for technologies or the level of technical maturity. For example, in the business cases we believe that there is no strong basis to distinguish life-cycle Hanford tank waste treatment cost estimates of $53 B from those estimated at $62 B (considering the current

level of knowledge). So the cost factors really only become an issue in deciding between the ~$60 B and > $200 B options. Also, we would like to point out that the early development costs for bulk vitrification as cited in the report are reported as zero (see Table 2.4). This is in stark contrast to the GAO[1] report that estimates $137 M costs or more (which is more than 3 times the cost of any other developmental technologies). Unexplained discrepancies such as this can compromise the effectiveness of the report.

5. Use of the technology readiness assessments is beneficial because it brings a well structured approach to technology evaluation. However, the TRA process itself should be viewed as evolving – it was initially designed for evaluation of a hardware development and now is being applied to essentially chemical process development. As a result, specific evaluation questions and their application will not always be as robust as desired, and revisions to specific questions and assessments can be anticipated as the methodology evolves. For example, numerical assessment inconsistencies may result from inadequate separation or distinction amongst the primary metrics when applied to chemical processes (i.e., with cast stone, the impact of not currently having demonstrated an adequate formulation is expressed as important for both technology maturity and waste form performance). In addition, viewing technologies strictly through the lens of Hanford having a "unique" waste management challenge will tend to undervalue experience elsewhere within and beyond the DOE complex.

   In general, numerical assessment inconsistencies also may result from (i) varying levels of familiarity with the different technologies amongst the assessment team members, (ii) uneven application of the sub-component metrics underlying the primary metrics, or (iii) absence of a process for a team with membership from each of the individual technology teams to review all TRAs for consistency in scoring. We recognize the substantial efforts by your team to include members within each TRA technology-specific team with prior expertise in the technology being evaluated, and to have technology specific team results be critiques collectively by team leads to achieve cross-technology evaluation consistency. However, some assessments appear inconsistent without explanation. For example, comparatively, the assessment of technology maturity for steam reforming and cast stone seem inconsistent, given that steam reforming as a process is in commercial application, salt stone (a process very similar to cast stone although the product form is presumed to be different) has been in full-scale operation at SRS for several years, and bulk vitrification is in its first large-scale demonstration.

   To address the evolving nature and limitations of the TRA ratings, it is very important to capture the critical technology questions that must be answered, and the investment needed to do so, in the overall business case summaries. This is to provide important insights beyond the numerical TRA values and overall development needs to reach a TRA value of 6 (prototypical engineering scale process demonstration). In addition, caution must be exercised that the TRA process does not just validate prior decisions and investments by the logic that a technology having the highest TRA rating is necessarily the most suitable (although it may be), even though this may be primarily a reflection of uneven early

[1] GAO Report to Congressional Committees, NUCLEAR WASTE, "DOE Should Reassess Whether the Bulk Vitrification Demonstration Project at Its Hanford Site Is Still Needed to Treat Radioactive Waste", June 2007 GAO-07-762.

investment prior to reaching a critical decision point. Thus, for effective selection, choices should be made from amongst options brought to the same maturity level, once critical "go, no-go" questions about individual technologies have been resolved (retaining viable technologies and discarding non-viable technologies) with adequate investment.

6. We observe that for most of the technologies, development costs are relatively modest in contrast to the anticipated overall $1-2B/y expenditures for process operations. These development costs range from a low of roughly $4.5M, to $32 M at the high end, to bring several of these technologies to a maturity level which could support more robust decision making. It would seem prudent to invest money upfront to continue development because the potential return on investment is staggering. A more practical way to look at this issue is, if DOE invests $100M in development of some or all of these technologies, and only one of them saves a year of WTP costs, then DOE has achieved a tenfold return on investment.

   From our review we have concluded that the most effective mechanism to save money is not through early technology down selection, but through picking viable technologies and strategies that minimize treatment time. Full lifecycle time to completion – especially treatment time, not intrinsic technology costs - tends to drive overall program costs. Consequently investing wisely now in a technology portfolio (where perhaps only a limited number are successful), can reduce the overall schedule of the mission. This, in our estimation is perhaps the best thing that can be done. But, this means keeping several technology options open while a disciplined learning process about them continues. This business case evaluation process should be viewed as an important component in defining that portfolio, rather than the final technology selection at this time.

7. Our recommendation is that technology options be sharply focused on how to drive down the operating time. This can be effective if 1) relatively equal technologies are given equal opportunity for development and testing, and 2) the evaluation process is better calibrated to assure that differences in experience of the authors are explicitly overcome during the iterative process we recommend.

8. Interactions and communications are needed with all stakeholders as this evaluative process continues. The role of the regulator is especially important. We encourage the DOE to be expansive in thinking about current and future regulator roles. In particular, while the NRC may not be a regulator per se at this time, this could change and we recommend that any risks associated with potential NRC issues and interactions be identified and analyzed under the category of regulatory risk.

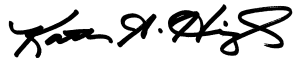
Finally, and perhaps most importantly, the authors should re-examine the current report for the explicit purpose of amending the text to clearly articulate to the readers what kinds of decisions the report can now be used to support and what it does not yet support. As it currently is written, the report itself (page 1-1, Introduction) states that it is not intended to be used for the purpose of down selecting among candidate technologies. That may be a sage observation. Still, that statement appears in the text but is not given elaboration. Instead, we suggest that the authors help validate the quite impressive start they have made with the current document by explicitly identifying how

they believe the “principals” for whom it is written should and should not use the analysis contained in the report.

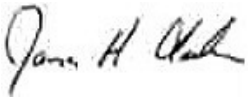
We look forward to discussing these observations and recommendations with you.

Sincerely,

David S. Kosson, Ph.D.
CRESP Review Team Chairman



Kathryn A. Higley, Ph.D.



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