



U.S. Department of Energy
Office of Inspector General
Office of Audits and Inspections

Management Alert

The 2020 Vision One System Proposal
for Commissioning and Startup of the
Waste Treatment and Immobilization
Plant



Department of Energy
Washington, DC 20585

October 3, 2012

MEMORANDUM FOR THE SECRETARY

FROM: 
Gregory H. Friedman
Inspector General

SUBJECT: INFORMATION: Management Alert on "The 2020 Vision One System Proposal for Commissioning and Startup of the Waste Treatment and Immobilization Plant"

IMMEDIATE CONCERN

The Department of Energy is considering a proposal known as the *2020 Vision One System* (2020 Vision) that would implement a phased approach to commissioning the \$12.2 billion Waste Treatment and Immobilization Plant (WTP). As part of the phased approach, the Low-Activity Waste (LAW) facility would be made operational approximately 15 months before commissioning the remainder of the project. Although the implementation of the phased approach offers potential benefits, early operation of the LAW facility presents significant cost, technological and permitting risks that could adversely affect the overall success of the River Protection Project's (RPP) mission of retrieving and treating the Hanford Site's tank waste in the WTP and closing the tank farms to protect the Columbia River.

Despite identified challenges, the Department had not developed a detailed analysis of the costs, benefits and risks of the proposal even after such steps were recommended by two independent review teams. Specifically, the Department had not included all costs associated with the proposal in existing cost estimates. Department officials told us that they completed a high-level business analysis of certain WTP costs. However, our review found that this effort did not include a cost analysis with sufficient detail to satisfy the recommendations made in the external review reports. Additionally, key technology attributes needed for the proposal may not be adequately developed to support operations. In particular, proposed near or in-tank pretreatment capabilities did not appear to be at the stage of maturity to support a critical decision to approve the performance baseline. Finally, an apparent lack of resources to meet the needs of an accelerated permitting process could further delay 2020 Vision implementation.

Although it had not made a final decision regarding implementation, the Department instructed its contractor to include a phased waste delivery strategy as part of the ongoing effort to develop a revised baseline for the WTP project. The Department had initially required a baseline change proposal by August 2012. However, because of recently identified technical concerns, modification of the baseline was delayed until the tests to address these concerns have been completed. To this end, the Department has formed a high-level panel of experts to provide advice on technical concerns related to the WTP's "black cells," where waste will undergo various pre-treatment processes. The panel's recommendations may impact alternatives under

consideration for pre-treatment of waste. In light of the decision to modify the WTP baseline and the potential impact of implementing a phased approach, we concluded that the Department should develop a detailed business case that includes a comprehensive cost analysis and risk assessment before making a formal decision to implement the 2020 Vision. The recommended analyses should help ensure that no actions are taken that could inadvertently delay the successful completion of the WTP project.

BACKGROUND

The Department's \$12.2 billion WTP at the Hanford Site is scheduled to be completed in 2019 and is expected to treat and immobilize approximately 56 million gallons of hazardous waste from the Site's tank farms. The WTP consists of multiple facilities, including the pretreatment facility, the first step in the WTP waste flow that is designed to receive, treat and separate the waste into High-Level Waste (HLW) and LAW streams. These waste streams will be pumped to the appropriate HLW and LAW vitrification facilities where the waste will be immobilized within glass. Bechtel National, Inc. (Bechtel) is the contractor responsible for design, construction and commissioning the WTP.

To address the challenges with commissioning the WTP, the Department is evaluating a proposal known as the 2020 Vision. The goal of 2020 Vision is to commission the WTP facilities using a phased approach, rather than the current baseline plan for commissioning all facilities at once. As part of the phased approach, the LAW vitrification facility is to be completed and commissioned significantly ahead of the Pretreatment and HLW vitrification facilities. Under these circumstances, the LAW vitrification facility could be operated prior to the availability of the pretreatment facility, which would still be under construction. This would require the construction of an interim pretreatment capability, as well as a temporary waste transport system to deliver the waste from the tank farm to the LAW facility. The proposal calls for LAW operations to start in 2016. However, in light of recent technical developments, the Department is considering a revised schedule that would have LAW operations begin in 2019.

The Department is evaluating the 2020 Vision proposal and had not yet decided whether to proceed. Accordingly, we initiated this review to identify the key risks associated with the 2020 Vision and to determine whether the Department has sufficient analytical data to make an informed decision on whether to proceed with implementation. It should be noted that although this report is based on the proposal's original schedule of LAW operations starting in 2016, the issues, risks and recommended actions contained herein are applicable to other scenarios being considered by the Department that involve early treatment of LAW prior to full commissioning of the WTP.

CONCLUSIONS AND OBSERVATIONS

If it is successfully implemented, the 2020 Vision offers several cost and schedule benefits. However, implementation involves potentially significant project risks that, in our view, require additional analysis. Specifically:

- Not all costs associated with the proposal were included in existing estimates;

- Key technology attributes needed for the proposal may not be adequately developed to support operations; and,
- Modifying permits needed for the proposal may significantly delay implementation.

To be clear, the Department has completed a substantial amount of planning. Yet, it was our observation that it did not yet have all of the data necessary to make a fully informed decision on the 2020 Vision. We were concerned that the Office of River Protection (ORP), the Department element directly responsible for the WTP, had not developed a detailed analysis of costs, benefits and risks for the proposal, even though such actions had been recommended by two independent review teams. Without analyses of these factors, the Department might choose a course of action that could inadvertently have a negative impact on the RPP mission — a critical component of the Department's overall environmental remediation strategy.

Benefits of 2020 Vision

According to the proposal submitted jointly by Bechtel and the contractor responsible for tank farm operations, Washington River Protection Solutions (WRPS), to the Department on October 24, 2011, the 2020 Vision offers a number of potential benefits. Based on the documentation supporting the proposal, augmented by discussions we had with Department officials, it was asserted that the 2020 Vision advances the project in the following ways:

- Early operational experience for the WTP's operating crews, which will allow management to work out the inevitable unforeseen challenges in a safer and more controlled manner;
- Waste vitrification in the LAW facility could begin up to 15 months earlier than the baseline plan. This would demonstrate the Department's commitment to stakeholders to clean up this waste; and,
- A phased commissioning approach for the WTP would transition completed facilities into beneficial operations with operating expense funding, decreasing the risk of exceeding line item cost limitations and keeping the project within its \$12.2 billion budget.

Risks and Information Needs

As noted previously, our review identified cost, technology and permitting concerns that require additional analysis if the Department is to make a fully informed decision on whether to proceed with the 2020 Vision proposal.

Cost Estimates

The Department did not know the complete cost of implementing the 2020 Vision. Although the Department received a formal cost estimate for portions of the 2020 Vision from Bechtel and WRPS, the full cost of all activities was not included in the proposal. Specifically, the contractors submitted a joint cost estimate of \$283 million that only included design,

construction and operation costs for the interim pretreatment and waste delivery systems, as well as the modifications for the LAW vitrification facility to receive waste directly from the tank farms. These estimates did not include the significant costs for operating the LAW vitrification facility that had been included in a prior similar proposal. When we discussed this concern with management, ORP and Bechtel officials informed us that the operating costs could not be estimated at this time. Per an agreement with ORP, Bechtel was not required to provide an estimate of these costs until 2014, and then only for costs to be incurred in Fiscal Year (FY) 2016. However, an earlier version of the proposal contained a cost estimate of \$315 million for operating costs from FYs 2014 through 2020. Since costs associated with early operation of the LAW vitrification facility are likely to be significant, we believe that the Department should insist on the development of the best possible estimate of such costs before determining whether to proceed with the proposal.

Technical Risks

Additional technical analysis was needed to demonstrate that the interim pretreatment capability would perform as intended. The pretreatment capability is comprised of two functions: a filtration system to remove solids from the liquid LAW and an ion exchange system to remove cesium. These systems would be installed near or inside of double-shell tanks. The development of new technologies to support Department projects is addressed in DOE Guide 413.3-4A, *Technology Readiness Assessment Guide* (Guide), which provides a process for assessing the maturity of technology critical to a project using a nine-step Technology Readiness Level (TRL) scale. The Guide also provides recommendations for the level of maturity a technology should be at key critical decision (CD) points in the progression of a project, as specified in DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*. The Guide recommends that new technologies be at TRL 6 prior to a project receiving CD-2 approval (approval of the performance baseline). TRL 6 is defined as being tested using engineering scale models in a relevant environment and with a range of stimulants.

The proposed near or in-tank pretreatment capabilities were not at the stage of maturity to support a critical decision (CD-2) as recommended in the Guide. Currently the proposed in-tank pretreatment capabilities are at TRL 4 for the filtration system and TRL 5 for the ion exchange system. According to the Guide, these levels are the equivalent of testing at laboratory and small scale levels. Departmental guidance stresses that moving from TRL 5 to 6, "represents a major step up in a technology's demonstrated readiness" and is, "well beyond the lab scale tested for TRL 5." For example, the guidance suggests that achieving TRL 6 status requires demonstrated success of the technology with real waste or a range of stimulants. Until the needed technologies are mature enough to realistically assess operational efficiencies and to demonstrate safety, we concluded that there is a significant risk that the technology may not be able to perform as intended. This could result in operational delays and the need to perform additional development work or the development of acceptable alternative technologies.

Permitting Issues

Permitting requirements for the 2020 Vision were identified as a critical risk to the proposal in August 2011, and little has changed to resolve these concerns. Specifically, because the waste activities contained in the proposal deal with Resource Conservation and Recovery Act (RCRA)

waste constituents, the systems and processes would need to be permitted by the Washington State Department of Ecology (Ecology). The RCRA permits would require modification for the pre-treatment activities in the tank farm, the LAW vitrification facility and other supporting facilities at the WTP. The Department recognized this as a risk in its June 2011 *Environmental Management Advisory Board – Tank Waste Subcommittee Report*. Additionally, several of the required permits relied upon the completion of the Tank Closure & Waste Management Environmental Impact Statement and its associated Record of Decision, which have not yet been finalized. Furthermore, the 2020 Vision proposal pointed out that although permitting processes and timelines were well established, they would not support the accelerated schedule requirements, thus they will need to be accelerated to meet the proposal's timeframe. An August 2011 report by the Office of Engineering and Construction Management's Construction Project Review cited a concern that both Bechtel and Ecology may lack sufficient resources to be able to address the needs of an accelerated permitting process.

Incomplete Business Case

The essence of our concern is that, despite recommendations by two independent review teams, ORP had not developed a detailed analysis of the 2020 Vision costs, benefits and risks. In this regard, in June 2011 the Environmental Management Advisory Board - Tank Waste Subcommittee recommended that a "business case" be developed for the 2020 Vision proposal. The business case was to address cost, schedule and project uncertainties and risks. Further, an August 2011 report by the Office of Environmental Management's Construction Project Review team also recommended that a cost-benefit analysis be performed for the proposal with a completion date of November 1, 2011. However, as of April 26, 2012, ORP had not developed a business case or a cost-benefit analysis for the 2020 Vision proposal. When we discussed this concern, ORP management asserted that it had performed a high-level business analysis that captured certain WTP costs. However, we found that the business analysis failed to include the detailed cost analyses called for by the external review reports.

Effect on Other EM Activities

In undertaking this review, we were mindful of the complexity of the decisions that Department officials face as consideration of the 2020 Vision goes forward. Most notably, this includes striking the right balance between the benefits of expediting the Hanford Site cleanup and ensuring that no actions are taken that may inadvertently delay a successful outcome or increase the overall multi-billion dollar cost of the project to the Government.

On one hand, as discussed in this report, there were a number of what we consider to be significant cost, technology and permitting hurdles that must be overcome if the 2020 Vision proposal implementation is to be successful. On the other hand, the 2020 Vision proposal has the potential for expediting the entire WTP strategy, which is a critical element in the Department's plan to treat the huge quantities of radioactive, hazardous and mixed waste stored at the Hanford Site. Any unnecessary delays in this process, or conversely, actions missed that could have expedited the cleanup at Hanford, only exacerbate the health, safety and environmental concerns at the Site. It is in this context that we have provided the following recommendations.

RECOMMENDATIONS AND PATH FORWARD

We acknowledge that the 2020 Vision proposal is currently under consideration and does not reflect Department policy at this time. While no formal decision has been made on whether or not to proceed, we recommend that the Manager, ORP, in coordination with the Office of Environmental Management:

1. Develop a detailed 2020 Vision business case as recommended by both the Tank Waste Subcommittee and Construction Project Review reports to include detailed cost-benefit analysis, risk assessment and impacts and other assessments as defined by the independent review teams; and,
2. Engage stakeholders, including Washington State officials, to ascertain their positions concerning issues such as permitting, commissioning and startup of WTP, proceeding with early treatment of LAW and other factors relevant to the 2020 Vision proposal.

MANAGEMENT REACTION

The Office of Environmental Management concurred with the recommendations to develop a more detailed business case analysis and to gain stakeholder input on the early treatment of LAW prior to making a decision to proceed with the 2020 Vision One System proposal. Management stated that the report accurately captured the Department's ongoing effort to develop a revised baseline for the WTP project. As a result of this effort, the Department is not evaluating the 2020 Vision One System proposal at this time. However, the Department plans to complete a detailed business case analysis prior to the decision to direct feed the LAW facility. In addition, the Department has begun and will continue engagement of stakeholders up to and through the decision to direct feed the LAW vitrification facility.

AUDITOR COMMENTS

Management's proposed actions are responsive to the recommendations. Management stated that the Department is no longer evaluating the 2020 Vision Proposal at this time, and we acknowledge that much can change in the Department's approach as it continues to evaluate certain technical challenges associated with this project. However, we were informed that the central tenet of the 2020 Vision Proposal remains a prominent alternative under consideration. Specifically, management is still considering early treatment of LAW prior to full commissioning of the WTP. Given this, the issues, risks and recommended actions contained herein are still valid and should be addressed in any detailed business case analysis developed in response to our first recommendation. Management's comments are attached in their entirety.

Attachment

cc: Deputy Secretary
Associate Deputy Secretary
Acting Under Secretary of Energy
Special Assistant for Environmental Management
Chief of Staff

MANAGEMENT COMMENTS

RL-712 (02/06)

United States Government

Department of Energy

memorandum

Hanford Site

DATE: SEP 14 2012
REPLY TO:
ATTN OF: ORP:JMG 12-ORP-0031

SUBJECT: THE U.S. DEPARTMENT OF ENERGY, OFFICE OF RIVER PROTECTION (ORP) COMMENTS ON THE OFFICE OF INSPECTOR GENERAL (OIG) DRAFT MANAGEMENT ALERT ON "THE 2020 VISION ONE SYSTEM PROPOSAL FOR COMMISSIONING AND START-UP OF THE WASTE TREATMENT AND IMMOBILIZATION PLANT (WTP)"

TO: Rickey R. Hass
Deputy Inspector General for Audit Services
Office of Inspector General, IG-30

The Office of Environmental Management (EM) appreciates the opportunity to review the OIG draft report, "The 2020 Vision One System Proposal for Commissioning and Start-up of the Waste Treatment and Immobilization Plant (WTP)." The Department remains committed to developing a robust and comprehensive strategy for Commissioning and Start-up of the WTP at Hanford.

EM agrees with the two recommendations in the OIG's draft report focused on developing a more detailed business case analysis and gaining stakeholder input on the early treatment of low-activity waste prior to making a decision to proceed with the 2020 Vision One System Proposal. The report accurately captures the Department's ongoing effort to develop a revised baseline for the WTP project. As a result of this effort, the Department is not evaluating the 2020 Vision One System Proposal at this time; however, the Department plans to complete a detailed business case analysis prior to the decision to direct feed the Low Activity Waste Facility.

Recommendation 1: Develop a more detailed business case as recommended by both the Tank Waste Subcommittee and Construction Project Review reports to include detailed cost-benefit analysis, risk assessment and impacts and other assessments as defined in the recommendation;

In August 2012, ORP directed Bechtel National, Inc. (BNI) to re-plan the WTP's Analytical Laboratory, Balance of Facilities, and the LAW Facility. These facilities were identified in the 2020 Vision One System Proposal as the facilities required for the initial phased start-up and commissioning of WTP. ORP also directed BNI to rebaseline the Pretreatment Facility and the High-Level Waste Facility after closing certain technical issues. BNI was directed not to preclude the capability to direct feed the LAW Facility as part of this re-plan/rebaseline effort.

Rickey R. Hass
12-ORP-0031

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Target Date: To be determined; but completed prior to the decision to 1) substantially invest in other related tank farm enhancements, and 2) complete physical modifications of WTP required to direct feed the Low Activity Waste Facility.

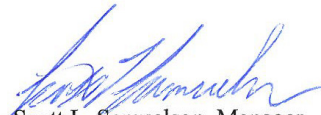
Recommendation 2: Engage stakeholders, including Washington State officials, to ascertain their positions concerning issues such as permitting, commissioning and startup of WTP, proceeding with early treatment of LAW and other factors relevant to the 2020 Vision proposal.

The Department has engaged and will continue to engage key stakeholders, including Washington State officials, regarding the 2020 Vision One System Proposal and other tank waste cleanup decisions. As stated in our response to Recommendation 1 above, the 2020 Vision One System Proposal was based on a set of assumptions that may no longer be valid after the Analytical Laboratory, Balance of Facilities, and the LAW Facility re-plan and Pretreatment facility rebaseline. The Department will ensure that the risk register is updated to include input from stakeholders regarding permitting, commissioning and startup of WTP, proceeding with early treatment of low-activity waste and other factors relevant to the 2020 Vision One System Proposal.

Target Date: Engagement of stakeholders has begun and will continue up to and through the decision to direct feed the Low Activity Waste Vitrification Facility.

The Department will outline the actions, including the schedule, and apprise the OIG of its progress in implementing the Recommendations by using the process established in the DOE Audit Reporting and Tracking System.

If you have any questions, please contact me, or your staff may contact JoLynn Garcia, ORP Audit Coordinator at (509) 376-6244.


Scott L. Samuelson, Manager
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