



U.S. Department of Energy

~~OFFICE OF RIVER PROTECTION~~  
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Richland, Washington 99352

07-WTP-149

MAY 23 2007

Mr. W. S. Elkins, Project Director  
Bechtel National, Inc.  
2435 Stevens Center Place  
Richland, Washington 99354

Dear Mr. Elkins:

CONTRACT NO. DE-AC27-01RV14136 – ASSESSMENT REPORT A-07-AMWTP-RPPWTP-011 – THE WASTE TREATMENT AND IMMOBILIZATION PLANT (WTP) IMPLEMENTATION OF OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT (OCRWM OR RW) WASTE ACCEPTANCE SYSTEM REQUIREMENTS DOCUMENT (WASRD), APRIL 9 THROUGH 13, 2007

This letter transmits the results of the U.S. Department of Energy (DOE), Office of River Protection (ORP) assessment of the Bechtel National, Inc. (BNI) implementation of the OCRWM or RW WASRD. The attached assessment was performed from April 9 through 13, 2007. The purpose of the assessment was to perform an independent technical evaluation of the BNI Immobilized High-Level Waste (IHLW) rationale and supporting documentation for meeting the OCRWM WASRD. This review is a follow-up to the OCRWM Quality Assurance Requirements Document (QARD) review performed in January 2007. The January review expressed concern over the level of detail and extent of QARD applicability represented in the BNI IHLW documents. The Quality Assurance (QA) Assessment Team recommended that an independent technical review be performed to further evaluate the concern.

In response to the recommendation, ORP, with support from QA and IHLW technical specialists from DOE Environmental Management (EM) and RW, the Savannah River Site Defense Waste Processing Facility, and RW Licensing Group performed a review of BNI IHLW documents and interviewed key project personnel. The Review Team concluded that there was an insufficient level of detail in the BNI Product Compliance Plan, the Waste Acceptance Impacting Items and Activities document, and the Waste Form Qualification Report to conduct an adequate technical review of BNI's rationale for meeting the WASRD. This includes informational requirements from the WASRD and from WASRD-referenced documents, such as DOE/RW-0511, *Integrated Interface Control Document*. The Review Team also concluded that BNI's recommendation to use a 10-gauge (thin) wall canister design for the IHLW form has not been formally submitted to ORP and approved by EM and RW for inclusion in the Yucca Mountain Repository RW license application. Until this approval for design change is received, the canister of record in the RW acceptance baseline is based on a 3/8- inch wall thickness.

Mr. W. S. Elkins  
07-WTP-149

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Within 30 days of receipt of this letter, BNI should respond to the assessment Findings and Observations A-07-WTP-RPPWTP-011-O01 and O02. The response should include:

- The cause of the issue;
- The corrective actions taken to control or remove any adverse impact to identified noncompliance situations (remedial actions) and the results achieved;
- The corrective actions taken or that will be taken to prevent similar issues in the future. This should also include the results of an extent of condition review; and
- The date by when all corrective actions are to be completed, verified, and compliance to applicable requirements is achieved.

Assessment Observations do not usually identify deficiencies, but represent experience-based observations of the Review Team that BNI should consider as a source of information for improving the program. BNI is required to respond only to the Findings and Observations noted above.

If you have any questions, please contact me, (509) 376-3151.

Sincerely,



Shirley J. Olinger, Acting Manager  
Office of River Protection

WTP:WLS

Attachment

cc w/attach:  
BNI Correspondence

U.S. DEPARTMENT OF ENERGY  
Office of River Protection  
Environmental Safety and Quality

**ASSESSMENT:** Bechtel National, Inc. Waste Treatment and Immobilization Plant  
Implementation of OCRWM Waste Acceptance System  
Requirements Document

**REPORT:** A-07-AMWTP-RPPWTP-011

**FACILITY:** Waste Treatment and Immobilization Plant Construction

**LOCATION:** Richland, Washington

**DATES:** April 9 through 13, 2007

**ASSESSORS**  
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**APPROVED BY:** P. P. Carrier, Team Leader  
Verification and Confirmation Official

## EXECUTIVE SUMMARY

From April 9 through 13, 2007, the U.S. Department of Energy (DOE), Office of River Protection (ORP), with support of DOE Office of Environmental Management (EM) and DOE Office of Civilian Radioactive Waste Management (OCRWM or RW) evaluated the Bechtel National, Inc. (BNI) strategy for implementation of OCRWM "Waste Acceptance System Requirements Document" (WASRD). This independent technical review focused on reviewing the key technical documents used by BNI to delineate scopes of work, items, and activities that demonstrate the final waste form will meet WASRD and "Quality Assurance Requirements Document" (QARD) (DOE/RW-0333P) requirements for acceptance of the Immobilized High-Level Waste (IHLW) into the Civilian Radioactive Waste Management System (CRWMS). The Independent Review Team reviewed the IHLW Product Compliance Plan (PCP), the Waste Acceptance Impacting Items and Activities (WAIIA) document, and several screening forms used to determine WAIIA. The Review Team was not able to review the Waste Form Qualification Report (WQR) because it was out-of-date relative to the current compliance rationale, and had not been updated since 2004; therefore, the WQR did not include the results of testing performed to demonstrate compliance to the PCP and WASRD.

In February 2007, the "Memorandum of Agreement for Acceptance of Spent Nuclear Fuel and High-Level Waste" (MOA) between EM and RW was updated to better delineate responsibilities for oversight of waste producer activities to meet WASRD and QARD requirements. The recently approved MOA states "EM shall condition HLW, as necessary, to ensure its compliance with applicable acceptance criteria." The MOA further states "The WCP and WQR and production records presently document the RW data needs for EM-vitrified HLW. EM shall provide initial compliance documents for all planned HLW production sites for review and concurrence by RW prior to initial issuance."

The independent technical review documented in this report is the first in a series of efforts that will be required by ORP, EM, and RW to ensure that the technical basis, production activities, and Quality Assurance (QA) program meet RW expectations for final transfer and acceptance of the waste form into the CRWMS.

The Review Team concluded that there was concern regarding the level of detail in the PCP, the WAIIA, and the WQR regarding the BNI rationale for meeting the WASRD. This includes informational requirements from the WASRD and from WASRD-referenced documents, such as DOE/RW-0511, "Integrated Interface Control Document (IICD)." The Review Team also concluded that BNI's approach to specifying a thin-wall canister design for containing the IHLW has not been formally submitted to ORP and approved by EM and RW for inclusion in the RW Yucca Mountain Geologic Repository license application. Until this approval for design change is received, the canister of record is based on a 3/8-inch wall thickness.

The Review Team also concluded that it may be more appropriate for BNI to apply the extent of application of WAIIA modeled after the Savannah River Site Defense Waste

Processing Facility (DWPF) instead of the West Valley Demonstration Project (WVDP). Given the multiple waste forms that are present at the Hanford and Savannah River sites and the single waste form at WVDP, the extended testing period at WVDP (approximately 5 years) compared to Waste Treatment and Immobilization Plant (WTP), and the potential number of canisters at WTP (approximately 10,000) compared to WVDP (275), the rigor of WAIIA and QARD application should be reconsidered.

The Review Team identified two Findings and five Observations. The Review Team considers that the two Findings and the two most significant Observations are fundamental to developing the appropriate technical rationale for waste form acceptance and the scope with which the rationale is applied.

The most significant issues identified during the review are listed below.

- The PCP does not include sufficient information in the Compliance Strategy and Qualification Activities subsections for the Review Team to perform a technical evaluation to determine if the strategies are compliant with RW IHLW requirements. (A-07-AMWTP-RPPWTP-011-F01)
- Configuration management of the design for IHLW canister dimensions and post-fill dose rates has not been kept current resulting in a difference in production canister specifications between the project and specifications for the Hanford IHLW canister documented in RW requirements. (A-07-AMWTP-RPPWTP-011-F02)
- BNI's decision to move forward with the thin-wall canister design as the canister of choice has not been formally communicated to DOE. As such, the design change has not been reviewed and approved by ORP and EM, forwarded to RW for concurrence, and has not been included in the RW license application. (A-07-AMWTP-RPPWTP-011-F02)
- In reviewing several screening forms used by BNI to determine WAIIA, the Review Team concurred with the results of the February 2007 QARD review by concluding that the application of the WAIIA is too limited in scope. (A-07-AMWTP-RPPWTP-011-O01)
- Concerns with the performance of limited 10-gauge (thin) wall thickness canister testing. (A-07-AMWTP-RPPWTP-011-O02)

**Independent Technical Review of Bechtel National, Inc. (BNI)  
Immobilized High-Level Waste Rational for Meeting  
Office of Civilian Radioactive Waste Management  
Waste Acceptance System Requirements Document Implementation**

**1.0 PURPOSE AND SCOPE**

During the period April 9 through 13, 2007, the U.S. Department of Energy (DOE), Office of River Protection (ORP), with support of DOE Office of Environmental Management (EM) and DOE Office of Civilian Radioactive Waste Management (OCRWM or RW) evaluated the Bechtel National, Inc. (BNI) strategy for implementation of OCRWM "Waste Acceptance System Requirements Document" (WASRD). This independent technical review focused on reviewing the key technical documents used by BNI to delineate scopes of work, items and activities that demonstrate the final waste form will meet WASRD and "Quality Assurance Requirements Document" (QARD) (DOE/RW-0333P) requirements for acceptance of the immobilized high-level waste (IHLW) into the Civilian Radioactive Waste Management System (CRWMS). The Independent Review Team reviewed the IHLW Product Compliance Plan (PCP), the Waste Acceptance Impacting Items and Activities (WAIIA) document, several screening forms used to determine WAIIA, and related supporting documents. The Review Team was not able to review the Waste Form Qualification Report (WQR) because it was out-of-date relative to the current compliance rationale, and had not been updated since 2004 to include the results of testing performed to demonstrate compliance to the PCP and WASRD.

**2.0 BACKGROUND**

On May 18, 2004, ORP directed BNI to use DOE/RW-0351, WASRD, Revision 4, as the implementing requirements base for development of the PCP and WQR for ensuring that the Waste Treatment and Immobilization Plant (WTP) IHLW will be acceptable for disposal in the geological repository. This direction was followed by a contract change containing the same direction. It should be noted that the Savannah River Site Defense Waste Processing Facility (DWPF) continued using the "Waste Acceptance Product Specifications for Vitrified High-Level Waste Forms" (WAPS), Revision 2, issued by EM as the requirements base for their Waste Compliance Plan (WCP) and WQR for determining that the generated IHLW will be acceptable for disposal by RW in the geologic repository. CH2M HILL Hanford Group, Inc.'s activities for preparation of the Canister Storage Building to store IHLW waste form canisters and the associated interface control document (ICD) are also based on the WAPS, Revision 2. Additionally, the West Valley Demonstration Project (WVDP) also used the EM WAPS, Revision 2, as the requirements base for their WCP and WQR documents. Further, in Appendix C to Revision 1 of the "Memorandum of Agreement between EM and RW for Acceptance of Spent Nuclear Fuel and High-Level Waste" (MOA), the EM WAPS is identified as "the documentation that identifies the technical specifications for the high-level waste forms."

The recently approved revision (February 2007) to the MOA between EM and RW states that "EM shall condition HLW, as necessary, to ensure its compliance with applicable acceptance criteria." The MOA further states "The WCP and WQR and production records presently document the RW data needs for EM vitrified HLW. EM shall provide initial compliance documents for all planned HLW production sites for review and concurrence by RW prior to initial issuance." On February 15, 2005, ORP rejected Revision 1 to the BNI PCP. Discussions with the ORP personnel involved with the review determined that the PCP, Revision 1, had more detail than was considered necessary. On October 6, 2005, ORP approved Revision 2 of the PCP.

To date, EM and RW have not formally evaluated the PCP to establish agreement that the rationale for meeting RW WASRD requirements will be acceptable for ultimate RW acceptance of the IHLW. For both DWPF and WVDP, EM established an independent Technical Review Group (TRG) that performed technical reviews of both sites' WCPs and WQRs. The TRG was a chartered organization comprised of subject matter experts from government, industry, and laboratories that provided a review following QARD implementing procedures. Based on discussions with RW and EM representatives on the Review Team and ORP Project and Quality personnel, a similar TRG has not been formed to review the technical rationale contained in the PCP, WQR, WAILA, and supporting documents. This process is important because some current design and procurement activities for WTP IHLW may be impacted by a change in the activities and/or application of the QARD for these activities.

### 3.0 RESULTS:

**A-07-AMWTP-RPPWTP-011-F01 – The PCP and WQR do not include sufficient information for the Review Team to perform a technical evaluation to determine if the strategies are compliant with RW IHLW requirements.**

The PCP, Section 4, "Compliance with WASRD Requirements," does not include sufficient information in the "Compliance Strategy" and "Qualification Activities" subsections for the Review Team to perform a technical evaluation for determining if the strategies are compliant. The issue is compounded because the WTP WQR, last updated in 2002, is still preliminary and has not been updated due to delays in the WTP Project schedule. While BNI understood that the WQR was significantly delayed, a formal request for a change in the Contract deliverables had not been made. Examples of missing or incomplete compliance strategy and details include:

- PCP, Section 4.4.3, does not contain detailed written description, characteristics, data limits, or drawings, pictures, or diagrams of the HLW canister grapple.
- PCP, Section 4.4.3, does not contain a discussion of the grapple's inadvertent release safety requirements as required by the WASRD.
- PCP, Section 4.4.1, does not contain sufficient detailed discussion of canister characteristics, data limits, dimensions, or drawings, pictures, or diagrams. While the PCP recognizes the potential for bulging of the canister and specifies that this will be evaluated during filling of the canisters in preparation for drop testing, the PCP does

not provide specific detail for how many canisters will be filled for evaluation. This is especially important given BNI's plans to reduce the wall thickness from 3/8-inch to 10-gauge.

- PCP, Section 4.2.4, glass composition algorithm discussion does not contain a detailed product consistency test discussion on composition/property correlations. It should also be noted that during discussion with the algorithm subject matter expert, it was stated that the algorithm assumed that all the data inputted for evaluation had a complete QARD pedigree. The need for a QARD pedigree on additional activities is discussed in more detail in Observation A-07-AMWTP-RPPWTP-011-001.

By comparison, both the WVDP and the SRS DWPF WCPs provide significant written detail including drawings and dimensions that allow the reader to easily and very clearly understand the function, design, equipment limits, and regulatory requirement compliance.

Thirteen deliverables scheduled by a 2004 revision to Contract Deliverable 6.4 have not been issued. The standalone test results form part of the basis for EM acceptance of the technical rationale and, based on their schedule for issue, were appropriate for this review. While it is recognized that some of this work may have been delayed, where appropriate, the Contract deliverable should be changed and where completed, the information should be finalized for submittal and approval.

**A-07-AMWTP-RPPWTP-011-F02 – Configuration management of the design for IHLW canister dimensions and post-fill dose rates has not been kept current resulting in a difference in production canister specifications between the project and specifications for the Hanford IHLW canister documented in RW requirements.**

The dimensions and radiation dose rates for the filled Hanford IHLW canisters are very important given the canister interfaces during transportation from the WTP, interim storage at the Canister Storage Building, rail transportation to the geological repository, and ultimate disposal in the geological repository. Dimension expectations are specified in the WASRD and further specified in DOE/RW-0511, "Integrated Interface Control Document (IICD)." Review of BNI documentation identified that the current BNI dimensions are not current with RW expectations. Specifically:

Canister Wall Thickness:

ICD 14, "Interface Control Document for Immobilized High-Level Waste," Revision 2, November 2003, lists the Hanford IHLW canister wall thickness as 3/8-inch. The current draft Yucca Mountain license application being prepared for submittal to the U.S. Nuclear Regulatory Commission (NRC) also lists the canister wall thickness as 3/8-inch. While BNI and ORP have held several discussions and exchanged emails regarding changing the wall thickness from 3/8-inch to 10-gauge to support an optimization of IHLW canister production, the Review Team did not identify any formal



change in the wall thickness signed by the ORP Contracting Officer from what was documented in ICD 14, Revision 2.

The Review Team noted that WTP-RPT-120, Revision 0, "Hanford Immobilized High-Level Waste Canister Drop Testing," Section 1.0, stated, as part of its IHLW PCP, BNI contracted Pacific Northwest Division (PNWD) to conduct drop tests on two prototypic IHLW canisters to demonstrate that the canisters could withstand a drop from 7 meters as required by WASRD Section 4.8.8. The two test canisters were made of 304L stainless steel and represented designs with different canister wall thicknesses, one with a 3/8-inch wall thickness and one with a 10-gauge wall thickness. The report concluded: Two IHLW canisters were drop tested from a height of 7 meters (23 feet) in a vertical orientation to achieve as close as possible a flat bottom impact. Both canisters impacted the drop pad in a vertical orientation with no measurable angle from perpendicular. Both canisters passed the drop test. They passed the helium leak test with a leak rate at least 4 orders of magnitude below the allowable limit,  $1.3 \times 10^{-4}$  atm-cc/sec, which equates to the WASRD standard to be "leak tight,"  $1 \times 10^{-4}$  ref-cc/sec. Neither canister showed signs of breach. However, the report did not provide a recommendation as to which canister design should be used for the production canister.

Sheet 2 of the production drawings (24590-HLW-MX-30-00008002) references 10-gauge (0.1345 inch thickness). This is the thin-wall dimension.

To move forward with the wall thickness specification currently in the production drawings, ORP, EM, and RW will need to review and approve the basis (engineering and testing data) for the dimension change prior to the wall thickness being changed in the NRC license application.

#### Canister Length and Diameter:

A comparison of canister dimensions between the WASRD, PCP, and the IICD identified that the tolerance specifications between the IICD and PCP were not consistent. The WASRD provides a specific statement of length and diameter (4.51 meters and 64 centimeters, respectively) for the filled canister at the time of delivery. The IICD and PCP provide more detailed specifications for the canister prior to fill. The PCP also states that the effect of thermal expansion and any canister bulging after filling will be taken into account in the tolerances to ensure that the maximum length and diameter requirements are still met at time of delivery to onsite interim storage.

- The PCP listed canister diameter prior to filling is 23.62 inches to 24.61 inches. The IICD, Revision 3, listed diameter prior to filling is 23.88 inches to 24.12 inches. As such, the IICD band from fabrication is smaller than is currently allowed by BNI.
- The PCP listed canister length as 176.38 inches to 177.36 inches prior to filling. The IICD listed the canister length at fabrication as 176.81 +0.00/-0.25 inches. The PCP listed length states that the overall length takes into consideration the potential of installing the secondary lid, which has an added length of .44 inches. When the additional length of the secondary lid is added to the IICD value, the final dimension

is 177.25 inches. It appears that the maximum in the IICD is less than the maximum length prior to filling and heating allowed in the PCP and listed on BNI fabrication drawings.

The BNI PCP and fabrication drawing specifications were consistent with the IICD, Revision 1. Based on discussions with BNI personnel, these same dimensions were listed on WASRD, Revision 3. The WASRD, Revision 4, Section 1.2, states that throughout the WASRD, some of the requirement numbers and headings are followed by the word "Deleted." The deletions were made in response to reviewer comments for a variety of reasons, and the rationale for each deletion is included in the requirements analysis sheets. Among the deletions were dimensional and weight limits on loaded canisters, materials of construction, and maximum dose rates. These items are considered to be characteristics of the waste form (canister plus contents) design and will be controlled in the ICDs.

WASRD, Revision 4, Section 5.4.1, "Prior to start of Production," specifies a list of documentation (current revision) required under the MOA that the waste producer shall provide. This shall include the WAPS, WCP, WQR, and any supporting documentation required by these documents. Section 5.4.1.B states that "the information provided shall include the following [list] which shall be controlled in ICDs." One item on the referenced list is canister dimensions.

While it appears that the current fabrication dimensions will meet WASRD post-fill canister dimensions based on review of the fill data for only one canister, the fabrication dimensions are not in accordance with RW's IICD, Revision 3.

#### Maximum Post Fill Canister Dose Rates:

A second example of WASRD/IICD data needs not properly documented in the PCP is WASRD, Revision 4, Section 5.4.1,b,(11), which lists estimated maximum gamma and neutron dose rates at the canister surface and states it will be controlled in ICDs. The PCP, Section 4.4.10, "Production Implementation," states "calculate the gamma and neutron dose rates based on the estimated per-canister radionuclide inventories. Estimated dose rates will be reported in the Production Records." However, the PCP does not discuss IICD, Figure C-21, Note-8, which specifies that the surface gamma dose rate shall be <100,000 rem/hr and the surface neutron dose rate shall be <10 rem/hr at the time of shipment. It should be noted that the WAPS, Revision 2, provides a more detailed expectation for implementation of the maximum dose rate limits, reporting, and indexing to the year 2015.

It should be noted that the Review Team only evaluated two areas addressed by the IICD. BNI's extent of condition review should fully explore this issue.

**A-07-AMWTP-RPPWTP-011-O01 – After review of several screening forms used by BNI to determine WAIIA, the Review Team concurred with the results of the February 2007 QARD review by concluding that the application of the WAIIA is too limited in scope.**

In February 2007, ORP, with support from EM-62 and RW-03, conducted an evaluation of BNI's implementation of the QARD. The most significant issues identified during the assessment deal with the process and records for proper identification of the scope of WAIIA.

- The overall activity that forms the bases for determining WAIIA such that the WASRD requirements will be met using a QARD-qualified program requires revision. The logic for several determinations of non-waste affecting for items or activities is questionable and requires a more detailed technical review. Additionally, the WQR, a support document for the evaluations, contains elements that are incomplete or not consistent with current thinking. (Observation)
- Design work covered by the QARD was accomplished on several items and activities without the QARD being applied to the activity. Design activities included test canister, production canister, and analytical equipment. The concept of performing a design review to accept design work that was performed without application of the QARD is not in accordance with the QARD. (Finding)

The Review Group concurs with the Findings of the February QARD review. In reviewing the completed screening forms for the WAIIA determination, the Review Team considers that the application of WAIIA is too limited in scope and should model the DWPF evaluations. This would be a better fit because of the following considerations: 1) multiple waste forms that will be present at WTP are similar to DWPF instead of the single waste form at WDVP; 2) WDVP approach adds an unnecessary level of risk given the fact that WTP could produce up to 10,000 canisters or more of waste compared to 275 canisters produced at WDVP; and 3) WDVP compliance strategy relied heavily on five years operation of a full-scale prototype facility using non-radioactive simulants. The Review Team recommends that BNI re-evaluate all items with the potential to be waste affecting to establish a more realistic base of WAIIA. Examples of items the Review Team would notionally be considered to be waste affecting items include:

- Maintaining homogenous mixture
- Canister Fabrication
- Melter Feed Preparation Vessel (MFPV) sample analysis
- Maintaining foreign material exclusion

To expand on the above examples, WTP is proposing a very similar approach to DWPF in qualifying the waste stream upstream of the melter in the MFPV. Once qualified, it is necessary to keep the material homogeneous in both the MFPV and the Melter Feed Vessel (MFV) prior to feeding the melter (the feed agitation "activity" has already been identified as WAI in both 24590-HLW-WSF-PR-04-087 and 24590-HLW-WSF-PR-04-098). The Items List should be re-evaluated to determine whether the specific attributes of the MFPV/MFV agitator design are important to the waste acceptance process including materials, impeller dimensions, and pitch and shaft length. By

including a Waste Acceptance Attribute section/column with the WA Item requiring control (see DWPF "Waste Acceptance Reference Manual" [WARM]), the necessary clarification can be made so that the entire item is not considered WAI (e.g., the motor for the agitator is non-WAI).

WTP is planning to use a similar chemical composition/property model approach as is being performed at DWPF. The MFPV analysis is vital to ensure that an acceptable glass product is produced. Even though the analysis equipment may not be required to be WAI, the analytical procedures and the measurement control program associated with the analytical lab would nominally be expected to be considered as a WAI activity for the MFPV analyses.

There is no temperature limit for the WTP melter in the WAIIA document to ensure that all the feed is converted to glass. Without a similar minimum melter temperature limit as documented in the DWPF WARM (950°C), there is no assurance that crystallization would not be a factor in a WTP melter. In extreme cases, this crystallization could impact glass quality and the product consistency specification.

This issue is being listed as an Observation instead of a Finding because of BNI actions to address this issue in response to the February 2007 QARD assessment. However, it is included in this report because of the broader technical review performed by this review and the Review Team's conclusion that the current list of WAIIA is too narrow given the nature of the waste form and the sheer volume of waste to be processed. It is the Review Team's expectation that BNI will take the necessary action address this concern.

**A-07-AMWTP-RPPWTP-011-O02 – Concerns with the performance of limited 10-gauge (thin) wall thickness canister testing.**

In Finding A-07-AMWTP-RPPWTP-011-F02, the Review Team expressed concern that the thin-wall canister design was moving forward without approval of DOE and without change to the RW Geologic Repository license application, and that the WTP PCP and canister test report did not take into consideration the RW IICD canister dimensions.

In September 2004, BNI recommended and ORP concurred with a change notice to the PCP to change from a drop test of three full-scale canisters filled with non-radioactive glass to performing only one drop test of a thin-wall canister. No other testing of the thin-wall canister was required assuming the canister wall integrity was maintained. The change also removed the use of finite element analyses as a part of the compliance strategy for repository acceptance. Based on discussions with WTP personnel and review of WTP-RPT-120, Revision 0, PNWD-3678, "Hanford Immobilized High-Level Waste Canister Drop Testing," only one thin-wall canister (HT-503) was tested. Given that the WTP could fill 13,000 canisters, the Review Team is concerned that insufficient testing for post-fill bulging and insufficient test and modeling data have been provided to demonstrate that performing only one drop test of a 4.5-meter, 10-gauge wall thickness canister provides sufficient statistical evidence that the canister will meet WASRD requirements given the bulging that was identified in the one drop that was performed.

Furthermore, there is a significant concern that using a single, successful HLW canister drop test to verify and quantify canister integrity is insufficient for a set of canisters numbering 7,000 to 13,000. Relying solely on statistical sampling to demonstrate confidence in the canister design would require a relatively large sample size. For example, using the hyper geometric distribution for a minimum population of 7,000 HLW canisters and requiring at least 80% confidence that no more than 700 canisters would fail the drop test (if all 7,000 were tested) yields a minimum sample size of 16 (randomly selected) HLW canisters that must successfully pass the drop test. A 90% confidence level requires that a random sample of 22 canisters passes the drop test.

By comparison, SRS drop tested seven HLW canisters, some more than once, without any breaching or failure, to contribute to their confidence in the integrity of the SRS canister design and its ability to meet all RW regulatory requirements. However, SRS did not rely solely on these successful drop tests to demonstrate confidence in the canister design. SRS established tight controls for canister procurement to ensure that canister fabrication would consistently meet design specifications to the point that fabrication of the canisters became waste affecting.

It is strongly recommended that ORP/BNI develop or provide additional engineering data, tests, or analysis to prove/show that the single HLW canister thin-wall drop test completed is representative of thousands of canisters expected to be produced and will remain leaktight following a 7-meter drop (e.g., additional HLW canister drop tests, finite element modeling to show compatible canister deformation between the model results and the actual drop test, etc.). Additionally, the procurement of canisters must be tightly controlled to ensure that the drop test results and modeling work apply to the actual production canisters. (See A-07-AMWTP-RPPWTP-011-O01, which recommends that canister fabrication be reconsidered as waste affecting.)

**A-07-AMWTP-RPPWTP-011-O03 - The archival of glass shards should be included in the compliance strategy for the following PCP sections: 4.2.1.2 (Chemical Composition During Production), 4.2.2.2 (Radionuclide Inventory During Production), and 4.2.4 (Product Consistency).**

Part of the rationale for archival of glass shards of each waste type is based on the potential for a future revision to the American Society of Testing and Materials (ASTM) glass standard issued, or litigation at Yucca Mountain that could result in the need for additional sampling. It should be noted that this archival of glass samples strategy was used at both DWPF and WVDP.

**A-07-AMWTP-RPPWTP-011-O04 – Improvement is needed in the configuration management and linkage of documents that identify the strategy for producing an IHLW form.**

Configuration management and linkages between documents that identify the strategy for producing an IHLW form that meets RW technical requirements and that specify activities important to assuring a quality IHLW are poor. These include documents that identify a compliance strategy for meeting the OCRWM WASRD, as well as those that

are important for identifying those items and activities that must be under the OCRWM QA program to ensure the IHLW is of a sufficient quality that OCRWM can accept the IHLW form. Examples include:

- No documented evidence could be found that the list of Items and Activities important to waste acceptance was reviewed for potential changes after the PCP was last revised in September 2005, because the latest revision of the Items and Activities List is March 2005. Discussions with BNI staff indicate that PCP changes did not impact Items and Activities List, but documentation to that affect was not identified.
- Appendix B of 24590-WTP-GPG-ENG-063, "Determination of IHLW Product Quality-Affecting Items and Activities," and Table 2 of 24590-HLW-RPT-PR-01-001, "Waste Acceptance Impacting Items and Activities," match in all areas except one, in which the HLW Canister Export Handling System in Appendix B of 24590-WTP-GPG-ENG-063 is identified as requiring screening, while it is not in Table 2, of 24590-HLW-RPT-PR-01-001.
- 24590-WTP-GPP-RTD-004, "Product Qualification Document Approval/ Change," Revision 2, addresses multiple product qualification documents, including secondary wastes and LAW wastes. That document does not make reference to the RW waste-affecting nature of the IHLW documents and the need to have them concurred by RW per the revised MOA between EM and RW and direction memorandum from EM-10.

As a recommendation to improve the presentation of the rationale for application of the QARD and meeting technical requirements for canistered waste form, BNI should consider integrating the Determination of IHLW WAIIA Guide, the WAIIA document, and individual WAIIA screening forms. Both the DWPF and WVDP have presented their respective rationales in such a manner.

By integrating the methodology for identifying product-qualifying items and activities with the list of items and activities and the rationale for the WAI designation, the process is simplified for the engineer and becomes a valuable tool (i.e., one-stop shopping). Fishbone diagrams would also give an excellent pictorial description of the WAI items and activities associated with a specific system. The Review Team also recommends that two additional sections be added to the WTP waste acceptance manual: an identification of software/electronic database management section as well as a procurement section. This approach of centralizing the WA items and activity process is consistent with the DWPF WARM (WSRC-IM-93-45), and the WVDP "Waste Acceptance Manual" (WVDP-200).

Additionally, the Review Team identified several concerns regarding the screening questions in Appendix C of 24590-WTP-GPG-ENG-063, "Determination of IHLW Product Quality-Affecting Items and Activities," Revision 4, which are used to determine whether an item or activity is important to the production of an IHLW form that requires special quality assurance controls to assure it can be accepted by OCRWM. These are as follows:

- The questions in Appendix C of 24590-WTP-GPG-ENG-063 provide three options for screener to make a determination: “Yes,” “No,” and “Not Applicable” (N/A). The answers should be either “Yes” or “No.” Either the item or activity does pose a risk to ensuring an IHLW canistered waste form can meet the technical requirements of the OCRW WASRD (DOE/RW-0351), or it does not. It may be that an item or activity may not be related at all to waste acceptance, in which case the answer to any of the questions should be “No.”
- Consideration should be given to providing examples that ensure sufficient detail is included in the rationale for answers to screening questions. Other factors to propose in guidance are analyses to be considered in performing the screening might include the following:
  - Failure modes and effects analyses or comparable analysis that quantifies the impacts of failure of the item
  - Reliability, maintainability, and operability analyses that address factors that might be relevant to determination of importance/significance of the item or activity to the risk of producing a non-conforming waste form.

**A-07-AMWTP-RPPWTP-011-O05 – The BNI IHLW Technical Issue Resolution Group should be covered by charter that clearly describes the organizational structure, roles, responsibilities, authorities, and activities.**

Recently, BNI formed a Contractor IHLW Technical Issue Resolution Group (Action Team), as described in a draft schematic chart provided to the Review Team, to address potential and ongoing technical issues in this area related to development and implementation of a strategy for meeting RW’s technical requirements for acceptance of IHLW contained in the WASRD. However, to be fully compliant with the QARD (DOE/RW-0333P) and DOE O 414.1C, “Quality Assurance,” requirements, a programmatic document or a charter needs to be developed to clearly describe the organizational structure; the roles, responsibilities, authorities, and activities of each functional organization; and its assigned points of contacts/participants. This document may consider addressing the internal and external interfaces among these functional organizations and with the ORP.

It was pointed out to the Review Team that issues resulting from the Action Team’s March 2007 work have been documented as part of a management assessment and, as such, entered into the Project Issues Evaluation Reporting System (PIERS) for tracking, trending, and closure. The above process may be strengthened by formalizing an issue documentation and closure process without having to use the management assessment process for each meeting.

<b>Task# ORP-WTP-2007-0154</b>
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E-STARS™ Report  
Task Detail Report  
05/24/2007 0848

TASK INFORMATION			
<b>Task#</b>	ORP-WTP-2007-0154		
<b>Subject</b>	(Concur 07-WTP-149) ASSESSMENT REPORT A-07-AMWTP-RPPWTP-011 - THE WASTE TREATMENT AND IMMOBILIZATION PLANT (WTP) IMPLEMENTATION OF OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT (OCRWM OR RW) WASTE ACCEPTANCE SYSTEM REQUIRMENTS DOCUMENT (WASRD), APRIL 9 THROUGH APRIL 13, 2007		
<b>Parent Task#</b>		<b>Status</b>	CLOSED
<b>Reference</b>		<b>Due</b>	
<b>Originator</b>	Licht, Sarah	<b>Priority</b>	High
<b>Originator Phone</b>	(509) 373-0068	<b>Category</b>	None
<b>Origination Date</b>	05/17/2007 1322	<b>Generic1</b>	
<b>Remote Task#</b>		<b>Generic2</b>	
<b>Deliverable</b>	None	<b>Generic3</b>	
<b>Class</b>	None	<b>View Permissions</b>	Normal
<b>Instructions</b>	<p>Hard copy of the correspondence is being routed for concurrence. Once you have reviewed the correspondence, please approve or disapprove via E-STARS and route to the next person on the list. Thank you.</p> <p>bcc: MGR RDG file WTP OFF file WTP RGD file M. K. Barrett, AMD W. Taylor, ESQ S. J. Olinger, DEP W. L. Smoot, PAC J. R. Eschenberg, WTP</p>		
ROUTING LISTS			
1	Route List	Inactive	
	<ul style="list-style-type: none"> <li>● Smoot, William - Review - Cancelled - 05/24/2007 0848 <i>Instructions:</i></li> <li>● Taylor, William - Review - Concur - 05/21/2007 0809 <i>Instructions:</i></li> <li>● Eschenberg, John R - Review - Concur - 05/22/2007 0824 <i>Instructions:</i></li> <li>● Olinger, Shirley J - Review - Concur - 05/24/2007 0847 <i>Instructions:</i></li> <li>● Eschenberg, John R - Approve - Cancelled - 05/24/2007 0848 <i>Instructions:</i></li> </ul>		
ATTACHMENTS			
<b>Attachments</b>	<ol style="list-style-type: none"> <li>1. 07-WTP-149.WLS.Albert.doc</li> <li>2. 07-WTP-149.WLS.Attach.FinalAssessmentReport-rev2.doc</li> </ol>		

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**Task# ORP-WTP-2007-0154**

E-STARS™ Report  
 Task Detail Report  
 05/17/2007 0127

TASK INFORMATION			
<b>Task#</b>	ORP-WTP-2007-0154		
<b>Subject</b>	(Concur 07-WTP-149) ASSESSMENT REPORT A-07-AMWTP-RPPWTP-011 - THE WASTE TREATMENT AND IMMOBILIZATION PLANT (WTP) IMPLEMENTATION OF OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT (OCRWM OR RW) WASTE ACCEPTANCE SYSTEM REQUIRMENTS DOCUMENT (WASRD), APRIL 9 THROUGH APRIL 13, 2007		
<b>Parent Task#</b>		<b>Status</b>	Open
<b>Reference</b>		<b>Due</b>	
<b>Originator</b>	Licht, Sarah	<b>Priority</b>	High
<b>Originator Phone</b>	(509) 373-0068	<b>Category</b>	None
<b>Origination Date</b>	05/17/2007 1322	<b>Generic1</b>	
<b>Remote Task#</b>		<b>Generic2</b>	
<b>Deliverable</b>	None	<b>Generic3</b>	
<b>Class</b>	None	<b>View Permissions</b>	Normal
<b>Instructions</b>	Hard copy of the correspondence is being routed for concurrence. Once you have reviewed the correspondence, please approve or disapprove via E-STARS and route to the next person on the list. Thank you.  bcc: MGR RDG file WTP OFF file WTP RGD file M. K. Barrett, AMD W. Taylor, ESQ S. J. Olinger, DEP W. L. Smoot, PAC J. R. Eschenberg, WTP J.L. POLEHN, ESQ		
<b>ROUTING LISTS</b>	J.L. POLEHN, ESQ		
1	Route List	Active	
	<ul style="list-style-type: none"> <li>Smoot, William - Review - Awaiting Response <i>WLS 5/17/07</i>  <i>Instructions:</i></li> </ul>		
	<ul style="list-style-type: none"> <li>Taylor, William - Review - Awaiting Response <i>WQT 5/18/07</i>  <i>Instructions:</i></li> </ul>		
	<ul style="list-style-type: none"> <li>Eschenberg, John R - Review - Awaiting Response <i>JE 5/21/07</i>  <i>Instructions:</i></li> </ul>		
	<ul style="list-style-type: none"> <li>Olinger, Shirley J - Review - Awaiting Response <i>W 5/21/07</i>  <i>Instructions:</i></li> </ul>		
	<ul style="list-style-type: none"> <li>Eschenberg, John R - Approve - Awaiting Response <i>JE</i>  <i>Instructions:</i></li> </ul>		
<b>ATTACHMENTS</b>			
<b>Attachments</b>	1. 07-WTP-149.WLS.Albert.doc 2. 07-WTP-149.WLS.Attach.FinalAssessmentReport-rev2.doc		

<b>Task# ORP-WTP-2007-0154</b>
<b>COLLABORATION</b>
<b>COMMENTS</b>
<i>No Comments</i>
<b>TASK DUE DATE HISTORY</b>
<i>No Due Date History</i>
<b>SUB TASK HISTORY</b>
<i>No Subtasks</i>

-- end of report --