U.S. Department of Energy
Office of River Protection
P.O. Box 450, MSIN H6-60
Richland, Washington 99352

DEC 0 6 2006

06-WTP-177

Mr. C. M. Albert, Project Director
Bechtel National, Inc.
2435 Stevens Center Place
Richland, Washington 99354

Dear Mr. Albert:

CONTRACT NO. DE-AC27-01RV14136 – TRANSMITTAL OF DESIGN OVERSIGHT REPORT, D-06-DESIGN-033, "STANDARDS FLOWDOWN FOR ROUND HIGH EFFICIENCY PARTICULATE AIR (HEPA) FILTERS"

This letter transmits the Design Oversight Report, D-06-DESIGN-033, "Standards Flowdown for Round HEPA Filters." The attached report concludes that the American Society of Mechanical Engineers (ASME) AG-1 *Code on Nuclear Air and Gas Cleaning*, Section FK, *Special HEPA Filters*, has been implemented adequately. One follow-up item was identified; the latest revision of the Contractor's engineering specification was initially transmitted to the vendor informally rather than formally through the material requisition.

Assessment Follow-up Item (AFI) D-06-AMWTP-DESIGN-033-A01 tracks the revision of the material requisition, 24590-QL-MRA-MKH0-00003, "HEPA Filters QL-1 (U6L8) (HV005)," to incorporate reference to the latest revision (Revision 2) of 24590-WTP-3PS-MKH0-T0002, "Engineering Specification for Nuclear Grade HEPA Filters (ASME AG-1 Section FK Filters)."

This letter is not considered to constitute a change to the Contract. In the event the Contractor disagrees with this interpretation, it must immediately notify the Contracting Officer orally, and in writing within five working days in accordance with the Contract (Section H, Clause H.1 "Technical Direction").

If you have any questions, please contact me, or your staff may call Lewis F. Miller, Jr., Waste Treatment and Immobilization Plant Project Engineering Director, (509) 373-9189.

Sincerely,

John R. Eschenberg, Project Manager
Waste Treatment and Immobilization Plant Project

WTP:JEO

Attachment

cc w/attach:
W. S. Elkins, BNI
BNI Correspondence

DESIGN OVERSIGHT REPORT, D–06–DESIGN–033, "REVIEW OF STANDARDS FLOWDOWN FOR ROUND HIGH EFFICIENCY PARTICULATE AIR (HEPA) FILTERS"

November 2006

EXECUTIVE SUMMARY

As part of its oversight responsibilities, the U.S. Department of Energy, Office of River Protection (ORP) performs various assessments of Bechtel National, Inc. (BNI; also referred to as the Contractor) activities during the design and construction phase. One type of assessment is a design review of various systems and processes, called a design oversight, performed by the Waste Treatment and Immobilization Plant (WTP) Engineering Division. The design oversight consists of document reviews, field walkdowns, and BNI management and staff interviews.

This design oversight traced that the relevant standards from the Contract, "Safety Requirements Document," "Basis of Design," and American Society of Mechanical Engineers (ASME) AG-1 *Code on Nuclear Air and Gas Cleaning*, have been adequately transmitted to and implemented through the Contractor's engineering specification, material requisition, and purchase order to the vendor. A unique feature of the WTP HEPA filter design is their round or cylindrical shape with radial flow; the conventional North American design for HEPA filters is rectangular shape with axial flow. Appropriate vendor submittals were reviewed to confirm that the applicable standards were captured by the vendor in the design of the HEPA filters. The manufacture and supply of the HEPA filters has not begun, so there is no hardware to inspect at this time. This report concludes that the flowdown of standards for round HEPA filters has been implemented adequately. One issue was identified; the latest revision of the Contractor's engineering specification that implements these standards was initially transmitted to the vendor informally, rather than formally through the material requisition.

Assessment Follow-up Item (AFI) D-06-AMWTP-DESIGN-033-A01 tracks the revision of the material requisition, 24590-QL-MRA-MKH0-00003, "HEPA Filters QL-1 (U6L8) (HV005)," to incorporate reference to the latest revision (Revision 2 or current) of 24590-WTP-3PS-MKH0-T0002, "Engineering Specification for Nuclear Grade HEPA Filters (ASME AG-1 Section FK Filters)." The action is being properly tracked by the Contractor in accordance with Engineering Department project instruction 24590-WTP-3GL-G06B-00001, "Material Requisitions," Revision 12, to incorporate the revised engineering specification during the next update to the material requisition.

1.0 INTRODUCTION

A major component of the U.S. Department of Energy (DOE), Office of River Protection (ORP) mission is the design and construction of the Waste Treatment and Immobilization Plant (WTP) in the 200 East Area of the Hanford Site. The design and construction contractor for the WTP is Bechtel National, Inc. (BNI; also referred to as the Contractor). As part of its oversight responsibilities, ORP performs various assessments of BNI activities during the design and construction phase. One type of assessment is the design review of various systems and processes, called a design oversight, performed by the WTP Engineering Division (WED).

The design oversight consisted of document reviews, field walkdowns, and BNI management and staff interviews. The evaluation began on November 1, 2006; it was completed on November 30, 2006.

2.0 BACKGROUND

Conventional ventilation systems provide many functions to control the internal environment; primarily heating, cooling, and humidity control for human comfort and equipment protection, heat removal, and gas and odor removal. Conversely, a significant objective in the design of the WTP confinement ventilation systems is to control the release of radioactive contaminants and hazardous chemical contaminants to the external environment. Unlike conventional ventilation systems that operate under pressure to keep the unconditioned air out of the controlled space, WTP confinement ventilation systems operate under vacuum to keep the unfiltered air confined within the controlled space. In the WTP, the air is channeled or cascaded from zones of lower potential contamination to zones of higher contamination by progressively lower negative pressures. Then the air is vented to the atmosphere only after passing through High-Efficiency Particulate Air (HEPA) filters designed to remove a sufficient portion of the particulate contamination, which allows the release of the cleaned air within regulated release criteria. A unique feature of the WTP HEPA filter design is their round or cylindrical shape with radial flow; the conventional North American design for HEPA filters is rectangular shape with axial flow. This difference in design has required the development of new and unique standards to implement. American Society of Mechanical Engineers (ASME) AG-1 *Code on Nuclear Air and Gas Cleaning*, Section FK, *Special HEPA Filters*, was specifically developed to address the manufacture and operation of the cylindrical, radial-flow HEPA filters, and incorporated for use at WTP through amendment to the Safety Requirements Document.

3.0 SCOPE AND APPROACH

3.1 Scope

The objective of this oversight was to verify that the appropriate, relevant, and applicable standards and requirements had been selected by the Contractor and transmitted to and implemented by the supplier of the round HEPA filters. The manufacture and supply of the HEPA filters has not begun, so there is no hardware to inspect at this time. Therefore, the assessor reviewed the following documents to confirm that the appropriate standards were captured by the Contractor and implemented by the vendor in the design of the HEPA filters:

- Contract: Section C "Statement of Work," (c) "Design,"
  "(15) Facility Ventilation System Design: The Contractor shall prepare the ventilation flow diagrams and heating, ventilation, and air conditioning system design for the Pretreatment, HLW Vitrification, LAW Vitrification, Analytical Laboratory, and balance of plant facilities. The diagrams shall identify the individual systems, all equipment components, and flows in the facilities. Sample locations and methods shall be specified. Equipment to provide motive force and ventilation control shall be identified."
  and
  "(20) Other Applicable Design Products Including:
  (i) Ventilation and instrumentation diagrams;"

- 24590-WTP-SRD-ESH-01-001-02, "Safety Requirements Document" (SRD): Safety Criterion 4.4-3, "Applicable Project Phases – Design and Construction, Ventilation Systems and Off-Gas systems;" and Appendix C-35.0, American Society of Mechanical Engineers (ASME) AG-1, *Code on Nuclear Air and Gas Treatment*;

- 24590-WTP-DB-ENG-01-001, "Basis of Design;" Section 12, "Ventilation Basis of Design," subsection 12.5, "System Descriptions," paragraphs 12.5.2, 4, 5, 6, 7, and 8: "The HEPA filter inserts are radial flow type, meeting the performance requirements of AG-1." Also subsection 12.9, "Filter Testing;" "Filter testing shall be in accordance with ASME AG-1, ASME N509, and ASME N510;"

- Codes and standards: ASME AG-1, Section FK, "Special Filters;"

- Engineering specification(s): 24590-WTP-3PS-MKH0-T0002, "Engineering Specification for Nuclear Grade High Efficiency Particulate Air (HEPA) Filters (ASME AG-1 Section FK Filters)," Revision 2, April 8, 2006;

- Material requisition(s): 24590-QL-MRA-MKH0-00003, "HEPA Filters QL1 (U6L8) (HV005)," Revision 1, June 25, 2003;

- Purchase order(s): 24590-QL-POA-MKH0-00003, "HEPA Filters Purchase Order;" and

- Vendor submittals:
  - 24590-QL-POA-MKH0-00003-04-00002-00D, "Specification for Manufacture and Acceptance of Nuclear Filters."
  - 24590-QL-POA-MKH0-00003-03-00001-00F, "Shop Detail Drawing for Safe Change Filter."
  - 24590-QL-POA-MKH0-00003-03-00005-00F, "Outline Drawing for Safe Change Filter."
  - 24590-QL-POA-MKH0-00003-03-00009-00D, "Assembly Drawing for Safe Change Filter."
  - 24590-QL-POA-MKH0-00003-03-00013-00B, "Shop Detail Drawing Remote Change Filter."

- 24590-QL-POA-MKH0-00003-03-00014-00B, "Assembly Drawing Remote Change Filter."
- 24590-QL-POA-MKH0-00003-03-00017-00B, "Outline Drawing for Remote Change Filter."

3.2 Approach

ORP conducted oversight within the guidelines of ORP DI 220.1, "Conduct of Design Oversight," Revision 1, issued April 18, 2006. Information was collected from various BNI and DOE documents, and interviews with BNI design staff were conducted. See Section 6.0 for a full listing of reviewed documents and personnel contacted.

The approved design oversight plan, "Review of Standards Flowdown for Round HEPA Filters," is provided in Appendix A.

4.0 RESULTS

4.1 Specification: 24590-WTP-3PS-MKH0-T0002, "Engineering Specification for Nuclear Grade HEPA Filters (ASME AG-1 Section FK Filters)"

The assessor reviewed the engineering specification to verify that the applicable standards were flowed down from the Contract, SRD, "Basis of Design," and ASME AG-1 Section FK code, into the Contractor's design. The engineering specification invokes ASME AG-1 Section FK code generally, and the applicable subarticles specifically, demonstrating that the applicable standards are properly flowed down to the Contractor's specification. The SRD provides for four exceptions to the ASME AG-1 Section FK code as follows: Subarticle FK-4100 is tailored to increase the maximum allowable media velocity; Table FK-4100-1 is tailored to increase the maximum allowable pressure drop; subarticle FK-6211 is tailored to relax the tolerances on parallelism and squareness; and subarticle FK-6212 is tailored to relax the tolerances on concentricity and general dimensions. The assessor concluded that these exceptions were captured in the Contractor's specification, further demonstrating that the applicable standards are properly flowed down.

4.2 Material Requisition: 24590-QL-MRA-MKH0-00003, "HEPA Filters QL1 (U6L8) (HV005)"

The assessor reviewed the Contractor's material requisition to verify that the Contractor's requirements were being appropriately flowed down to the vendor. The material requisition lists 20 line items. The first line item is for the design and certification of the filters; it is also the only active line item. The remaining line items are for the fabrication and supply of the filters, differentiated by type and facility, such as safe change or remote change, High-Level Waste (HLW), Low-Activity Waste (LAW), and Pretreatment (PT) Facilities; Analytical Laboratory (LAB), or certification testing. These line items for fabrication and supply of the filters have not been released to the vendor for action. The material requisition includes the Revision 0 version of the Contractor's specification, which predates the SRD revision and so does not call out the ASME AG-1 Section FK code. The Contractor's procedure, "Material Requisitions," 24590-WTP-3GL-G06B-00001, Revision 12, requires, "For those revised documents that will not be provided to a supplier (for any reason) and therefore will not cause a revision to an material

requisition, a means of tracking (such as a log, database, etc.) that decision will be maintained by Engineering." The assessor reviewed a copy of the Engineering database entry for the subject material requisition that noted the outstanding engineering specification with the comment, "Plan to incorporate into next technical revision of material requisition." Further interviews with Engineering personnel involved showed that the plan was to revise the material requisition within the next year to coordinate with releasing the line items for fabrication and supply of the filters for certification testing. The assessor concluded that these initial and tracking actions are compliant with the relevant procedure, but an Assessment Follow-up Item (AFI) will be opened to verify that the closure actions are completed as planned.

4.3 Vendor Submittals

The assessor reviewed the list of vendor submittals and determined that there were 24 submittals for the subject purchase order. Of these, seven submittals directly related to the flowdown of technical standards to demonstrate how the supplier was implementing requirements. The assessor reviewed each of these submittals to verify that the applicable requirements were being appropriately flowed down to the vendor.

- 24590-QL-POA-MKH0-00003-04-00002-00D, "Specification for Manufacture and Acceptance of Nuclear Filters." The assessor determined that the specification applied primarily to manufacturing processes. The tolerances specified conformed to the tolerances specified in the Contractor's engineering specification and the ASME AG-1 Section FK code, with approved exceptions.
- 24590-QL-POA-MKH0-00003-03-00001-00F, "Shop Detail Drawing for Safe Change Filter."
- 24590-QL-POA-MKH0-00003-03-00005-00F, "Outline Drawing for Safe Change Filter."
- 24590-QL-POA-MKH0-00003-03-00009-00D, "Assembly Drawing for Safe Change Filter."
- 24590-QL-POA-MKH0-00003-03-00013-00B, "Shop Detail Drawing Remote Change Filter."
- 24590-QL-POA-MKH0-00003-03-00014-00B, "Assembly Drawing Remote Change Filter."
- 24590-QL-POA-MKH0-00003-03-00017-00B, "Outline Drawing for Remote Change Filter."

The assessor reviewed the vendor submittals for compliance with the Contractor's engineering specification and the ASME AG-1 Section FK code, with approved exceptions, and concluded that they satisfied the applicable requirements.

5.0 OPEN ITEMS AND RECOMMENDATIONS

5.1 Open Items – Assessment Follow-up Item (AFI)

D-06-AMWTP-DESIGN-033-A01: This AFI tracks the revision of the material requisition 24590-QL-MRA-MKH0-00003 to incorporate reference to the latest revision (Revision 2 or current) of engineering specification 24590-WTP-3PS-MKH0-T0002. The action is being tracked by the Contractor in accordance with Engineering Department project instruction 24590-WTP-3GL-G06B-00001, "Material Requisitions," Revision 12, to incorporate the revised engineering specification during the next update to the material requisition.

6.0 PERSONNEL CONTACTED AND REFERENCES

6.1 Personnel Contacted

- Elaine Diaz, BNI Engineering, Procurement Support
- John Dick, BNI Engineering, HVAC Design
- Gerard Garcia, BNI Engineering, HVAC Design Supervisor
- Alfredo Jocson, BNI Engineering, HVAC Design
- Pat Sullivan, BNI Engineering, HVAC Design
- Leo Solis, BNI Engineering, HVAC Design
- Paul Yegge, BNI Engineering, Procurement Support

6.2 References

ORP DI 220.1, "Conduct of Design Oversight," Revision 1, DOE, ORP, Richland, Washington, April 18, 2006.

Contractor Documents:

- 24590-WTP-SRD-ESH-01-001-02, Revision 4, "Safety Requirements Document," Safety Criterion 4.4-3, "Applicable Project Phases – Design and Construction, Ventilation Systems and Off-Gas systems"; and Appendix C-35.0, ASME AG-1, *Code on Nuclear Air and Gas Treatment*;
- 24590-WTP-DB-ENG-01-001, "Basis of Design," Section 12, "Ventilation Basis of Design," Revision 1H, August 3, 2006;
- 24590-WTP-3GL-G06B-00001, "Material Requisitions," Revision 12, April 25, 2006;
- 24590-WTP-3PS-MKH0-T0002, "Engineering Specification for Nuclear Grade High Efficiency Particulate (HEPA) Filters (ASME AG-1 Section FK Filters)," Revision 2, March 8, 2006;
- 24590-QL-MRA-MKH0-00003, "HEPA Filters QL1 (U6L8) (HV005)," Revision 1, June 25, 2003; and
- 24590-QL-POA-MKH0-00003, "HEPA Filters Purchase Order," Revision 1, April 15, 2005:
  - 24590-QL-POA-MKH0-00003-04-00002-00D, "Specification for Manufacture and Acceptance of Nuclear Filters."
  - 24590-QL-POA-MKH0-00003-03-00001-00F, "Shop Detail Drawing for Safe Change Filter."
  - 24590-QL-POA-MKH0-00003-03-00005-00F, "Outline Drawing for Safe Change Filter."
  - 24590-QL-POA-MKH0-00003-03-00009-00D, "Assembly Drawing for Safe Change Filter."
  - 24590-QL-POA-MKH0-00003-03-00013-00B, "Shop Detail Drawing Remote Change Filter."
  - 24590-QL-POA-MKH0-00003-03-00014-00B, "Assembly Drawing Remote Change Filter."
  - 24590-QL-POA-MKH0-00003-03-00017-00B, "Outline Drawing for Remote Change Filter."