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

04-WEC-005

FEB 11 2004

Mr. J. P. Henschel, Project Director
Bechtel National, Inc.
2435 Stevens Center
Richland, Washington 99352

Dear Mr. Henschel:

CONTRACT NO. DE-AC27-01RV14136 – SUBMITTAL OF U.S. DEPARTMENT OF ENERGY, OFFICE OF RIVER PROTECTION (ORP) DESIGN OVERSIGHT REPORT ON BLACK CELL DESIGN ADEQUACY

This letter transmits the Black Cell Design Adequacy Oversight Report which documents the conclusions, recommendations, and open items that were identified during the conduct of this oversight. The objectives of this oversight were to identify any potential changes to the design, construction, or operational aspects of the Black Cells that can improve system performance and identify any safety issues that have not been previously considered.

The Oversight Team has identified a number of detailed issues contained within each Line of Inquiry (LOI) given in Appendix C and highlighted in the Executive Summary. A list of Open Items is given in Appendix A.

As a follow on to this review and in response to the recommendations contained herein, it is requested that Bechtel National, Inc. (BNI) prepare a "Black Cell Management Strategy" document that more comprehensively substantiates the Design, Operations, and Maintenance Standards for the Waste Treatment and Immobilization Plant (WTP) Black Cells. This document should address these key considerations:

1. Are the Black Cell design and construction approaches sufficiently conservative to allow the WTP components to function as intended, considering the unique requirements being imposed within these cells?; and

2. Are these unique requirements of no access and no direct surveillance within Black Cells necessary and appropriate to support WTP mission completion?

In addition, ORP has been recently informed that a full volumetric inspection of the primary confinement weld was not performed prior to installing the Submerged Bid Scrubber Condensate Receiver Vessel, HOP-VSL-00903. Section six of the Safety Requirements Document requires that an inaccessible area (or black cell) vessel undergo full volumetric inspection. ORP will continue to follow this issue with BNI, and is concerned with the effectiveness of implementing the material specification and acceptance processes which allowed this vessel to be installed in the High Level Waste facility.

It appears as if management of "Black Cells" would benefit from establishing a BNI lead individual and/or committee representing cognizant WTP system and plant areas. This entity

could act as a focus (which presently seems lacking) to develop and implement an integrated consistent approach across all "Black Cells."

ORP would like to acknowledge the excellent support provided by Mr. Steve Foebler, Mr. Steve Vail, and their staff within the BNI engineering organization. Their support and leadership in organizing responses for the Oversight Team information requests and obtaining the needed design information was invaluable in allowing the Oversight Team to complete this review on the required schedule.

Please provide ORP with a written response to the recommendations and open items contained within this report. These recommendations and open items should be entered into the BNI Recommendation and Issue Report Tracking System. Further, BNI should review each of the LOI write-ups contained in Appendix C of this report and address any other issues contained therein that may require resolution.

ORP will be conducting a follow-up oversight on the WTP Black Cell design. This oversight will focus on the resolution of any remaining recommendations and open items from this design oversight, design and construction processes for vessels and components in the WTP Black Cells, and the modular piping section. The timing for this oversight should coincide with the assembly of the piping modular sections. Please identify a timeframe based on the current schedule when this review should be conducted.

If you have any questions, please contact me, or your staff may contact William F. Hamel, Director, WTP Engineering and Commissioning Division, (509) 373-1569.

Sincerely,

Roy J. Schepens
Manager

WEC:WFH

Attachment

cc w/attach:
G. Duncan, BNI
S. Foelber, BNI
S. Lynch, BNI
R. Tosetti, BNI
S. Vail, BNI
L. Demick, GTI
L. Holton, PNNL

Attachment to
04-WEC-005

Waste Treatment Plant
Black Cell Design Adequacy Oversight Report

D-03-DESIGN-006

February 2004

WEC:WFH
February 6, 2004

Waste Treatment Plant
Black Cell Design Adequacy Oversight Report

Prepared By:

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U.S. Department of Energy, Office of River Protection

Waste Treatment Plant
Black Cell Design Adequacy Oversight Report

D-03-DESIGN-006

February 2004

Prepared by:

William F. Hamel, Director
Engineering and Commissioning Division
Office of River Protection

Approved:

John Eschenberg, Project Manager
Waste Treatment Plant
Office of River Protection

Office of River Protection
Richland, Washington

Executive Summary

The Office of River Protection (ORP) staff and technical support contractor staff have conducted a technical design oversight on the adequacy of the black cell[1] design for the Waste Treatment and Immobilization Plant (WTP). The objectives of this oversight were to determine if:

1. The design, construction and operational features of the process equipment and piping located in the "black cells" of the Waste Treatment and Immobilization Plant (WTP) appear adequate to support an anticipated 40 year design life,

2. Identify, if required, any potential changes to the design, construction or operational aspects of the black cells that can improve system performance, and

3. Identify any safety issues that have not been previously considered.

The scope of this oversight included the design, procurement, fabrication, installation and operation of process equipment components to be located in the WTP facility black cells. Specifically:

- Design requirements and design processes for the process equipment (piping, vessels, pipe supports, etc) housed in the black cells
- Fabrication, procurement and installation requirements for the process equipment and
- Operational planning and contingencies for the process systems.

The Oversight Review was conducted by a 13 member team that was divided into four sub-teams to investigate Design Processes and Implementation, Construction Planning, and Operational Planning. This design oversight was conducted by collecting and evaluating WTP project design and construction procedures and documentation, and forming independent perspectives that are documented on Lines of Inquiry presented in Appendix B. The information reviewed originated from:

- Presentations by key BNI staff on specific lines of inquiry,
- Discussion of specific aspects of the design and construction processes with key BNI staff,
- Review and evaluation of design documentation, and
- Completing a walk down of the WTP construction site.

[1] A black cell is a radiochemical process hot cell that contains vessels, evaporators, and piping systems that are used to support process waste stream storage and blending functions. No active equipment components are located in the black cell. The design for the vessels and piping is all welded construction. Some instrumentation (e.g. thermocouples, radiation detectors) are remotely replaceable by insertion into sealed pipe wells. The black cell vessels and design do not possess design features for remote replacement. The black cell concept is used in areas where the risk of vessel or piping failure due to corrosion or erosion is low. The WTP Pretreatment facility contains fifteen black cells and the HLW Vitrification Facility contains three black cells.

As a result of this oversight the Team has observed the following favorable aspects of the BNI design, construction and operational planning processes:

- BNI has established a disciplined work process which has the necessary elements to ensure the design and quality requirements are adequately implemented in the facility design and that sufficient BNI technical oversight is performed.
- BNI has chosen conservative and robust design and fabrication standards for the vessels and piping for the black cells that when effectively applied will provide high reliability for the black cell equipment components and meet their intended functions for the 40-year design life.
- BNI has staffed the WTP engineering and construction organization with senior and appropriately experienced personnel.
- BNI has developed a standardized work process for pipe stress analysis and piping support design to promote consistency, completeness and efficiency in piping engineering.
- The BNI strategy that uses modular construction for black cell piping makes the installation of piping in the black cells more efficient compared to installation line-by-line, and can reduce the opportunity for residual pipe stress in black cell piping during final assembly.
- The design includes provisions for unplugging transfer devices and piping should excessive solids accumulate.
- Although not a requirement of the WTP design, there are black cell design features that could potentially be used to provide black cell access, if required, for equipment repair. These provide a limited degree of defense in depth if unforeseen problems occur during the operating life of the plant.

Despite the quality of the BNI design and construction planning processes, this design oversight has identified a number of areas where significant improvement is required. Specifically:

- The technical basis for the selection of the materials of construction and the establishment of the corrosion and erosion wear allowances are not defensible. The requirements (WTP Contract and process chemistry material balances) are not clearly linked to the material selection process. The rationale for the materials selection, as provided in the corrosion evaluation, is not presented in clear, concise terms. The basis for the establishment of the erosion allowances is not traceable to the supporting documentation.

- The design processes used to establish the spare and redundancy requirements for equipment are not defined, and when considered, are not consistently applied throughout the WTP design. This has resulted in potential single and common cause failure modes for plant operations. The design appears to have many opportunities, through the use of existing unspecified vessel nozzles and cell wall penetrations to provide operational robustness to the plant. In addition the plant has cell penetrations (construction and HVAC openings) that could be provided for cell access to repair unforeseen failures of equipment systems.

- The design documentation generated for the piping does not completely and accurately depict the interfaces between the black cell and hot cell. This includes black cell boundaries identified on the P&IDs, isometrics and data bases (e.g. line lists, equipment drawings). Because of this, the potential to fabricate black cell components to less stringent standards than planned is possible.

The Oversight Team has made the following recommendations that when effectively implemented can strengthen the design processes for the black cell systems and components and provide long term operational flexibility of the WTP facilities.

1. BNI should prepare a procedure (or design guide) that completely defines the process conditions and materials selection process. This procedure should describe the process from the preparation of the material balance through the preparation of the corrosion evaluation report. BNI should re-evaluate the process conditions and material selection process as part of the upcoming revision of the material balance, scheduled in March 2004, to ensure:

    a. Documentation of the traceability of all chemical species from the WTP Contract requirements through the Corrosion Evaluation.
    b. Normal and bounding conditions are identified for the process chemistry.
    c. Normal and off-normal expected operational conditions are identified.
    d. A clear rationale for the material selection is documented.
    e. Wear allowances associated with corrosion and erosion are separately identified.

2. BNI should re-assess the technical basis for the erosion wear rates to determine if they are adequate and document this re-assessment. BNI should determine if waste processing in WTP has the potential for increasing the erosion potential of the waste.

3. BNI should develop design guidance on redundancy and spares and re-assess the current black cell design against that guidance to determine if additional redundancy or spares should be provided. Design features resulting in single or common mode failures of the process system should be addressed. This assessment should be documented and justified.

4. BNI should evaluate the feasibility of modifying existing black cell openings such as HVAC or construction openings for future access to support unforeseen maintenance.

5. BNI should establish design process "rules" for consistently and explicitly ensuring that black cell requirements are implemented that:

    a. Identify black cell boundaries on primary drawings and documents.
    b. Identify black cell requirements on physical fabrication and construction drawings, and collateral databases.
    c. Identify black cell requirement in procurement specifications and datasheets.
    d. Establish and document the requirements for black cell HVAC systems and components.

No new safety issues were identified in the conduct of this design oversight.

Based on this review and the recommendations contained herein, it is suggested that BNI prepare a "Black Cell Management Strategy," that clearly delineates the Design, Operations, and Maintenance Standards for the WTP Black Cells. This Strategy should also address the key considerations:

1. Are the design and construction approaches sufficiently robust enough to allow the WTP components to function as intended considering the unique requirements being imposed within these cells?; and

2. Are these unique requirements of no access and no direct surveillance necessary and appropriate for the WTP Black Cell components to support mission completion?

It should also be noted that management of this issues unique to "Black Cells" within BNI would benefit from establishing a lead individual and/or committee representing cognizant WTP system and plant areas. This entity could act as a focus (which presently seems lacking) to develop and implement an integrated consistent approach across all "Black Cells."

An extensive list of Open Items related to specific aspects of the design and construction processes are presented in Appendix A. These open items are for BNI consideration and action. Once the Recommendations and Open Items are effectively resolved, the Team believes that the black cell design should meet the design performance standard of a 40 year operating life as required by the WTP Contract.

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Introduction

Background

The Waste Treatment and Immobilization Plant (WTP) facility complex is comprised of three large nuclear waste treatment facilities; a Pretreatment facility, a LAW Vitrification facility and a HLW Vitrification facility. The Pretreatment facility receives liquid waste slurry from the Hanford tank farm and treats the waste using solids-liquid filtration, ion-exchange to remove soluble radio-cesium, and concentration and blending processes to produce waste feeds for immobilization in the LAW Vitrification facility and the HLW Vitrification facility. The tank waste that is processed is highly radioactive and is therefore treated and immobilized in heavily shielded facilities. The process systems are located in concrete cells to provide the necessary shielding, secondary containment and confinement for the process systems.

A large portion of the Pretreatment facility and a portion of the HLW Vitrification facility use a black cell design concept to house the process equipment. A black cell is a radiochemical process cell that contains vessels and piping systems in which no active waste processing (e.g. solid-liquid separations or concentration) occurs. The design of the vessels and piping for the black cells is all welded construction. Some instrumentation (e.g. thermocouples, radiation detectors) is remotely replaceable by insertion into sealed pipe wells from outside the black cell through external piping. The black cell vessels and piping are designed for the WTP operating mission life of 40 years and do not possess design features for remote replacement.

The black cell concept is used in areas where the risk of vessel failure is low to achieve a reduced design and capital cost compared to a comparably equipped fully remotely accessible hot cell.

The use of closed cells to house process equipment was originally used for processing facilities located in the United Kingdom and France. Closed cells were specified in the conceptual design of the WTP facilities. The current WTP Contractor, Bechtel National Inc has advanced the conceptual design and has started construction of the WTP facilities using black cells to house a number of process systems. The transition from closed cells to black cells and the design difference between the two cell concepts are discussed in a later section of this report. The Pretreatment facility has 15 black cells and the HLW Vitrification facility has 3 black cells.

Previous design concepts used by the Department of Energy have used fully maintainable hot cells[2] (e.g., the Defense Waste Processing Facility and West Valley Demonstration Projects waste vitrification facilities). Because of the use of black cells in the WTP design, the Office of River Protection has initiated a review and evaluation of the black cell design concept.

[2] In historic DOE designs these approaches are normally remote access via cell covers, doors or hatches, remote maintenance capability (e.g. cranes, remote manipulators) or remote equipment features (e.g. flanged connections, jumpers) that allow modular replacement of vessels or piping.

Oversight Objectives

The objectives of this design oversight review are to:

1. Determine if the design and operational features of the process equipment and piping located in the black cells of the WTP appear adequate to support an anticipated 40 year design life,
2. Identify any required changes to the design, construction or operational aspects of the black cells that can improve system performance, and
3. Identify any safety issues that have not been previously considered.

This oversight review is being conducted as part of ORP's responsibility as owner and operator of the WTP facilities to ensure that the design and planned operation complies with the appropriate functional and operating requirements specified in the WTP Contract.

Scope of the Oversight Review

The scope of this oversight review is the design, procurement, fabrication, installation and operation of process equipment components to be located in the WTP facility black cells. The scope includes:

- Design requirements and design process for the equipment (piping, vessels, pipe supports, etc) housed in the black cells,
- Fabrication, procurement and installation requirements for the equipment, and
- Operational planning and contingencies for the process systems.

This review has been scoped to avoid duplication with other design topics that are currently being evaluated by BNI including design and operation of the fluidics mixing systems, and potential for hydrogen gas generation.

Approach

This design oversight was conducted by collecting and evaluating WTP project documentation. This information originated from:

- Presentations by key BNI staff on specific lines of inquiry,
- Discussion of specific aspects of the design and construction processes with key BNI staff,
- Review and evaluation of design documentation, and
- Completing a walk down of the WTP construction site.

This Oversight was conducted during the time period January 20, 2004 to February 3, 2004. The Oversight Plan is provided in Appendix A. An Oversight Team (hereafter referred to as "Team") was formed, and divided into 4 sub-teams to complete the oversight. The title, participants (including affiliation, assignment and expertise) of each member of the sub-teams are defined in Table 1. Resumes for the Team members are provided in Appendix D.

Table 1 Composition of the Black Cell Design Oversight Team

Function	Personnel/Affiliation	Expertise
Design Oversight Process	Bill Hamel, DOE-Team Leader John Treadwell, DOE-Team Co-Leader Barry Naft, Consultant	Waste Treatment Plant Program Management Design and Construction Management Program Management
Design Oversight Team	Bill Hamel, DOE Jeff Barnes, WSRC Dave Houghton, BNFL Larry Demick, Consultant Tom Ballweg, Bechtel	Waste Treatment Plant Program Management Engineering Management/Plant Startup Construction/Black Cell Design Engineering Management Project Engineering and Design
Construction Oversight Team	John Treadwell, DOE Dave Hooks, Bechtel Tim Adams, Consultant John Treadwell, DOE	Design and Construction Management Construction/Piping Design/Welding Vessel, Piping and NDE Design/Fabrication/NDE
Operations Oversight Team	Lew Miller, DOE Bill Brasel, DOE Langdon Holton, PNNL	Nuclear Safety Plant Startup and Operations Process Engineering/Radiochemical Operations

Data collection for the oversight process was completed through the development of Lines of Inquiry (LOI) that were provided to BNI for response. Forty-five specific lines of inquiry (LOI) associated with the following topical areas were identified.

- Installation and Operating Conditions (Normal and Off-normal)
- Failure Mechanisms
- Design Provisions to Address Failure Mechanisms
- Adequacy of Design Implementation
- Adequacy of Supplier Implementation
- Adequacy of Construction Implementation
- Field Inspections to Assure Installation as Designed
- Repeatability for All Black Cells

During the initial part of the Design Oversight, January 20 to 23, 2004, the Team met with BNI staff to participate in presentations by BNI on each specific LOI. On January 24, 2004, the Team conducted a walk-down of the WTP site to review construction progress. This walk down included an inspection of the fabrication of the Pretreatment facility LAW feed receipt vessels being fabricated by Chicago Bridge and Iron, and a walk down of the black cells in the Pretreatment facility and HLW Vitrification facility. During the time period, January 24 to February 2, 2004, the Team reviewed project information and prepared assessments and responses to the LOIs and prepared this summary report. The Teams responses to the LOIs is provided in Appendix B.

Historical Perspective on Black Cells and Application to RPP-WTP

The black cell concept used in the WTP originated from the closed cell design concept used in European nuclear waste treatment facilities. This design evolution is briefly summarized to provide a historical context for the WTP black cell design.

Closed Cell Design Configuration

A closed cell is defined as a shielded cell housing both active and passive process equipment. Active equipment could include pumps, valves, filters, centrifuges and heat exchangers. Passive equipment could include vessels and piping. The closed cell design concept provides design features that allow for the remote removal and replacement of active process equipment by withdrawal into a shielded maintenance cask. The active equipment components are positioned inside a fixed housing permanently built into the cell roof (or wall) within the shielded cell to facilitate their replacement. Access is provided for the components requiring maintenance to be withdrawn into the shielded cask. A replacement equipment component can then be installed and the plant returned to normal service.

Major passive process equipment components (e.g. vessels, piping) are generally designed as maintenance free items. Their design life is commensurate with the design life of the facility. However, it is recognized that non-routine maintenance or replacement may be necessary at some future time. To accommodate this, features of the cell and equipment design may facilitate removal or repair in the unlikely event of failure. These features typically include provision of removable cell roof or wall plugs, or shielded access doors to facilitate for example equipment repairs to shell and tube heat exchangers.

The reliability of the closed cell design solution draws primarily from experience in Europe. The closed cell design concept is employed both in the United Kingdom in the MAGNOX and THORP nuclear fuel reprocessing plants at the Sellefield Site, and by the French in the UP-2 and UP-3 nuclear fuel reprocessing plants located at the LaHague Site. Other facilities at these two sites also use the closed cell design concept.

The closed cell design concept has been used for over 45 years at the Sellefield site and 38 year at the LaHague site. At these two sites the design features of the cell facilities, removable equipment and supporting maintenance equipment have been fully developed and demonstrated.

Transition to current Black Cell / Hot Cell Design Configuration

The advanced conceptual design provided by DOE to Bechtel National at the time of contract award in December 2000 was based on the design developed by BNFL between September 1996 and April 2000. This conceptual design used a closed cell design concept based upon design concepts used in the United Kingdom. Bechtel National Inc (BNI) with operational input from their prime sub-contractor Washington Group International (WGI) undertook two significant reviews of the conceptual design, which subsequently led to the reconfiguration of the Pretreatment facility (RPT-W375-MG00078, CCN 021268). These studies document a thorough review of the conceptual design and recommend modifications (implementation of Hot Cells) to

the Pretreatment facility layout that are typical of DOE nuclear waste treatment facilities and simplify the maintenance support requirements for the WTP facilities. The BNI/WGI project team perceived that certain features (e.g. incorporation of an active equipment maintenance philosophy) in the Pretreatment facility cells presented a significant risk to achieving a 40-year design operating life. Consequently, the active equipment that would require maintenance or replacement (e.g. transfer pumps, ion exchange systems and agitators) were relocated into a hot cell. Vessels and supporting piping that have a high degree of reliability were located in black cells.

BNI subsequently developed a hybrid design for the Pretreatment facility utilizing a hot cell for active and high maintenance equipment, while retaining the BNFL closed cells concept for the passive, non-maintenance equipment.

The advantages of retaining the black cell concept in conjunction with the hot cell were:

- Maintaining a smaller building footprint and volume, which is considerably reduced compared to a canyon design.
- Minimizing maintenance activities to the hot cell only.
- Reduction in the net capital and operating costs.
- Reduction in the construction schedule.

The black cell vessel and piping systems, which use high quality specifications, reflect an extensive material selection process, and employ redundant fluidic components that should provide a reasonable and sufficient assurance for a 40-year operating life.

Oversight Assessment Results

The oversight assessment results are organized in the primary functional areas: Design Requirements and Implementation, Materials Selection, Construction Planning and Operational Planning.

Design Requirements and Implementation

The design oversight team reviewed the design processes to determine the adequacy of the design relative to: a disciplined process, contract requirements implementation, application of engineering tools, qualification and experience of personnel, and appropriate oversight.

Design Process

BNI established a uniform project wide approach for their engineering processes. A key element of this approach is the Central Engineering organization which is responsible for establishing and maintaining the codes and standards to be applied to the WTP project and the procedures for the engineering work processes. The Area Project Engineering organization is responsible for providing the specific facility design input information and for implementing the design in the field. The engineering procedures and design guides apply across the WTP project, including each facility, and promote consistency in design application and methodology. The project procedures are continually updated for improvements and are based upon the requirements of the Bechtel corporate procedures. The procedures are organized in line with the ISMS 5 Core Functions and 7 Guiding Principles.

Key to the WTP application of the black cell concept is the limitation of the equipment in the cell to types that require no maintenance. The black cells are limited to vessel systems and associated pumping, mixing, and sampling extraction systems. These systems use power fluidics systems (e.g., air-driven pulse jet mixers and reverse flow diverter pumps with no in-cell moving parts) rather than motor-driven pumps or mechanical agitators to avoid equipment requiring maintenance or replacement.

The principal design criteria for the black cells are:

- Contract: 40 year design life.
- Washington Administrative Code: liner, sump and camera viewing, and vessel integrity assessment.
- Safety Basis: Safety Requirement Document (SRD), Volume II, Appendix H.

The BNI design process does not include any special provisions for black cells. The design process appropriately considers material selection and corrosion allowance to ensure compatibility with fluid chemistry and operating conditions, standard vessel design principles, standard piping and support design principles, requirements for flushing provisions in areas where components are susceptible to plugging, and selection of instrumentation and controls compatible with expected operating conditions and procedures. In addition, the BNI design process does require that vessels and in general the piping be given the highest safety

classification of the project. This ensures that the vessels will be designed, fabricated and inspected with the most conservative conditions and at the highest quality level of the WTP project. This increases confidence that the vessels should be functional over the 40 year design life of the plant.

Design Standards

The two basic design codes have been chosen for the design of vessels and piping in the black cells are American Society of Mechanical Engineers (ASME) Section VIII and ASME B31.3-1996, respectively. The year of ASME Section VIII for the vessels is dependent upon the time of the vessel purchase since the ASME Code inspector is required to use the applicable code in effect at the time of the vessel purchase. On the other hand, the 1996 edition of ASME B31.3 was chosen so that the stress analysis was consistent with the stress analyses approved by the NRC. The ASME Section VIII and ASME B31.3 are the same design codes that were chosen for the Performance Category (PC)-3 process piping, and are the same codes specified in DOE G 420.1-1, Nonreactor Nuclear Safety Design Criteria and Explosive Safety Criteria Guide, for safety significant and safety class vessels and piping to provide primary confinement and prevent or mitigate radioactive and/or hazardous material releases to the environment. ASME B31.3 is used for piping typically found in the petroleum refineries, chemical, pharmaceutical, textile, paper, semiconductor, and cryogenic plants and related processing plants and terminals. The WTP Project is a chemical plant that processes radioactive and hazardous waste. BNI has determined that ASME B31.3 was applicable for piping containing radioactive fluids in a chemical plant.

For the black cells, the WTP Project has determined that the additional requirements in Section 6 of Appendix H of the SRD should supplement the requirements of the ASME B31.3. NRC has approved the use of ASME B31.3, for piping and valves, and ASME Section VIII, for pressure vessels. Consideration was given to ASME Section III as a potential code of use. ASME Section III is used for the design of safety systems in commercial nuclear power plants. However, most of the systems in commercial nuclear power plants are high pressure and high temperature systems. The WTP process systems are much lower pressure and temperature. In some cases, ASME Section III provides more design details than does ASME Section VIII or B31.3. As allowed by ASME B31.3, the WTP Project has adopted some of the methodology used in ASME Section III, where details are missing from ASME B31.3.

The vessel codes are specified as ASME Section VIII, which is the industry standard for high-reliability vessels. WTP also imposes requirements beyond the code to ensure the requisite reliability. Some of the key requirements include;

- Vessels are designed a minimum pressure of 15 psig even if the operating pressure would support a lower design pressure. Vessels are also rated for vacuum to the maximum extent possible, using the thickness established for internal pressure conditions as a basis.
- All nozzles are integrally reinforced and attached by full penetration welds.
- All main vessel weld seams contacted by process liquids are 100% radiographed.
- All jacket attachment welds are inspected ultrasonically.

- Any nozzle attachment welds in contact with the process liquids are 100% radiographed while those not in contact are dye penetrant tested.
- Where heavily loaded attachments to the vessel shell or heads are made, ultrasonic examination of the pressure retaining component is performed prior to attachment.

There is no unique code or standard applied to components in the black cells. Generally, there is no additional margin provided solely because the component is in a black cell. This is because most of the components and systems in the WTP project are designed to a 40 years design life.

Engineering Processes

The design and engineering processes are typical for any major project using detailed procedures and design guides. Formal review and approval processes are defined for the design documents. A graded approach is applied to the document change process and construction change process to ensure the appropriate level of review. The procurement specification process places the responsibility for code compliance and calculations on the constructor or fabricator with an independent check by BNI engineering.

Design documents, including PFDs, P&IDs, isometrics, calculations, specifications, equipment data sheets, equipment proposal drawings, and vendor drawings and documents, are used to implement the design requirements specified by the WTP Contract and Authorization Basis Documents (Preliminary Safety Evaluation Report (PSAR), Safety Requirements Document (SRD), Integrated Safety Management Plan (ISMP), Radiation Protection Program (RPP), and Quality Assurance Manual (QAM). Additional requirements are specified in Basis of Design, Operational Requirements Document, and the Interface Control Document for Waste Feed (ICD 19).

Qualification and Experience of Personnel

The design products are developed, checked, and approved by qualified individuals. The training process includes several elements to ensure the engineering personnel have the appropriate skills and experience to perform their assigned tasks. These elements include work experience verification, classroom training, computer based training, vendor training and informal topical training. The amount and type of training is tailored to the individual's assignment and position in the organization. Once an engineer completes the required training, the person is placed on the "List of Qualified Individuals". Additionally, BNI has staffed the WTP Project with senior and experienced personnel who had prior experience with BNFL, a company that originated the closed cell and fluidics technology concepts.

Design Oversight

Safety screenings and evaluations of the design products are performed prior to approval to ensure the design, or design change, is compliant with the Authorization Basis and related requirements. The System Process Assurance group reports directly to the Project Engineering Manager and provides additional reviews and oversight of the work processes and procedures. The Bechtel Chief Engineer's Office reviews selected calculations, drawings, specifications, and

corrosion evaluations. An Independent Qualified Registered Professional Engineer reviews drawings and documents related to the State of Washington permits.

Design Process Conclusions and Recommendations

Some improvements can be realized in the transitioning of information between the various databases and different documents developed by engineering to ensure that black cells and requirements that apply to black cells are clearly identified. The Team notes that black cells are not clearly identified on some documents and that this omission could lead to a failure to apply the appropriate standards. Accordingly it is recommended (Recommendation 5) that BNI establish design process 'rules' for consistently and explicitly ensuring that black cell components and interfaces are clearly identified in the following:

- Boundaries on primary drawings and documents.
- Requirements on physical fabrication and construction drawings, and collateral databases.
- Requirements in procurement specifications and datasheets.
- Requirements for HVAC systems and components.

Material Selection

The evaluation of the materials selection process considered the procedures and basis for the selection of the vessel and piping materials including the bases for corrosion and erosion allowances.

The BNI materials selection process is based upon an engineering evaluation that involves the following major elements:

- Development by the Process Engineering Organization of a Mass Balance for the WTP to define fluid chemistry and operating conditions, e.g. pressure and temperature for every process stream throughout the plant. This mass balance is prepared by the Central Engineering Organization and is based upon the waste feed envelopes (and waste feeds) defined in the WTP Contract.

- Identification of normal and off-normal operating conditions: The mass balance information for the process flow streams is intended to be used to estimate normal, maximum and off-normal operating conditions for each vessel in the design. Based upon this assessment a Materials Selection Data Sheet (MSDS) is prepared that contains the process information associated with each vessel in the design. The process conditions for piping are assumed to be the same as for the vessels to which the piping is attached.

- Completion of a Corrosion Evaluation: A corrosion evaluation is prepared by materials experts, based upon the MSDS, to identify the materials of construction and establish corrosion and erosion allowances for the vessel/piping. The corrosion evaluations are prepared to document the thought process in determining types of materials and minimum corrosion allowances that should be used in the design of process vessels. The corrosion

evaluations are also used to specify any operating restrictions that limit the use of the materials or corrosion allowances specified.

- The corrosion evaluations are re-examined as part of the design change process if there is a change in process operating conditions.

Material Selection Process Conclusions and Recommendations

Based upon the review and evaluation of the documentation associated with the materials selection process the Team concluded the following.

Estimate of Waste Stream Chemistry and Operating Conditions

The material balance calculation used to prepare the MSDS and subsequent Corrosion Evaluation for the current MSDS's may not be bounding with respect to feed chemistry.

The WTP Contract requires that the WTP be capable of processing waste feeds representing the compositions for LAW as defined in Specification 7, *Low Activity Waste Envelopes* and for HLW as defined in Specification 8, *High Level Waste Envelopes*. The WTP Contract also places responsibility on the WTP contractor for any modification of these wastes feeds due to process operations within the WTP. The intent of the Envelope designations is that specified chemical compositions are bounding for a majority of the tank waste compositions that the WTP will process during its operating life.

The material balance calculation that was used to develop the MSDSs used in the corrosion evaluations were based upon an Envelope A/D feed vector. Other feed Envelopes; most notably, Envelope B, have concentrations of Cl, F and SO_4 per mole Na that is approximately two times higher than Envelope A. The impact to the expected process stream concentrations has not been fully characterized and although an impact to the materials selection is not likely, the final impact to the materials selections is not known.

Completion of the Material Specification Data Sheets

The process information on the MSDS is not complete, potentially resulting in errors in material selection or erosion/corrosion allowance estimates.

Using information from the process material balance, the MSDSs are prepared by the process engineering organization and are intended to estimate the following;

- Process fluid chemistry (chemicals, undissolved solids, pH)
- Process fluid operating parameters (temperature, pressure, viscosity, specific gravity)
- External environment parameters
- Process operating conditions (cold startup, normal operations, standby/idle, cleaning, and off-normal
- Operating limitations

An inspection of the MSDSs revealed that a majority of the process information fields had not been completed. Most notably absent were the fields for off-normal operating conditions.

In addition the MSDSs do not completely represent the actual process chemistry, particularly with respect to erosion. For example, during process operations hard precipitates will be formed at some process locations. Most notably, manganese dioxide precipitates will be formed in the treatment of Envelope C wastes to remove Sr/TRU (and in the Oxidative Leaching[3] of the HLW sludge to remove Cr). The manganese dioxide has a hardness that is greater than stainless steel. In addition, the tank waste feeds may contain sand or other impurities such as tank scale and mineral waste forms with higher than the average assumed hardness indices. Many of the MSDSs for the Pretreatment facility vessels assumed that there were no solids in the process stream. An approach was used that assumed that the solids were dissolved to maximize the chemical inventory for the corrosion assessments. However this assessment approach does not provide a basis to assess the potential impact from erosion caused by tank waste solids.

Estimate of the Erosion Allowances

The erosion allowances used in the Materials Selection process do not appear to be adequately bounded. The hardness of the slurry solids particles is based on limited information. One report is used as a basis for evaluation, "Simulant Erosion Testing" (WTP-RPT-001). This report states that an analysis of a Hanford tank waste core sample shows that the waste solids are soft. This report also includes an analysis of a Hanford waste slurry simulant that BNI believes to have a bounding hardness. However, the report documenting this analysis raises several concerns over whether the simulant analyzed was actually bounding. It states that changes in mineralization have been noted in tank farm wastes but not widely characterized. The report further states that these changes could result in significant hardening of the solids.

Wear testing based upon information from the literature used by BNI for two different tests showed the relationship between wear and fluid velocity is exponential. It is not clear that this data can be extrapolated to the actual wear rates anticipated with WTP process conditions. In addition the erosion wear allowance for vessels with PJMs accounts for the higher wear rate of stainless steel when the surface to particle angle is small, (e.g. <30 degrees) such as observed during the site inspection of the perimeter PJMs in FRP-VSL-00002A/B/C/D. However when the jet impact is perpendicular to the vessel wall the erosion rate will be lower as was assumed in the BNI erosion calculations. This issue needs to be considered in calculations on erosion wear allowances.

There appears to be no consideration of changes in waste hardness caused by WTP processing (e.g. the precipitation of MnO_2 which is generated by the treatment of the Envelope C waste and by the planned oxidative leaching of the tank wastes). The BNI erosion assessment (24590-WTP-M06-50-00004) assumes that the waste is soft with a Miller Number of 32. This assumption may not be representative of the Hanford tank wastes. While some wastes may be this soft, others will likely contain components that are harder. Accordingly, it is recommended

[3] Oxidative Leaching of the HLW sludge was added in Modification A029 of the WTP Contract , DE-AC27-01RV14136, dated April 25, 2003. This process will use sodium permanganate to selectively oxidize chromium. The reduction of the permanganate anion will result in the formation of a manganese oxide precipitate.

(Recommendation 2) that BNI re-assess the technical basis for the erosion wear rules to determine if they are adequate. As part of this re-assessment, BNI should determine if waste processing in WTP has the potential for increasing the erosion potential of the waste.

The methodology and specific wear allowances are contained in a project committed calculation (24590-WTP-M06-50-00004). Based upon this assessment, wear allowances are established for equipment components that would be subjected to specific anticipated operating conditions. These conditions and requirements for the wear tolerances have been specified in a series of "Rules". (See LOI 3.5 in Appendix B for a summary of these "Rules"). The derivation of the rules is not traceable to the supporting technical analysis and the rules associated with the erosion allowance have not been documented in a formalized procedure.

In addition the erosion allowances used in the Corrosion Evaluation are inconsistent with the requirements specified in the Safety Requirements Document (SRD), Appendix H requirements. The SRD requires that where the solids content is greater than 4% by weight, a minimum corrosion/erosion allowance of 0.125 inch shall be provided or hard facing shall be provided in areas of high velocity. A general review of the Corrosion Evaluations for vessels that will contain non-Newtonian fluids (UFP-VSL-00001 A/B, UFP-VSL-00002 A/B, HLP-VSL-00028, HLP-VSL-00027, HCP-VSL-00001/00002) found that lower wear allowances (0.04 inch) were specified and no clear indication of hardening provisions identified.

A test using stainless steel and a Hanford waste simulant indicates that, at flow rates of 10 ft/sec, no signs of erosion were found after 1100 hours. However, there is little or no other data using the WTP materials of construction at higher flow velocities with a solids slurry representative of Hanford waste, and there is no scope in the Research and Technology Program to obtain any additional data. BNI should evaluate the need for additional testing.

Materials Selection Process Documentation

The BNI strategy and requirements for the Material Selection process are not completely documented. The materials selection process is not completely described or defined in a procedure or design guide. Missing in the material selection process are descriptions for:

- Establishment of bounding case process material balance(s).
- Identification of normal, off-normal and special (e.g. vessel flushing) operating conditions.
- A clear rationale for the materials selection.
- Establishment of a sound technical basis for the erosion wear allowance.
- Ensuring traceability and understanding in the corrosion evaluation.

It is recommended (Recommendation 1) that BNI establish a procedure that completely define the process chemistry and materials selection process.

The Procedure for Corrosion Evaluations requires that the process and operational limitations be identified. These limitations typically address specific provisions for the flushing and rinsing of equipment where the normal chemistry conditions of the vessel will be exceeded. In addition,

the normal operating modes (e.g. temperature, pH and process solution chemistry) are identified. The Materials Selection Report indicates that the Operations organization of the WTP project "provides information on the effect of operating limits and input on off-normal conditions".

BNI anticipates that based upon a revised material balance due in March 2004 that the MSDSs will be reviewed and the Corrosion Evaluations will be re-assessed. This provides an opportunity to improve the defensibility of the material selection process and document decisions that have been made.

The Oversight Team also reviewed the status of the open items associated with a previous oversight on Materials Selection (03-WEC-018). A resolution approach for the remaining open items was agreed upon and will be documented in the formal BNI action tracking system. The recommendations and open items identified in this report are unique to this oversight and will be documented as new separate item(s) in action tracking systems both at ORP and BNI.

Construction Planning

The construction oversight team reviewed the processes in place to ensure purchasing of materials and components comply with requirements; construction methods employed to minimize deformation and residual stresses in vessels and piping; and, non-destructive testing methods proposed for black cells are appropriate. These are considered the key activities to successfully construct the WTP and are summarized below.

Specifying Requirements and Assuring Compliance in Purchasing

Most components in black cells purchased either from vendors or from subcontractors. All major vessels (except for the four LAW feed receipt vessels) and most pipe spools are manufactured off site. Accordingly, quality assurance and control in procurements is very important.

A potential problem on large construction projects is a breakdown in communication between designers and suppliers. In order to support construction, procurement activities are often based on incomplete designs which are finalized by working with suppliers during fabrication. BNI has effectively managed this by establishing a Multi Facility Acquisition Team (MFAT) responsible for permanent plant item procurement. This team includes engineers and buyers whose responsibilities include preparation of material requisitions (MR) and purchase orders (PO) and managing the contracts once awarded. These engineers and buyers work closely together as one team reporting to the MFAT Manager. MFAT engineers are responsible for preparation of MR's and are responsible for ensuring quality and inspection requirements are correctly identified in MR scope documents and that related drawings and documents prepared by engineering and Supplier Quality (SQ) are included in the MR package.

Plant inspection is currently being accomplished by 22 Supplier Quality Representatives (SQR) at approximately 130 different vendor locations. The number of vendors should peak around 300 over the next year. The planning for control of procurement documents, evaluation of bidder quality programs, specification of supplier QA program requirements, are well thought

out by BNI and MFAT to meet the requirements of NQA-1. The team strongly endorses the establishment of MFAT and believes the program is an excellent means to ensure purchased materials/commodities meet design requirements.

Construction Methodology

The major field construction activities in black cells involve setting vessels followed by construction of process piping. BNI is currently intending to use modular construction for piping assemblies wherever practical in black cells. This is a method of construction were piping systems in common areas that are interconnected through a common support structure are pre-assembled in easily accessible areas other than the final plant location. Once the module is completed to a certain point it is moved into place. Then it is hooked into adjoining piping or equipment (that was previously placed) making a complete interconnected system. Per discussions with BNI staff, they intend to create and install 22 modules in the PT building. The majority of these modules will be in Black Cell areas.

The team believes the use of Modular construction can be of great benefit to the WTP project and reduces the opportunity for residual pipe stress. Some of additional benefits associated with its use include:

a. Module concept allows more work to be performed at or near ground level reducing risks from working at heights.
b. Moves more work outside of the black cell area, which is a confined work area with strict access, egress and air quality requirements.
c. Limits the number of trips and amount of time required for workers to pass into and out of black cell.
d. Allows for local material storage, close to the work front
e. Allows welding and fabrication work, support utilities and other equipment to be staged in one location.
f. Most of the piping in the Modular units can be easily leak tested outside the black cell.
g. Provides for better quality control access during installation.
h. Easier to resolve field problems and tolerance related issues.

The team investigated other construction processes that might result in residual pipe stress and early failure of piping systems and concluded that BNI has planned a sound construction program that complies with NQA-1 requirements and if effectively implemented should meet all the project requirements to ensure a facility life of 40 years.

During inspection of the LAW feed receipt vessels, the construction team evaluated the requirements for vessel fabrication, transport and installation. Chicago Bridge and Iron (CBI) has the contract for fabrication and installation of the feed receipt vessels. CBI is using sound procedures, which should preclude overstressing vessels during transport installation. Their requirements are considered an example for other vessel suppliers and installers. Specifically:

- It is the responsibility of CBI to do the analysis and develop the rigging plan for these Tanks. This must include consideration of any residual stress effects on the Vessel. BNI reviews the analysis and the BNI rigging engineers review the rigging plan.

- In the General Vessel Design and Fabrication specification via standard drawings, BNI provides a set of suggested lug dimensions which can be selected and applied by vendors. BNI engineering, including construction rigging engineers, review and approve the rigging plan.

- Ultrasonic inspections are required on the plate within 3-inches of the lug prior to welding in order to assure there is not laminar tearing. The lug fillet welds are inspected using dye penetrant testing.

This team considered the example of BNI/CBI vessel design and fabrication fully acceptable.

Mechanical means are not allowed during fit-up of pipe to vessel nozzles so there is little chance of residual stresses from this activity. BNI's allowable pipe tolerances also preclude overstressing during construction. Tolerances exceeding these specified require BNI engineering approval providing them the opportunity to review for residual stresses. The team did suggest that design should consider establishing criteria which would allow construction to move pipe into tolerance without employing mechanical means.

Non-Destructive Testing and Evaluation

To the extent possible, it is BNI's intention that pressure containing welds will be 100% volumetrically examined either at the vendor's shop or in the field. Any weld defects that do not meet the acceptance criteria will be repaired and reexamined. For vessel welds, RT, UT, and PT examinations are performed in accordance with ASME Section VIII, Division 1 and ASME Section V. BNI is intending to using automated UT on the field piping welds and using RT where automated UT is not possible.

Based on reviewing the information provided in the vertical slice review it appears that for NDE of the pressure retaining portions of vessels during fabrication, 100% radiography is being used to the maximum extent possible. Where not possible, other acceptable methods such as 100% UT are being conducted. The information reviewed indicates that the NDE methods applied are in accordance with the ASME Section V. This is consistent with the requirements of the Design Code of record, ASME Section VIII, Division 1. The procedures are in place to communicate the requirements to the Subcontractors and to ensure submittal and review of all subcontractor NDE procedures to BNI.

For field fabricated piping and installation, BNI intends to use an Automated Ultrasonic Testing (AUT) process for the Non-Destructive Examination (NDE) of butt welded field welds at the WTP. The development and implementation of this Automated UT process for the Non-Destructive Examination (NDE) of field welds at the WTP is only in its initial stages.

The ASME B31.3 Code permits the use of either Radiographic Testing (RT) or Ultrasonic Testing (UT). For either case it specifies that the examination method shall be in accordance with the ASME Section V. In both cases, ASME B31.3 requires written procedures per ASME Section V. The concept of "Automated" UT as put forward during this review means the use of a mechanical device to rotate the UT Probe around the weld being examined (continuous scanning) and feed the signal in real time to a data recorder (most likely a PC or Laptop PC).

Although ASME B31.3 allows either RT or UT, traditional piping weld inspection has been done using RT. UT (including automated scanning) among other applications, has been used for in-service inspection of pipe and vessel welds in commercial nuclear power plants. Table A-110 of ASME Section V provides general guidance on the effectiveness of the various NDE methods. A review of the ASME Table A-110E indicates that for the overall detection of weld imperfections RT would appear to perform better than UT on some deficiencies. However, in two key areas of concern for the black cell piping (*Cracks* and *Incomplete Fusion*) UT performance would be judged to be better than RT. In the areas where there is a concern for longer-term crevice corrosion (*porosity, root concavity, undercut and misalignment*) RT performance would be judged better than UT.

The team is concerned with the proposed subcontract planning which has NDE testing services reporting to the construction group. The discussion on the subject of ultrasonic inspection showed a major concern with radiographic inspection was the time required to perform them including evacuation of personnel while the tests are being performed. Obtaining results in a short period of time is a significant factor in using the AUT method. With several thousand field welds on black cell piping[4], the concern with schedule is understandable.

Furthermore, with BNI performing the welding with direct labor, the Government loses the second tier QA oversight used when suppliers or subcontractors are involved. Accordingly, the team believes ORP should evaluate increasing the utilization of Government Acceptance Inspection on field welding performed on black cell piping.

Another item brought up during the meetings was proposed use of vacuum box testing. (See LOI 7.5 in Appendix B). These welds will not undergo any of the standard leak tests specified in ASME B31.3 such as a hydrostatic test, a pneumatic leak test or a sensitivity leak test. Therefore, discussions were held on the sensitivity of the AUT process. This should be further evaluated during the development of this process.

BNI is planning on using vacuum box leak testing to leak tests on field pipe welds where it is not practicable to perform hydrostatic or pneumatic leak tests. Vacuum box leak testing is done by covering a weld to be tested with leak detection solution and drawing a vacuum over the weld and looking for bubbles formed. Vacuum box testing is commonly done for welds in liner plates and on tank bottoms where access to one side of the weld is inaccessible. The general requirements for performing vacuum box test procedure are specified in ASME Section V,

[4] During discussions with Paul Petrusha of BNI on January 20, 2004 it was stated that the HLW facility has ~34000 feet of pipe and ~4200 welds, and the Pretreatment Facility has ~200,000 ft pipe with 11,200 total welds. It is estimated that up to 6000 weld would need to be vacuum box tested for weld integrity verification.

Article 10, Appendix II. Appendix II was not written specifically for vacuum box leak testing of piping welds, but it is the only section in the ASME where a methodology to conducted vacuum box testing is defined. BNI intends to develop a vacuum box leak test procedure in accordance with ASME Section V Article 10, Appendix II for testing piping welds at WTP. This method of leak testing is being proposed for the closure welds in the black cells of the Pretreatment facility and all in-facility field welds in the black cells in the HLW Vitrification facility.

BNI is developing a test plan with an independent laboratory to demonstrate that the method can detect leaks of 1 E-3 atm-ml/sec or less. Thus the implementation of the vacuum box leak testing for leak testing of field welds to demonstrate they meet the ASME B31.3 Code at the WTP is still in the initial stage. Therefore the potential for this method must be demonstrated and verified.

Operational Planning

The operations planning team looked at the operational aspects of the black cells, specifically provisions for equipment plugging, redundancy and spares, cell accessibility, and any operational risks identified in the project risk register.

Equipment plugging

The review team found that the Basis of Design and Operations Requirements Document require that provisions for flushing and mechanical clean out ports be included in the design. Review of the Piping and Instrumentation Diagrams (P&IDs) shows that these features have been given adequate consideration in the design. Reverse Flow Diverters (RFDs) are the most likely component to plug based on the smaller port sizes and lower location in the vessel.

The review team notes, based on a 2001 BNFL report, that out of several hundred RFDs in service with approximately 2,000 years of operating life, with some operating as long as 11 years, there have been no failures or reduced performance with the exception of 3 RFDs in one vessel. These RFDs were cleared by performing rapid pneumatic cycles. The WTP design has the capability to perform these rapid pneumatic cycles. The cause of this blockage was found to be an unexpected increase in solid content of the waste stream, above the design envelope, caused by excessive wear on the shear blades in an up-line facility. Once the cause had been established, higher velocities were employed in the tank to increase mixing performance. BNFL has acquired significant experience with Pulse Jet Mixers (PJMs) as well, with some having 31 years of successful operation with no indication of plugging or reduced performance.

Redundancy and Spares

The team looked at black cell equipment, including piping between facilities, for redundancy and spares. The team found that a significant amount of equipment had redundancy or spares provided, and there was some spare piping routed to a nozzle connection in the hot cell or melter cells that could have new equipment installed to duplicate the function of failed equipment. In addition, there are spare penetrations and tank nozzles that could be utilized if a need was identified during cold startup.

However, the team also found that there was no structured approach or criteria for determining where redundancy or spares should be provided. Because of this, there are areas that the team felt may have been overlooked. For example, there is a single line in a black cell that brings all waste, both HLW and LAW, into the facility. Although unlikely, a line failure such as this could completely shutdown the WTP for a lengthy and difficult repair. The team believes that there could be other examples of single failure modes.

The Basis of Design Section 11.4.2 defines the approach required for establishing if equipment should be duplicated or provided with redundancy. There is no documented evidence that such an approach has been applied in the design of the vessels and piping for the black cells. There is also apparently no evaluation of the entire facility for mission essential equipment. Accordingly, it is recommended (Recommendation 3) that BNI develop design guidance on redundancy and spares as required by the Contract and assess the current black cell design against that guidance to determine if additional redundancy or spares should be provided. Design features resulting in single or common mode failures of the process systems should be addressed.

Black Cell Accessibility

The team reviewed the potential for temporary access into the black cells for purposes such as repairs, inspection, or facility modifications. BNI's design is based on all black cell equipment not requiring any maintenance or inspection that would require entry into the black cell for the 40 year design life. Therefore, only passive components are installed in the black cell. These black cell components are primarily vessels and associated equipment, evaporators, piping, structural steel, ventilation ductwork and sump eductors. BNI maintains that by design, there is no requirement to enter the black cell so there is no requirement to provide a capability to access them.

However, there are design features that could be used to provide black cell access. For example, there are access plugs to allow cell flushing that could be used for non-personnel access (boroscope or robotic entry). There are also shield plugs above the black cell evaporators (for maintenance of the demister pad) to allow entry into that equipment (but not into the black cell). The team recommends that these accesses be preserved in the design. There are also 10' by 10' construction accesses that are currently planned to be sealed after cold commissioning for structural integrity of the building. These construction accesses could be modified prior to closure to leave a small (i.e. 3' by 3') opening that could be closed with a removable shield plug. Alternatively, if the ventilation shadow shielding inside the cell were made such that it could be moved, entry could be made through the ventilation supply duct from the operating corridor. The team considered that one of these options should be pursued to provide flexibility to recover from unforeseen equipment failures. A systems engineering approach would have to be employed to determine the utility of this access. Accordingly it is recommended (Recommendation 4) that BNI evaluate the feasibility of modifying existing black cell openings such as HVAC or construction openings for future access to support unforeseen maintenance.

Operational Risks

The team reviewed the current and past risk assessment reports. Only two risks were found related to the black cells. Only one active risk directly related to the black cells. This risk is related to the ability of pulse jet mixers to adequately mix clack cell vessels. However, this oversight has been specifically scoped to avoid duplication with review in the pulse jet mixing area since it is the subject of an ongoing BNI evaluation. Only one closed risk was found related to black cells; the failure of non-redundant HLW equipment. This risk was closed based on a design effort to provide redundancy "where appropriate." The risk assessment does not address risks related to the long term operation of WTP.

Conclusions

Based upon the review of the project information and discussions with BNI project staff the Oversight Team has concluded the following:

- BNI has established a disciplined work process which has the necessary elements to ensure the design and quality requirements are adequately implemented in the facility design and that sufficient BNI technical oversight is performed.
- BNI has chosen conservative and robust design and fabrication standards for the vessels and piping for the black cells that when effectively applied should provide high reliability for the black cell equipment components and meet their intended functions for the 40-year design life.
- BNI has staffed the WTP engineering and construction organization with senior and appropriately experienced personnel.
- BNI has developed a standardized work process for pipe stress analysis and piping support design to promote consistency, completeness and efficiency in piping engineering.
- The BNI strategy that uses modular construction for black cell piping makes the installation of piping in the black cells more efficient compared to installation line-by-line, and can reduce the opportunity for residual pipe stress in black cell piping during final assembly.
- The design includes provisions for unplugging transfer devices and piping should excessive solids accumulate.
- Although not a requirement of the WTP design, there are black cell design features that could potentially be used to provide black cell access, if required, for equipment repair. These provide a limited degree of defense in depth if unforeseen problems occur during the operating life of the plant.

Despite the quality of the BNI design and construction planning processes, this design oversight has identified a number of areas where significant improvement is required. Specifically:

- The technical basis for the selection of the materials of construction and the establishment of the corrosion and erosion wear allowances are not defensible. The requirements (WTP Contact and process chemistry material balances) are not clearly linked to the material selection process. The rationale for the materials selection, as provided in the corrosion evaluation, is not presented in clear concise terms. The basis for the establishment of the erosion allowances is not traceable to the supporting documentation.

- The design processes used to establish the spare and redundancy requirements for equipment are not defined, and when considered are not consistently applied throughout the WTP design. This has resulted in potential single and common cause failure modes for plant operations. The design appears to have many opportunities, through the use of existing unspecified vessel nozzles and cell wall penetrations to provide operational robustness to the plant. In addition the plant has cell penetrations (construction and

HVAC openings) that can be provided for cell access to mitigate unforeseen failures of equipment systems.

- The design documentation generated for the piping does not completely and accurately depict the interfaces between the black cell and hot cell. This includes black cell boundaries identified on the P&IDs, isometrics and data bases (line lists, equipment drawings). Because of this the potential to fabricate black cell components to less stringent standards than planned is possible.

Recommendations

The Oversight Team has made the following recommendations that when effectively implemented can strengthen the design processes for the black cell systems and components and provide long term operational flexibility of the WTP facilities.

1. BNI should prepare a procedure (or design guide) that completely defines the process conditions and materials selection process. This procedure should describe the process from the preparation of the material balance through the preparation of the corrosion evaluation report. BNI should reevaluate the process conditions and material selection process as part of the upcoming revision of the material balance, scheduled in March 2004 to ensure:

    a. Document the traceability of all chemical species from the WTP Contract requirements through the Corrosion Evaluation.
    b. Normal and bounding conditions are identified for the process chemistry.
    c. Normal and off-normal expected operational conditions are identified.
    d. A clear rationale for the material selection is documented.
    e. Wear allowances associated with corrosion and erosion are separately identified.

2. BNI should re-assess the technical basis for the erosion wear rates to determine if they are adequate and document this re-assessment. BNI should determine if waste processing in WTP has the potential for increasing the erosion potential of the waste.

3. BNI should develop design guidance on redundancy and spares and re-assess the current black cell design against that guidance to determine if additional redundancy or spares should be provided. Design features resulting in single or common mode failures of the process system should be addressed. This assessment should be documented and justified.

4. BNI should evaluate the feasibility of modifying existing black cell openings such as HVAC and/or construction openings for future access to support unforeseen maintenance.

5. BNI should establish design process "rules" for consistently and explicitly ensuring that black cell requirements are implemented that:

    a. Identify black cell boundaries on primary drawings and documents.
    b. Identify black cell requirements on physical fabrication and construction drawings, and collateral databases.
    c. Identify black cell requirement in procurement specifications and datasheets.
    d. Establish and document the requirements for black cell HVAC systems and components.

References

1. RPT-W375-MG00078, Rev 0, "Due Diligence Summary", April, 2001"
2. CCN 021268 , "Pretreatment Facility Reconfiguration Study", September 26, 2001
3. 24590-WTP-SRD-ESH-01-001-02, Rev 3, "Safety Requirements Document", Volume II, Section 6 , Appendix H
4. 24590-WTP-PSAR-ESH-01-002-02, Rev 1, "Preliminary Safety Evaluation Report for Support Construction Authorization; PT Facility Specific Information"
5. Integrated Safety Management Plan (ISMP),
6. 24590-WTP-RPP-ESH-01-001, "Radiation Protection Program for Design and Construction", December 11, 2001.
7. 24590-WTP-QAM-QA-01-001, Rev 04B, "Quality Assurance Manual"
8. 24590-WTP-DB-ENG-01-001, Rev 1.0, "Basis of Design" November 24, 2003
9. 24590-WTP-RPT-OP-01-001, Rev 2.0, "Operations Requirements Document" May 5, 2003.
10. 24590-WTP-ICD-MG-01-019, Rev 3.0, "ICD-19-Interface Control Document for Waste Feed", August 15, 2003.
11. 24590-WTP-M06-50-00004, Rev B, "Wear Allowances for WTP Waste Slurry Systems" October 20, 2003.
12. 03-WEC-018. Letter from ORP to BNI, "ORP Design Oversight Report for the BNI Material Selection Process", dated April 21, 2003.

Appendix A - Open Items-BNI

This Appendix summarized the Open Items identified during the conduct of the Black Cell Design Oversight. These open items have been discussed with BNI staff and have also been included in the reference ORP prepared LOI included in Appendix B. The LOI reference is provided at the end of the Open Item statement in brackets. The Open Items have also been prioritized in terms of significance starting with the first item being of greatest importance.

1. BNI should continue to inform ORP on their progress in development of the AUT method. BNI should address the concerns identified in LOI 7.4.

    a. BNI intends to demonstrate that the proposed AUT method will have the capability to detect the required weld imperfection that represent the detection levels specified for RT in Table 341.3.2 of ASME B31.3 versus the less stringent criteria specified in Section 344.6.2 of ASME B31.3. While this is not a specific ASME B31.3 Code requirement, the Team believes this would provide increased confidence in the integrity of the welds for the 40 year plant design life. It is also understood that the requirements of ASME Section V, Article 4 will be met. [LOI 7.4]

    b. BNI intends to consider the requirements added by the 2002 addendum to Section V, in Article 4, Subarticle T-421.1 for the examination of austenitic stainless steel welds and its applicability to this project. It is the Oversight Teams understanding that BNI will also evaluate complying with the non-mandatory Appendix E to Article 4, Section V, ASME for the Computerized Imaging Techniques. [LOI 7.4]

2. BNI should document the operating conditions (and limitations) that were identified in the materials selection process for a vessel/component in the System Description for the respective system. The System Description should be placed under configuration control. [LOI 3.16]

3. BNI should brief ORP on the development of vacuum box leak testing and obtain ORP concurrence for the proposed usage. BNI should address the suggestions identified in LOI 7.5.

4. BNI should evaluate the permissible configurations for black cell piping related to socket welds, branch connections, welded reinforcement pads and other welded attachments to piping. BNI should evaluate the required nondestructive examination for the permissible configurations. BNI should update Appendix A to shop fabrication and field piping specifications regarding inspection requirement for black cell piping as appropriate. [LOI 3.2, 7.2, 7.4]

5. BNI should evaluate the air flow balance interaction of the Pretreatment Vessel Vent Process system with the vessel overflow system (PWD). [LOI 3.2]

6. BNI should evaluate the overpressure / vacuum protection for the FRP system including system operational scenarios and equipment failure scenarios to determine the limiting

design case. Describe how that was factored into establishing the vacuum design pressure for the FRP vessels, large diameter piping and other devices connected to the vessel vent header and system. [LOI 3.2]

7. BNI should identify the design pressures basis for lines that may be used for unplugging fluidics components or other components than may become plugged. [LOI 3.2]

8. BNI should advise ORP on how independence will be maintained for weld acceptance as required by NQA-1. [LOI 7.4]

9. BNI should consider relocating the C5V volume dampers in the black cells to a place where they can be physically adjusted in the future or devising volume dampers that can be adjusted from the hot cell side. [LOI 3.2]

10. BNI should provide the engineering rationale for placing stainless steel pipe directly in contact with painted carbon steel support steel (w/o SS shims), using carbon steel bolts, carbon steel U-bolts, within black cells especially at lower levels which may be wetted by the cell wash/spray system or potentially rinsed with nitric acid solution for decontamination. [Reference requirement of 24590-WTP-GPG-ENG-005 Rev 1 item 10, page 42 of 163.] [LOI 3.2]

11. BNI should evaluate the approach for modular construction to ensure that significant deflections that will result from placing concrete and upper levels of steel are anticipated. [LOI 3.2]

12. BNI should conduct a system engineering approach to assign functional requirements to the current Black Cell access openings (e.g. spray wand, camera viewing, shield plugs above separators). [LOI 3.8]

13. BNI should evaluate the inclusion and formal documentation of thrust loading/fatigue in the design of the vessels. [LOI 5.2]

14. Due to the importance of items and/or materials destined for black cells, BNI should evaluate using independent testing laboratory services to verify quality requirements of materials and welding have been met. [LOI 5.5]

15. BNI should evaluate the adequacy of the 24590-WTP-3PS-PS02-T-00003 Rev 1, Section 3.6.6, regarding pipe slope and determine if slope verification is adequately addressed for process lines requiring sloping. [LOI 3.2, 7.2]

16. BNI should identify what provisions have been incorporated into breakpot design and the design of other internals to make them sufficiently robust to assure that a forty year service life? Include an evaluation of fluid flashing, impingement or other transients have been considered in the design of these vessels and internals. [LOI 3.2]

17. BNI should evaluate the erosion wear allowance for vessels with PJMs accounts for the higher wear rate of stainless steel when the surface to particle angle is small, [e.g. ~<30 degrees] such as observed during site inspection of the perimeter PJMs in FRP-VSL-00002A/B/C/D. This should be evaluated for all other vessels with PJMs. (WSRC-TR-2001-00156, RPP-WTP Slurry Wear Evaluation Literature Search) [LOI 3.2]

18. BNI should update the MSDS for FRP-VSL-0002A/B/C/D, the PT Waste Feed Receipt Vessels, 24590-PTF-N1D-FRP-00001 Rev 2, to have a minimum solids concentration consistent with the WTP contract value of 3.8 wt%. [LOI 1.1]

19. BNI should present the results of the erosion testing (non-Newtonian fluid applications) for the PJM nozzle materials ORP for review and evaluation. The design impacts associated with application of the testing results should be identified. [LOI 3.3, 3.4]

20. BNI should assess the materials selection (corrosion evaluation-24590-PTF-N1D-UFP-0003) for the UFP feed Vessels (UFP-VSL-00002A/B) and other affected vessels based upon the proposed use of these vessels for oxidative leaching of the HLW sludge. These vessels will be used in process operations in which hard precipitates are produced (e.g. MnO2). This assessment should account the procurement and fabrication of the affected vessels. [LOI 3.3, 3.4]

21. BNI should add the information presented in their response to LOI 3.4 on a corrosion assessment under acidic conditions for vessels as appropriate to the respective MSDS's and Corrosion Evaluations. [LOI 3.3, 3.4]

22. BNI should reconcile the discrepancy between the SRD based requirements for corrosion/erosion wear allowance with the erosion "rules" contained in the wear allowance calculation (24590-WTP-M06-50-00004, Rev B). [LOI 3.5]

23. BNI should document the "rules" established for the erosion allowance (24590-WTP-M06-50-00004, Rev B) in a formal design guide. [LOI 3.5]

24. BNI should ensure that Black Cell Vessels have nozzle internals so that fluids entering the tank extend inside the vessel to assure that chemical additions drop freely into the vessel rather than dribble along the vessel wall. This reduces the risk that concentrated chemicals added to the vessel will attack the vessel locally. [LOI 3.2]

25. BNI to advise what provisions are being made to preclude seismic interaction of three vessel applications (TCP-1, TLP-A&B and CNP-4) were identified as SC-III items with SC-I items in the black cells. [LOI 3.2]

26. BNI should evaluate the method of installing, tightening and securing pipe support bolts, u-bolts and other mechanical fasteners to ensure they will remain secure for the entire service life of the facility. [LOI 3.2]

Open Items-ORP

The Open Items summarized below were identified by the Black Cell Oversight Team for the Office of River Protection.

1. ORP should evaluate the benefits of providing erosion hardening design features (e.g. PJM nozzle hardening and PJM jet wear plates) to the black cell vessels that are expected to be used for the storage of Newtonian fluids to provide future flexibility in waste processing. These tanks include the LAW and HLW feed receipt vessels. [LOI 3.3, 3.4]

2. ORP should evaluate increasing the utilization of Government Acceptance Inspection on field welding performed on black cell piping.[LOI 7.3]

3. ORP should add to their design oversight schedule an assessment review of BNI's vacuum testing program and AUT Implementation. [LOI 7.2, 7.4]

4. ORP should perform a follow-up design oversight that focuses on the resolution of any remaining recommendations and open items from this design oversight, design and construction processes for vessels and components in the WTP Black Cells, and the modular piping sections.

Appendix B - Oversight Plan

U.S. Department of Energy, Office of River Protection

DESIGN PRODUCT OVERSIGHT PLAN

WTP Black Cell Design Adequacy Design Oversight

January 2004

Design Oversight: D-03-DESIGN-006

Team Lead: Bill Hamel

Reviewer(s): Tim Adams
Jeff Barnes
Tom Ballweg
Bill Brasel
Larry Demick
Langdon Holton
Dave Hook
Dave Houghton
Lou Miller
Barry Naft
John Treadwell

Submitted by:

Signature on File _____ _____
William Hamel, Director — Date
WTP Engineering and Commissioning Division
Office of River Protection

Concurrence:

Signature on File _____ _____
Jim Betts, Project Manager — Date
Waste Treatment Plant
Bechtel National Inc.

Signature on File _____ _____
John Eschenberg, Project Manager — Date
Waste Treatment Plant
Office of River Protection

1.1 Objectives and Scope

Objectives

The objectives of this design oversight review are to determine if:

4. The design and operational features of the process equipment and piping located in the "black cells" of the Waste Treatment and Immobilization Plant (WTP) are adequate to support an anticipated 40 year design life, and
5. Identify, if required, any potential improvements to the design, construction or operational aspects of the Black Cells that can improve system performance, and
6. Identify any safety issues that have not been previously considered.

This design oversight is being conducted as part of ORP's obligation as owner and operator of the WTP facilities to ensure that the design and planned operation complies with the appropriate functional and operating requirements including WTP Contract requirements.

A black cell is a radiochemical process hot cell that contains vessels, evaporators, and piping systems-that are used to support process waste stream storage and blending functions. No active waste processing (e.g. separations or concentration) occurs in the black cell vessels. The construction techniques for the vessels and piping use all welded construction. Some instrumentation (e.g. thermocouples, radiation detectors are remotely replaceable by insertion into sealed pipe wells). The black cell vessels and design do not possess design features for remote replacement. These are normally remote access via cell doors or hatches, remote maintenance capability (e.g. cranes, remote manipulators) or remote equipment features (e.g. flanged connections, jumpers) that allow modular replacement of vessels or piping. The black cell concept is used in areas where the risk of vessel failure due to corrosion or erosion is low. The black cell concept has a reduced design and capital cost compared to an equally equipped fully remote hot cell.

Scope of Review

The scope of this design oversight is the design, procurement, fabrication, installation and operation of process equipment components to be located in the WTP facility black cells. The scope includes:

- Design requirements and design process for the process equipment (piping, vessels, pipe supports, etc) housed in the black cells
- Fabrication, procurement and installation requirements for the process equipment and an
- Operational planning and contingencies for the process systems.

This review has been scoped to avoid duplication with other design topics that are currently been evaluated by BNI including; design and operation of the fluidics mixing systems and potential for hydrogen gas generation.

1.2 Specific Objectives/Lines of Inquiry(LOI)

This design oversight will be completed by investigation of specific lines of inquiry (LOI) associated with the design, construction and operational features of the black cell. The oversight team Table 1 has been structured around three sub teams, Design, Construction and Operations. The initial LOIs are presented below.

Installation and Operating Conditions (Normal and Off-normal)

1.1 What are the expected operational conditions (e.g. corrosion, erosion, thermal) of the black cell equipment components?

1.2 How has BNI used operational limitations and requirements (including: solids concentration, solids mobilization and transfer, hydrogen mitigation and acid-base reactions) to define design requirements for the black cell vessels?

- Process Composition
- Static Loads
- Dynamic Loads
- Thermal Loads
- Environmental Controls
- Construction Stresses

Failure Mechanisms

2.1 How have the following failure mechanisms been characterized and addressed? Are there other significant failure mechanisms that apply to any of the black cell components?

- Corrosion
- Erosion
- Fatigue/Cyclic Loadings
- Overstress due to Normal or Occasional Loads
- Residual Stress
- Plugging
- Design/Fabrication/Installation Errors

Design Provisions to Address Failure Mechanisms

3.1 Are the requirements adequate to meet the WTP contract requirements for design life? Where are they documented?

3.2 What design codes or standards have been selected for the components in black cells and why?

3.3 How is the adequacy of materials of selection for black cell process components determined?

3.4 Are the materials assessments for black cell components adequately bounded based upon requirements and existing data (e.g. materials properties and expected conditions)?

3.5 How were corrosion/erosion allowances determined, including any limitations on fluid velocity, particle size, particle hardness?
3.6 What provisions are made in the piping stress analyses to account for residual stresses due to installation?
3.7 Are specific layout criteria imposed on black cell components to mitigate potential failure mechanisms (such as for piping systems)?
3.8 Are there any provisions or capability for temporary access into the black cells for any purpose?
3.9 What types of design models (e.g. piping, thermal stress, load stress) are used in the BNI design process? Do these models adequately represent the expected operational conditions (e.g. chemical, thermal, load stress) of the respective black cell process components?
3.10 What design models are used for vessel and piping design? What verification has BNI conducted on these models?
3.11 Are there provisions to clear potential pipe or component plugging?
3.12 What level of contingency planning, in terms of identification of equipment redundancy and spares, has been identified in the development of the design?
3.13 Identify the process piping spares that currently exist for each system that is entirely enclosed, or partially enclosed, in a black cell.
3.14 Identify the process piping spares that exist between major facilities (e.g. Pretreatment and HLW Vitrification and Pretreatment and LAW Vitrification).
3.15 Is there an experience base that supports the use of these design concepts with the operational limitations/requirements identified?
3.16 How is BNI documenting operational limitations identified in the materials selection process and design process, and how are these limitations/procedures to be captured in the operational specifications for the facility?
3.17 What are the operational risks that have been identified in the Risk Register that are related to design aspects of the black cell equipment? What are the current mitigating measures?
3.18 Are any additional margins added to the design of any features in consideration of black cell inaccessibility?

Adequacy of Design Implementation

4.1 Do design documents correctly implement the design requirements for black cells? (Vertical slice review of FRP in PTF)
4.2 How does BNI verify that the requirements and guidance identified in the design process are adequately implemented in the design of the black cell components?
4.3 What technical oversight is provided by BNI engineering management to ensure the adequacy of design products (e.g. model calculations, design calculations, procurement specifications)?
4.4 Have the designs of the large vessels been proven in actual operation at other sites? Has BNI incorporated learning from these previous projects into the design and fabrication of the vessels and piping?

Adequacy of Supplier Implementation

5.1 What types of design models (e.g. vessels, thermal stress, load stress) are used in the BNI suppliers design process? Do these models adequately represent the expected operational conditions (e.g. chemical, thermal, load stress) of the respective black cell process components?
5.2 How are stresses associated with the operation of the fluidic mixing equipment (e.g. pulse jet mixers) accounted for in the design of vessels?
5.3 Explain how the in-process inspections at the vendors shop insures that the spools to be installed in black cells have the correct wall thickness, bend radius, weld details, NDE, and leak testing required in the purchase order.
5.4 Is the BNI inspection program adequately identified in the procurement specifications (here address both BNI oversight and supplier inspections, such as their NDE implementation)?
5.5 What is BNI's QA oversight program for procured components?
5.6 What provisions assure materials used are consistent with design requirements?

Adequacy of Construction Implementation

6.1 Describe the constructability/design reviews that are conducted on large process vessels and piping to ensure that residual stresses are accounted for in the design and eventual fabrication of components?
6.2 Describe the constructability/design reviews conducted to ensure that residual stresses from alignment and final assembly are acceptable.
6.3 How are large vessels handled to ensure the vessels are not stressed during fabrication or in the field during final placement (e.g. design features, rigging requirements, final placement requirements)? Include the lifting and placement of the FRP vessels built by CB&I)
6.4 What tolerances are allowed in piping installation fit up and when is engineering approval required?
6.5 How is the cleanliness of piping components installed in black cells maintained?

Field Inspections to Assure Installation as Designed

7.1 Explain the sequence of inspections, and the controls that are in place for components, which occur from the time components are received on site until they are installed in black cells.
7.2 What are the non-destructive inspection techniques that have been identified for equipment components that will be in the black cells? What is the technical basis for these inspection techniques and inspection frequency?
7.3 What types of acceptance inspections will be made for completed systems to ensure compliance with requirements?
7.4 Explain the characteristics of both automated UT and RT and how they compare for this application in identifying defects that could shorten the life of pipe weld.
7.5 Explain the vacuum box leak test procedure and why vacuum box leak testing is an adequate method of leak testing lines in lieu of pneumatic or hydrostatic testing.

Repeatability for All Black Cells

8.1 What specific requirements and guidance is identified in the BNI design process to ensure adequacy and uniformity in the design of black cell process components? (Address design

processes related to procurement support, system design, and physical layout; address organizational structure, work process procedures, and design guidance.)

8.2 What qualification and training program exists for designers of the black cell components?

8.3 What training and qualification is provided to designers who use design models?

8.4 What is the experience level of the designers, and design managers, with respect to qualification to codes and standards, and familiarity with fabrication and construction?

Open Issues

9.1.1 What is the status of the open items associated with the ORP Design Oversight D-03-Design-001, "BNI Materials Selection Process"? (Document provided with ORP Letter 03-WEC-018).

1.2 Schedule of Activities

Table 2 summarizes the schedule for completion of this oversight. BNI will provide initial responses to LOIs at the start of each presentation.

1.4 Documentation

The product of this design oversight will be a management briefing package and a final report that shall contain the sections and content as summarized in Table 3.

The final report shall include any

- Recommendations on methods to improve the activities (e.g. design, fabrication and operational planning) for the process system associated with the black cells.
- Observations from the design oversight. These will be areas of strength and weaknesses in the current BNI identified processes or activities. Favorable aspects of the BNI program will be identified as appropriate.
- Open Items which are work items jointly identified to improve the activities (e.g. design, fabrication and operational planning) associated with the black cells.

The open issues identified in this oversight shall be listed in the final report. Each open issue shall be assigned an item number and shall be tracked to resolution through the CARS for ORP, and RITS for BNI.

1.5 Closure

The Team Leader shall confirm that the open issues from this oversight are adequately resolved.

Table 1 Composition of the Black Cell Design Oversight Team

Function	Personnel/Affiliation	Expertise
Design Oversight Process	Bill Hamel, DOE-Team Leader John Treadwell, DOE-Team Co-Leader Barry Naft, Consultant	Waste Treatment Plant Program Management/Vitrification Operations Design and Construction Management Program Management
Design Oversight Team	Bill Hamel, DOE Jeff Barnes, WSRC Dave Houghton, BNFL Larry Demick, Consultant Tom Ballweg, Bechtel	Waste Treatment Plant Program Management/Vitrification Operations Engineering Management/Plant Startup Construction/Black Cell Design Engineering Management Project Engineering and Design
Construction Oversight Team	John Treadwell, DOE Dave Hooks, Bechtel Tim Adams, Consultant	Design and Construction Management Construction/Piping Design/Welding Vessel & Piping Design/Fabrication/NDE
Operations Oversight Team	Lew Miller, DOE Bill Brasel, Consultant Langdon Holton, PNNL	Nuclear Safety Plant Startup and Operations Process Engineering/Radiochemical Operations

Table 2 Design Oversight Schedule

Activity Description	Responsibility	Complete By
Develop Oversight Plan/Identify Team Members	Hamel	1/15/04
Advise BNI of planned oversight and provide system oversight plan to identify needed BNI support	Hamel	1/15/04
Commence Design Oversight	Team	1/20/04
Design Oversight Discussions with BNI	Team	1/20/04 to 1/23/04
WTP Site Walkdown	Team	1/24/04
Complete Design Oversight Data Collection	Team	1/30/04
Prepare Draft Design Oversight Report	Team	1/29/04
Management Debriefing on Findings and Observations	Team	2/2/04
ORP and BNI review of draft report complete. Open issues identified and reconciled	DOE/BNI	2/2/04
Finalize Design Oversight Report and open issues. Open issues entered into ORP/BNI action tracking systems	Team	2/5/04

Table 3 Contents of Design Oversight Report

Executive Summary
Introduction
Background
- Objective
- Scope
- Approach

Summary of Results
- Design Oversight Team
  - LOI Discussion *
- Construction Oversight Team
  - LOI Discussion *
- Operations Team
  - LOI Discussion *

Summary of Recommendations, Observations and Open Items
References/Bibliography
Appendices
- BNI LOI Responses
- Open Item Issue Resolution

**Address each LOI and resulting-open items and observations.*

Appendix C - ORP Prepared Lines of Inquiry

This appendix is a compilation of the Oversight Team Lines of Inquiry (LOIs). These LOIs were used to provide a structured method to investigate the black cell design processes, construction planning and operations planning information. The LOI's were prepared by the Team members and represent the perspectives of the Oversight Team. Summarized in the Table below are the LOI number, and LOI Question. In some cases the LOS questions have been grouped to avoid duplication in the responses. The LOIs are presented numerically in the appendix.

LOI Number	Lines of Inquiry
1.1	What are the expected operational conditions (e.g. corrosion, erosion, thermal) of the black cell equipment components?
1.2	How has BNI used operational limitations and requirements (including: solids concentration, solids mobilization and transfer, hydrogen mitigation and acid-base reactions) to define design requirements for the black cell vessels?
2.1	How have the following failure mechanisms been characterized and addressed? Are there other significant failure mechanisms that apply to any of the black cell components?
3.1	Are the requirements adequate to meet the WTP contract requirements for design life? Where are they documented?
3.2	What design codes or standards have been selected for the components in black cells and why?
3.3	How is the adequacy of materials of selection for black cell process components determined?
3.4	Are the materials assessments for black cell components adequately bounded based upon requirements and existing data (e.g. materials properties and expected conditions)?
3.5	How were corrosion/erosion allowances determined, including any limitations on fluid velocity, particle size, particle hardness?
3.6	What provisions are made in the piping stress analyses to account for residual stresses due to installation?
3.7	Are specific layout criteria imposed on black cell components to mitigate potential failure mechanisms (such as for piping systems)?
3.8	Are there any provisions or capability for temporary access into the black cells for any purpose?
3.9	What types of design models (e.g. piping, thermal stress, load stress) are used in the BNI design process? Do these models adequately represent the expected operational conditions (e.g. chemical, thermal, load stress) of the respective black cell process components?
3.10	What design models are used for vessel and piping design? What verification has BNI conducted on these models?
3.11	Are there provisions to clear potential pipe or component plugging?
3.12	What level of contingency planning, in terms of identification of equipment redundancy and spares, has been identified in the development of the design?
3.13	Identify the process piping spares that currently exist for each system that is entirely enclosed, or partially enclosed, in a black cell.
3.14	Identify the process piping spares that exist between major facilities (e.g. Pretreatment and HLW Vitrification and Pretreatment and LAW Vitrification).
3.15	Is there an experience base that supports the use of these design concepts with the operational limitations/requirements identified?
3.16	How is BNI documenting operational limitations identified in the materials selection process and design process, and how are these limitations/procedures to be captured in the operational specifications for the facility?
3.17	What are the operational risks that have been identified in the Risk Register that are related to design aspects of the black cell equipment? What are the current mitigating measures?
3.18	Are any additional margins added to the design of any features in consideration of black cell inaccessibility?
4.1	Do design documents correctly implement the design requirements for black cells? (Vertical slice

LOI Number	Lines of Inquiry
	review of FRP in PTF)
4.2	How does BNI verify that the requirements and guidance identified in the design process are adequately implemented in the design of the black cell components?
4.3	What technical oversight is provided by BNI engineering management to ensure the adequacy of design products (e.g. model calculations, design calculations, procurement specifications)?
4.4	Have the designs of the large vessels been proven in actual operation at other sites? Has BNI incorporated learning from these previous projects into the design and fabrication of the vessels and piping?
5.1	What types of design models (e.g. vessels, thermal stress, load stress) are used in the BNI suppliers design process? Do these models adequately represent the expected operational conditions (e.g. chemical, thermal, load stress) of the respective black cell process components?
5.2	How are stresses associated with the operation of the fluidic mixing equipment (e.g. pulse jet mixers) accounted for in the design of vessels?
5.3	Explain how the in-process inspections at the vendors shop insures that the spools to be installed in black cells have the correct wall thickness, bend radius, weld details, NDE, and leak testing required in the purchase order.
5.4	Is the BNI inspection program adequately identified in the procurement specifications (here address both BNI oversight and supplier inspections, such as their NDE implementation)?
5.5	What is BNI's QA oversight program for procured components?
5.6	What provisions assure materials used are consistent with design requirements?
6.1	Describe the constructability/design reviews that are conducted on large process vessels and piping to ensure that residual stresses are accounted for in the design and eventual fabrication of components?
6.2	Describe the constructability/design reviews conducted to ensure that residual stresses from alignment and final assembly are acceptable.
6.3	How are large vessels handled to ensure the vessels are not stressed during fabrication or in the field during final placement (e.g. design features, rigging requirements, final placement requirements)? Include the lifting and placement of the FRP vessels built by CB&I)
6.4	What tolerances are allowed in piping installation fit up and when is engineering approval required?
6.5	How is the cleanliness of piping components installed in black cells maintained?
7.1	Explain the sequence of inspections, and the controls that are in place for components, which occur from the time components are received on site until they are installed in black cells.
7.2	What are the non-destructive inspection techniques that have been identified for equipment components that will be in the black cells? What is the technical basis for these inspection techniques and inspection frequency?
7.3	What types of acceptance inspections will be made for completed systems to ensure compliance with requirements?
7.4	Explain the characteristics of both automated UT and RT and how they compare for this application in identifying defects that could shorten the life of pipe weld.
7.5	Explain the vacuum box leak test procedure and why vacuum box leak testing is an adequate method of leak testing lines in lieu of pneumatic or hydrostatic testing.
8.1	What specific requirements and guidance is identified in the BNI design process to ensure adequacy and uniformity in the design of black cell process components? (Address design processes related to procurement support, system design, and physical layout; address organizational structure, work process procedures, and design guidance.)
8.2	What qualification and training program exists for designers of the black cell components?
8.3	What training and qualification is provided to designers who use design models?
8.4	What is the experience level of the designers, and design managers, with respect to qualification to codes and standards, and familiarity with fabrication and construction?

Attachment to Appendix C
ORP Prepared Lines of Inquiry

DOE ORP Black Cell Design Review Oversight
Summary of Results in Review of Lines of Inquiry (LOI)

Line of Inquiry

1.1: What are the expected operational conditions (e.g. corrosion, erosion, thermal) of the black cell equipment components?

Discussion of Review:

Based on the limited review of this LOI described below, the reviewers concluded that Bechtel National, Inc. (BNI) partially documented the expected operational conditions of the black cell vessels. These descriptions were partially contained in two types of documents, the material selection data sheets (MSDSs), and corrosion evaluations. Written guidance for the expected description of operational conditions was incomplete, and not available when the descriptions were completed.

The MSDSs were compiled into two references pertinent to the black cells found in the High Level Waste (HLW) facility and the Pretreatment (PT) Facility: *24590-HLW-RPT-PR-02-003, Rev. 0,* Material Selection Datasheets for the HLW Vitrification Facility, and *24590-PTF-RPT-PR-02-002, Rev. A,* Material Selection Datasheets for the Pretreatment Facility.

The only written guidance concerning MSDSs was found in BNI Design Guide *24590-WTP-GPG-M-047, Rev. 0,* Preparation of Corrosion Evaluations, which stated that "the process chemistry conditions will be provided on an MSDS." The reviewers found that this design guide was issued in late 2003. The MSDSs were largely completed in 2001 and 2002. No other written guidance was identified for the preparation of the MSDSs that were used to describe the process chemistry conditions for the black cell vessels. No written procedure or guidance completely implemented the requirement of the Safety Requirements Document, Appendix H, Section 6.0, *Inaccessible Areas* (i.e.; black cells) that, "materials are selected and evaluated to ensure that they are compatible with **the expected operating** conditions [emphasis added] (including temperature, pH, and chemistry) and will last for a design life of 40 years." BNI personnel stated that a design guide for MSDSs was in preparation.

The reviewers found, through discussions with BNI personnel who had prepared the documents, that the HLW MSDSs for the black cell vessels generally provided a summary description of the normal, off-normal, and accident chemical concentrations, radioactivity, and physical properties (such as pH and temperature) expected to be encountered in that vessel. The black cell vessel MSDSs considered in the HLW review were for HOP-VSL-00903/00904 (HLW Submerged Bed Scrubber Condensate Receiver Vessel), RLD-VSL-00002 (Offgas Drains Collection Vessel), RLD-VSL-00008 (HLW Plant Wash and Drains Vessel), RLD-VSL-00007, Acidic Waste Vessel, and HCP-VSL-00001/2 (Concentrate Receipt Vessels). The PT MSDSs for the black cell vessels generally provided only a single set of chemical properties that were the maximum steady state calculated values of chemical properties anticipated based on the contract maximum input values and an associated mass balance calculation (*24590-PTF-M4C-V11T-00001, Rev 1).* All of the PT black cell MSDSs in *24590-PTF-RPT-PR-02-002, Rev. A* were considered in the review. The reviewers noted that expected values of the ranges of normal operating conditions, abnormal, and accident conditions were not identified in the PT MSDSs. The reviewers also noted that none of the MSDSs described the effects of interaction among chemicals on materials, or effects of chemical speciation; the reviewers did not attempt to assess the significance of this omission beyond noting the incompleteness of the specification of operating conditions in this regard.

The MSDS for FRP-VSL-0002A/B/C/D, the PT Waste Feed Receipt Vessels, *24590-PTF-N1D-FRP-00001 Rev 2,* stated that the maximum concentration of undissolved solids was zero. This appears to be in error since a nominal value for the WTP contractual feed is 3.8 wt%. The error is potentially significant, since the concentration of such solids is used by BNI to assign an erosion allowance to be

included in the corrosion allowance. Calculation *24590-WTP-MOC-50-00004 Rev B*, Wear Allowance for Waste Slurry Systems, Section 7.1.2.1, describes that for solids concentrations less than 2 %, no erosion allowance is assigned. The reviewers did not determine whether correction of this error would have affected material selection. The reviewers later found BNI made the assumption that the solids dissolved as a means to add conservatism to the corrosion assessment.

Finally, one inconsistency was noted between the concentration components listed in the MSDS for CNP-BRKPT-00002, Cs Evaporator Breakpot and in the MSDS attached to the corrosion evaluation for this vessel. Specifically, the MSDS values for sulfate and carbonate were significantly different, between the MSDS in *24590-PTF-RPT-PR-02-002, Rev. A* and the corrosion evaluation for the Cs Evaporator Breakpot, 24590-PTF-N1D-CNP-00008. The effect of this error on material selection was not assessed due to the limitations of the review.

Corrosion evaluations were prepared by BNI to "document the thought process in determining types of materials and minimum corrosion allowances that should be used in the design of process vessel and piping, " according to BNI Design Guide *24590-WTP-GPG-M-047, Rev. 0*, Preparation of Corrosion Evaluations, which was approved on November 9, 2003. The reviewers found that the design guide required that the evaluation identify the environment the material would be subjected to, and the types of corrosion that the material would be subjected to. The design guide otherwise provided little guidance concerning how to perform a corrosion evaluation. BNI personnel stated that this design guide reflected how corrosion evaluations were performed prior to issuance of the design guide. The MSDSs attached to the corrosion evaluations for FRP-VSL-00002A/D (PTF) Waste Feed Receipt Vessels (24590-PTF-N1D-FRP-00001, Rev 2, CNP-BRKPT-00002 (PTF), Cs Evaporator Breakpot, 24590-PTF-N1D-CNP-00008, and HCP-VSL-00001/2 (HLW), HLW Concentrate Receipt Vessel were reviewed. All had been approved in 2002. All evaluations reviewed contained a recommendation of the material to be used, and from the "corrosion considerations" conclusion selection, the reviewers could infer the types of corrosion that were used as a basis for the selection of the material. MSDSs for the respective vessel were attached to the corrosion evaluations.

There was insufficient information in the evaluations reviewed to determine why the selections had been made. This was partially due to the incomplete nature of the PT MSDSs described above, and partially due to the limited and sometimes contradictory exposition found in the evaluations. For example, in the Cs Evaporator Breakpot discussion of stress corrosion cracking, for which the design temperature is given as 352 degrees F, the evaluation states:

> *"The exact amount of chloride required to stress corrosion crack stainless steel is unknown. . . Hence, even as little as a few ppm can lead to cracking under some conditions. . . The use of 304L [stainless steel] is acceptable."*

However, the attached MSDS states that the calculated value of chloride is 8.6E-03 g/l (approximately 8.6 ppm), and fluoride is 1.1E-02 g/l (approximately 11 ppm). The basis for the conclusion that the effect of these halide components on 304 L material was not considered significant was not provided.

Results, Conclusions and Recommendations:

Recommendations

1. See Recommendation in LOIs 3.3/3.4

Observations

None

Open Items

1. BNI should update the MSDS for FRP-VSL-0002A/B/C/D, the PT Waste Feed Receipt Vessels, *24590-PTF-N1D-FRP-00001 Rev 2*, to have a minimum solids concentration consistent with the WTP contract value of 3.8 wt%.

BNI personnel contacted in this review:

Name	Organization	Title
Dale Obenauer	BNI	Discipline Manager, Process Engineering

References:

1. 24590-WTP-GPG-M-047, Rev. 0, Preparation of Corrosion Evaluations,
2. 24590-WTP-RPT-M-01-001, Rev 0, "Material Selection Guide" May 19, 2003.
3. 24590-WTP-GPG-M-047, Rev 0, "Mechanical Systems Design Guide: Preparation of Corrosion Evaluations" November 9, 2003.
4. 24590-WTP-M06-50-00004, Rev B, "Wear Allowances for WTP Waste Slurry Systems" October 20, 2003.
5. 24590-HLW-RPT-PR-02-003, Rev. 0, Material Selection Datasheets for the HLW Vitrification Facility
6. 24590-PTF-RPT-PR-02-002, Rev. A, Material Selection Datasheets for the Pretreatment Facility.

Prepared by: Lew Miller, Langdon Holton

Review and Approval (sign and date):

John Treadwell **William Hamel** **Barry Naft**

DOE ORP Black Cell Design Review Oversight
Summary of Results in Review of Lines of Inquiry (LOI)

Line of Inquiry

1.2: How has BNI used operational limitations and requirements (including: solids concentration, solids mobilization and transfer, hydrogen mitigation and acid-base reactions) to define design requirements for the black cell vessels?

- *Process Composition*
- *Static Loads*
- *Dynamic Loads*
- *Thermal Loads*
- *Environmental Controls*
- *Construction Stresses*

Discussion of Review:

LOI 1.1 describes how BNI determined the operational conditions of the black cell equipment components, as it relates to the evaluation of corrosion. LOI 3.5 describes how BNI determines the expected erosion of the black cell equipment components (especially piping), including consideration of the effect of glass formers. Those discussions are not repeated here. Also, BNI has not yet completed defining how non-Newtonian fluid solids mobilization and transfer concerns, or hydrogen mitigation considerations should affect the design of the components which have significant solids or hydrogen evolution potential as part of their constituents.

The reviewers noted from discussions with BNI personnel that black cell equipment components were designed, and were being designed, on a system-by-system basis. Other than the specification of a 40 year life for such components and requiring a 100% volumetric examination of the primary containment weld, BNI personnel could not identify a specific review of the black cell equipment that had been performed on a black cell by black cell basis. The design requirements documentation (Basis of Design, Operations Requirements Document) does not provide any unique requirements for equipment components located in black cells. BNI personnel had not identified those components within the black cells whose failure would significantly impact plant operations. Although some spare components for the main process flow paths had been identified, a comprehensive list of these had not been prepared. During the review, some spares were identified, as features of particular system designs. Beyond the 40 year life criterion, BNI had not pre-established criteria for spare components and flow paths in the black cells. The reviewers concluded that, absent such criteria, the potential existed (with unknown probability), that operation of the facility would be significantly impacted by unexpected component malfunctions. These malfunctions could be caused by corrosion, erosion, or blockage due to deposits, greater than assumed by the designer. Given the uncertainties and unverified assumptions inherent in determining component life in the all WTP process and support system environment, this absence of criteria and an associated black cell design review, appeared to be a potentially significant oversight.

Other design requirements arising from operational limitations and requirements such as vessel and piping design loadings were defined using the design codes defined in the Safety Requirements Document Safety Criteria (SC), principally SC 4.2-2. These codes include ASME B31.3-96, *Process Piping*, and ASME Section VIII, *Boiler and Pressure Vessel Code, Rules for Construction of Pressure Vessels*. The reviewers concluded that these requirements were being implemented, based their limited review.

Results, Conclusions and Recommendations:

Recommendations

None

Observations

None

Open Items

None

BNI personnel contacted in this review:

Name	Organization	Title
Steve Vail	BNI	Mechanical Systems Materials and Compliance Supervisor

References:

1. 24590-WTP-RPT-OP-01-001, Rev 2, "Operations Requirements Document", May 5, 2003.
2. 24590-WTP-DB-ENG-01-001, Rev 1A, "Basis of Design", November 23, 2003.

Prepared by: Lew Miller, Langdon Holton, Bill Brasel

Review and Approval (sign and date):

John Treadwell **William Hamel** **Barry Naft**

DOE ORP Black Cell Design Review Oversight
Summary of Results in Review of Lines of Inquiry (LOI)

Line of Inquiry

2.1: How have the following failure mechanisms been characterized and addressed? Are there other significant failure mechanisms that apply to any of the black cell components?

- *Corrosion*
- *Erosion*
- *Fatigue/Cyclic Loadings*
- *Overstress due to Normal or Occasional Loads*
- *Residual Stress*
- *Plugging*
- *Design/Fabrication/Installation errors*

Discussion of Review:

The reviewers have concluded that BNI had acceptably characterized and addressed the listed failure mechanisms, except as noted previously in the ORP response to LOIs 1.1, 1.2, and 3.5. The reviewers recommend that BNI define and include specific additional design, installation, and construction reviews for mission critical black cell components to ensure that their design, fabrication and construction were adequate. Mission critical components are those that are essential to allow the WTP facilities to continue to operate at or near the design capacity.

The reviewers found that BNI characterized a spectrum of corrosion failure mechanisms in 24590-WTP-RPT-M-01-001, Materials Selection Report, and described erosion failure mechanisms in 24590-WTP-M0C-50-00004, Rev B, Wear Allowances for WTP Waste Slurry Systems. The reviewer's evaluation of BNI's dispositions of these failure mechanisms is described in LOI 1.1, 1.2, and 3.5, and will not be repeated here.

As described in LOI 3.11, the reviewers found that BNI has given the requirement to provide provisions for the unplugging of piping and devices adequate consideration in the design process.

The reviewers also found from presentations by BNI personnel, that BNI considered the design codes and standards for the WTP adequately characterized failure mechanisms such as fatigue/cyclic loadings, overstress due to normal or occasional loads. Specifically, the codes and standards that address these topics are ASME Section VIII and ASME B 31.3, Process Piping. After consideration of these presentations, the reviewers agreed that the design codes and standards provisions were adequate to prevent failure of black cell components due to these mechanisms.

BNI personnel considered that the combination of low stress in vessels, control of construction piping alignment (including procedural limits on cold springing), and the use of ductile materials were sufficient to ensure that residual stress did not contribute significantly to the probability of piping or vessel failure. The reviewers agree with this judgment.

BNI personnel described the design control process as consisting of design procedures and guides, trained and qualified personnel, and careful review by multiple engineering personnel. The reviewers concluded, based on this description, that proper execution of the established design processes and use of the approved design requirements would ensure an adequate design. Similarly, fabrication and installation errors would be prevented by the detailed quality control and assurance program, including the system for identification and correction of errors, if these programs were properly executed.

However, given the difficulty of preventing all significant human errors, the reviewers concluded that failure of black cell components due to design, fabrication or installation errors could not always be prevented by the controls in effect. The reviewers observed that some errors in design and construction had been identified, but the combination of BNI and DOE oversight had been sufficient, to date, to identify and correct these errors. The reviewers noted that while human error could never be eliminated, the consequences of human error could be reduced to acceptable levels.

Results, Conclusions and Recommendations:

Recommendations

None

Observations

1. BNI has ensured that residual stress does not contribute significantly to the probability of piping or vessel failure in their design and fabrication processes.

Open Items

None

BNI personnel contacted in this review:

Name	Organization	Title
Dale Obenauer	BNI	Process Engineering Supervisor-Central Engineering

References:

1. 24590-WTP-RPT-M-01-001, Rev 0, "Material Selection Report" May 19, 2003.
2. 24590-WTP-GPG-M-047, Rev 0, "Mechanical Systems Design Guide: Preparation of Corrosion Evaluations" November 9, 2003.
3. 24590-WTP-M06-50-00004, Rev B, "Wear Allowances for WTP Waste Slurry Systems" October 20, 2003.

Prepared by: Lew Miller, Langdon Holton

Review and Approval (sign and date):

John Treadwell **William Hamel** **Barry Naft**

DOE ORP Black Cell Design Review Oversight
Summary of Results in Review of Lines of Inquiry (LOI)

Line of Inquiry:

3.1: Are the requirements adequate to meet the WTP contract requirements for design life? Where are they documented?

3.2: What design codes or standards have been selected for the components in black cells and why?

Discussion of Review:
The requirements unique to black cells are contained in Section 6 of Appendix H of 24590-WTP-SRD-ESH-01-001, Rev 3b, Safety Requirements Document, Volume II as follow:
Correct Material Selection, Adequate Corrosion Allowance, High Quality Assurance Requirements, Vessel Design, Piping Design, Redundant Components – where appropriate, Flushing Provisions, Fatigue Analyses, Traceability of Materials, Control of Welding Processes, Positive Material Identification, Volumetric Inspection, Hydrostatic and Pneumatic Tests, Cold Chemical Testing, and Monitoring of Process Operating Conditions .

Two basic design codes chosen for the design of vessels and piping in the black cells are ASME Section VIII and ASME B31.3-1996, respectively. The year of ASME Section VIII for the vessels varies because the ASME Code inspector is required to use the applicable code in effect at the time of the purchase of the vessel. On the other hand, the 1996 edition of ASME 31.3 was chosen so that the stress analysis was consistent with the stress analyses approved by the NRC. It is important to fix the date of the piping code early since a number of downstream design decisions and procurement depend on the code edition. The ASME Section VIII and ASME B31.3 are the same design codes that were chosen for the PC-3 process piping, and are the same codes specified in DOE G 420.1-1, Nonreactor Nuclear Safety Design Criteria and Explosive Safety Criteria Guide, for Safety Significant and Safety Class vessels and piping to provide primary confinement and prevent or mitigate radioactive and/or hazardous material releases to the environment. ASME B31.3 is used for piping typically found in petroleum refineries, chemical, pharmaceutical, textile, paper, semiconductor, and cryogenic plants, and related processing plants and terminals. The WTP Project is a chemical plant processing radioactive and hazardous waste. By letter on November 19, 1993, the following interpretation (12-20) was obtained from the ASME:

Question:	In accordance with ASME B31-1993 Edition, may the owner apply B31.3 to piping containing radioactive fluids in a chemical plant.
Reply:	Yes, see the Introduction which states that, "If no section of the code for pressure piping specifically covers the installation, the owner at his discretion may select any section determined to be generally applicable... It should be noted, however, that requirements supplementing the Code Section may be necessary to provide safe piping for the intended application."

For the black cells, the WTP Project has determined that the additional requirements in Section 6 of Appendix H of the SRD will augment the requirements of ASME B31.3. The 1996 edition of the ASME B31.3 was chosen so that it was consistent with the stress analyses approved by the NRC. In Regulatory Guide 1.143, Revision 2, Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants, the NRC approved the use of ASME B31.3, for piping and valves, and ASME Section VIII, for pressure vessels. In some cases, ASME Section III provides more design details than does ASME Section VIII or ASME B31.3. As allowed by ASME B31.3, the WTP project has adopted some of the methodology used in ASME Section III, where details are not provided in ASME B31.3.

HVAC Design codes for ventilation of Black Cell are ASME AG-1-97 with ASME AG-1a-2000 addenda, Code on Nuclear Air and Gas Treatment, SMACNA Rectangular Industrial Duct Construction, 1st edition, 1980 and SMACNA Round Industrial Duct Construction, 2nd edition, 1999. Ref: [System Description for PTF C5 Ventilation System C5V, 24590-PTB-3YD-C5V-00001, Rev B]. These are appropriate choices

Results, Conclusions and Recommendations:

The rationale for selection of ASME Section VIII and ASME B31.3-1996 is reasonable and appropriate.

A good practice observed includes detailing of Feed Receipt Vessels FRP-VSL-00002A/B/C/D nozzle internals so that fluids entering the tank extend inside the vessel to assure that chemical additions drop freely into the vessel rather than dribble along the vessel wall. This reduces the risk that concentrated chemicals added to the vessel will attack the vessel locally. Vessels are qualified to Seismic Category 1 levels. BNI should ensure that Black Cell Vessels have this feature.

WTP Project has elected to qualify all QL-2, SC-II piping and supports located in black cells as Seismic Category I. This good practice significantly simplifies control and management of potential seismic interaction.

Black Cell Requirements reflected in design documents

Black cell boundaries for piping systems are defined on some P&IDs. Sometimes the transition to black cell is labeled C5 which could be either black cell or hot cell. Examples are Plant Wash P&IDs PTF-M6-FRP-00009 & 10 Rev 1.and 24590-PTF-M6-PVP-00020 Rev 1, P&ID-PTF Pretreatment Vessel Vent Process System Passive Purge Air Inlet System. BNI should establish design process "rules" for consistently and explicitly identifying black cell boundaries on primary drawings and documents (e.g. P&IDs, V&IDs, GA).

Propagating black cell boundary information from primary drawings to down stream physical drawings (e.g. isometrics) or data bases (e.g. Line list, equipment) is done indirectly. Black cells contain QL-1, SC-I and QL-2, SC-II and CM, SC-III components. The fabrication isometrics for the QL-2, SC-II lines located in the black cells still shows these lines to be QL-2, SC-II. The Line List also shows these lines as SDC and SC-II even though the lines are qualified as SC-I. There is great potential for the downstream users (fabricators, construction, QC) of these documents to miss the fact that this line IS subject to the black cell requirements. BNI should establish "rules" to consistently and explicitly identifying black cell requirements on physical fabrication and construction drawings, and collateral databases. [3.2]

Recently BNI wrote a CAR to address the programmatic implications of an NCR regarding the lack of 100% volumetric examination of black cell vessel SBS Condensate Receiver Vessel (HOP-VSL-00903). It is understood that the path forward is expected to be either a specification or vessel data sheets revision.

The C5V HVAC system components located inside the black cells will be inaccessible. No requirements could be identified for C5V ventilation system in black cells. [Ref: 24590-PTF C5V 00001, Rev B, System Description for PTF C5 Ventilation System, C5V and 24590-WTP-DB-ENG-01-001 Rev 1, Basis of design, Section 12 – Ventilation Basis of Design]. BNI should determine and document the requirements (e.g. SC-I, support, inspection requirements, NDE requirements) for any black cell HVAC systems and components located in black cells.

The isometrics, sheets 388, 390 and 392 of in-process stress calculation 24590-PTF-P6C-FRP-50001 Rev A include both black cell piping as well as piping outside the black cells. Construction work area 50 identified on these isometrics; yet the black cell piping is in construction work area 01. BNI should

evaluate the acceptability of the computer generated isometrics to identify the correct construction work area when a pipe crosses a construction work area boundary. BNI should verify that any design issued for fabrication contains the correct construction work area and the scope of black cell piping.

Isometrics, sheets 346 and 347of in-process stress calculation 24590-PTF-P6C-FRP-50001 Rev A both have black cell piping designs which have pockets that do not drain. BNI should verify that the design issued for fabrication drain if required by the process.

HVAC Dampers located in Black Cells

HVAC C5 Hot cell exhaust is drawn into the north Black Cells. Volume dampers used to balance the C5 exhaust system are located inside the north black cells. The current approach is to perform the air balance during and some time before hot commissioning, permanently fix [weld] the adjustable volume dampers before the Black Cell is sealed. This precludes the rebalance or adjustment of the C5 HVAC balance during operation. Adjustment for future operational flexibility to accommodate variation in process feed streams and processing merit consideration. [24590-PTF-P2-P63T-00102 Rev 0, and 24590-PTF-P2-P63T-00101, 106, 107, 111, 112 all Rev 0]. BNI should consider relocating the volume dampers to a place where they can be physically adjusted in the future by some means or devising volume dampers that can be adjusted from the hot cell side. [3.2]

Pretreatment Vessel Vent Process System

The supply air to the black cells is via "in-bleeds" from a C2/C3 area. A portion of this air is metered and drawn through the Pretreatment Vessel Vent Process System [24590-PTF-M6-PVP-00020 Rev 1]. The PVP system will interact with the Vessel Overflow System (PWD). Maintaining an acceptable air flow balance among the PVP system and the vessel overflow system (PWD) may be very difficult. It seems likely that potential "short circuits" exist that could impair the operation of the overflow system or result in more or less sweep air through a given vessel than needed. It appears that this cannot be adjusted from outside the black cells should the systems not balance. The hydraulic calculation sizing the FRP vessel overflow gravity drain lines to their final destination should factor in any significant air flow that may occur. There are no means of balancing or adjusting PVP / PWD system interaction from inside the black cells. BNI should evaluate the air flow balance interaction of the Pretreatment Vessel Vent Process PVP system with the vessel overflow system (PWD).

Given the complex interaction of the PVP and PWD systems BNI should evaluate the overpressure / vacuum protection for the FRP system including system operational scenarios and equipment failure scenarios to determine the limiting design case. The evaluation should describe how limiting cases were factored into establishing the vacuum design pressure for the FRP vessels, large diameter piping and other devices connected to the vessel vent header and system.

Socket Welds and Filet Welds on Black Cell Piping.

Pipe fabrication specification allows PT/MT on socket welds, branch connections and attachment welds (e.g. branch connection reinforcements and pipe support lugs) for black cell pipe (App A , 24590-WTP-3PS-PS02-T0001 Rev 3) This infers that socket welds, fillet welds, etc. are permissible configurations for black cell piping. These geometries are incompatible with the requirement to perform 100% Volumetric examination (UT or RT) as required by Section 6 of Appendix H of 24590-WTP-SRD-ESH-01-001, Safety Requirements Document, Volume II. [Same comment applies to 24590-WTP-3PS-PS02-T-00003 Rev 1, App A.] For example, weldolets are specified as branch connections on 24590-PTF-P3-PJV-GV00023001 Rev A which is sheet 342 of in-process calculation 24590-PTF-P6C-FRP-50001 Rev A. Based on the SRD Appendix H volumetric examination of welded attachments (e.g. pipe support lugs) to black cell piping would also be expected. ASME B31.3 usually required hydrostatic or pneumatic testing after welded attachments are made to piping. Consideration should be given to vacuum box testing of such attachments if done after code pressure testing. BNI should evaluate the permissible

configurations for black cell piping related to socket welds, branch connections, welded reinforcement pads and other welded attachments to piping. BNI should evaluate the required nondestructive examination for the permissible configurations. BNI should update Appendix A regarding inspection requirement for black cell piping as appropriate. [3.2]

Pipe Slope Verification
As written, the dimensional tolerances provided for piping erection and support installation could result in slope reversal from that being specified while being in tolerance. Slope is specified for process piping for process reasons. Specific slope installation and verification criteria are not provided in the specification. Slope verification should be a top level inspection criteria for piping above all other tolerances not withstanding piping erection / installation. BNI should evaluate the adequacy of the 24590-WTP-3PS-PS02-T-00003 Rev 1, Section 3.6.6, regarding pipe slope and slope verification for process lines.

Black Cell Piping Design Pressure
BNI should identify the design pressures basis for lines that may be used for unplugging fluidics components or other components than may become plugged. If other lines may potentially be used to recover from off normal events, this should be identified and considered in establishing the design pressure.

Robustness of Break pots
Based on the presentations, the break pots located in several black cells appear to have demister, bubble tray like sections within them. Typically these are relatively fragile and susceptible to damage from fluid transients and deposits of soluble and insoluble solids. BNI should identify what provisions have been incorporated into break pot design and the design of other internals to make them sufficiently robust to assure a forty year service life. The evaluation should address fluid flashing, impingement or other transients that have been considered in the design of these vessels and internals.

Seismic Category III Items in Black Cells
BNI to advise what provisions are being made to preclude seismic interaction of three vessel applications (TCP-1, TLP-A&B and CNP-4) were identified as SC-III items with SC-I items in the black cells. If these vessels do indeed remain SC-III, it may be difficult to seismically qualify the piping connected to them as SC-I. [3.2]

Carbon Steel Pipe Support Materials for Stainless Steel Piping
BNI should provide the engineering rationale for placing stainless steel pipe directly in contact with painted carbon steel support steel (w/o SS shims), using carbon steel bolts, carbon steel U-bolts, within black cells especially at lower levels which may be wetted by the cell wash/spray system or potentially rinsed with nitric acid solution for decontamination. [Reference requirement of 24590-WTP-GPG-ENG-005 Rev 1 item 10, page 42 of 163.]

Consideration should be given to selection of coatings used in the black cell recognizing that structural carbon steel, structural fasteners and concrete are attacked by nitric acid. [3.2]

Securing Mechanical fasteners in Black Cells
BNI should evaluate the method of installing tightening and securing pipe support bolts, u-bolts and other mechanical fasteners to ensure they will remain secure for the forty year service life of the facility. [3.2]

Conflicting Data on Rate of Erosion based on Impingement Angle
BNI should evaluate the erosion wear allowance for vessels with PJMs accounts for the higher wear rate of stainless steel when the surface to particle angle is small, [e.g. ~<30 degrees] such as observed during site inspection of the perimeter PJMs in FRP-VSL-00002A/B/C/D. This should be evaluated for all other

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File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=69> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=69
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=69)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=70> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=70
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=70)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=71> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=71
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=71)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=72> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=72
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=72)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=73> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=73
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=73)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=74> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=74
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=74)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=75> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=75
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=75)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=76> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=76
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=76)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=77> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=77
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=77)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=78> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=78
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=78)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=79> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=79
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=79)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=80> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=80
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=80)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=81> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=81
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=81)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=82> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=82
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=82)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=83> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=83
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=83)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=84> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=84
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=84)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=85> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=85
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=85)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=86> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=86
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=86)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=87> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=87
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=87)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=88> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=88
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=88)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=89> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=89
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=89)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=90> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=90
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=90)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=91> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=91
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=91)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=92> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=92
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=92)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=93> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=93
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=93)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=94> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=94
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=94)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=95> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=95
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=95)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=96> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=96
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=96)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=97> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=97
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=97)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=98> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=98
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=98)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=99> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=99
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=99)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=100> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=100
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=100)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=101> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=101
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=101)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=102> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=102
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=102)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=103> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=103
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=103)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=104> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=104
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=104)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=105> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=105
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=105)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=106> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=106
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=106)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=107> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=107
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=107)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=108> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=108
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=108)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=109> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=109
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=109)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=110> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=110
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=110)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=111> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=111
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=111)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=112> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=112
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=112)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=113> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=113
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=113)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=114> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=114
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=114)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=115> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=115
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=115)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=116> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=116
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=116)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=117> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=117
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=117)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=118> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=118
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=118)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=119> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=119
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=119)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=120> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=120
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=120)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=121> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=121
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=121)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=122> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=122
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=122)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=123> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=123
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=123)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=124> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=124
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=124)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=125> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=125
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=125)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=126> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=126
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=126)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=127> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=127
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=127)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=128> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=128
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=128)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=129> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=129
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=129)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=130> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=130
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=130)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=131> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=131
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=131)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=132> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=132
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=132)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=133> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=133
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=133)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=134> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=134
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=134)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=135> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=135
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=135)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=136> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=136
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=136)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=137> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=137
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=137)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=138> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=138
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=138)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=139> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=139
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=139)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=140> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=140
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=140)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=141> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=141
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=141)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=142> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=142
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=142)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=143> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=143
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=143)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=144> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=144
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=144)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=145> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=145
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=145)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=146> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=146
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=146)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=147> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=147
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=147)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=148> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=148
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=148)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=149> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=149
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=149)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=150> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=150
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=150)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=151> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=151
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=151)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=152> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=152
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=152)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=153> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=153
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=153)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=154> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=154
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=154)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=155> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=155
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=155)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=156> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=156
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=156)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=157> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=157
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=157)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=158> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=158
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=158)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=159> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=159
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=159)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=160> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=160
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=160)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=161> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=161
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=161)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=162> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=162
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=162)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=163> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=163
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=163)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=164> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=164
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=164)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=165> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=165
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=165)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=166> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=166
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=166)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=167> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=167
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=167)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=168> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=168
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=168)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=169> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=169
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=169)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=170> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=170
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=170)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=171> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=171
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=171)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=172> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=172
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=172)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=173> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=173
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=173)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=174> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=174
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=174)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=175> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=175
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=175)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=176> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=176
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=176)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=177> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=177
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=177)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=178> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=178
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=178)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=179> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=179
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=179)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=180> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=180
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=180)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=181> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=181
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=181)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=182> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=182
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=182)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=183> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=183
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=183)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=184> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=184
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=184)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=185> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=185
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=185)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=186> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=186
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=186)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=187> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=187
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=187)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=188> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=188
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=188)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=189> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=189
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=189)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=190> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=190
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=190)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=191> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=191
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=191)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=192> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=192
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=192)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=193> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=193
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=193)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=194> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=194
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=194)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.

File <http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=195> could not be opened.

Error:
(Empty file): http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=195
(http://APDRMWEB.rl.gov/RIMVU/getfile.aspx?id=D3964831&page=195)
Server response: 200(HTTP_OK)
OK

Please make sure this file can be accessed by typing it into your browsers address bar then pressing enter.

Cancel the prompt and report this problem to Daeja at support@daeja.com.

If the file does not exist then the browser will provide you with an error message that may help further.