**Department of Energy**
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

00-RU-0210

Mr. M. J. Bullock, Vice President
BNFL Inc.
3000 George Washington Way
Richland, Washington 99352

Dear Mr. Bullock:

DESIGN PROCESS INSPECTION REPORT, IR-00-001

From January 10-14, 2000, the Office of Safety Regulation (Regulatory Unit) performed an inspection of the BNFL Inc. (BNFL) Design Process.

Three Findings (documented in the Notice of Finding [Enclosure 1]) were identified and are summarized as follows: (1) four examples were identified where BNFL staff had not followed procedures; (2) BNFL did not have procedures addressing nor was considering inspectability and testability in the ongoing Integrated Safety Management process; and, (3) the QA organization was not effectively overviewing the design program.

The inspection team found for the areas reviewed that BNFL's design process was acceptable with the exception of not actively considering inspectability and testability. The inspection team noted that the design process had many elements specified to ensure the development of a safe facility design. The RU is concerned, however, by the limited QA organization overview of the design process and the continued instances of procedural noncompliances by the BNFL staff. An active, highly interactive QA organization that self-identifies problems, like the procedure noncompliance issues identified in this and previous RU inspections, and a robust corrective action program are two elements required to assure the development of a safe design.

You are requested to provide a written response to the Findings within 30 days, in accordance with the instruction provided in the enclosed Notice of Finding. Details of the inspection, including the Findings, are documented in the inspection report (Enclosure 2). In addition, you are requested to provide to the RU within 30 days, either a copy of your response to Deviation and Corrective Action Report (DCAR) WP&DP-AUE-00-01-1, if it addresses the RU issue concerning data quality (Follow-up Item IR-00-001-04-IFI) or a written response describing how you intend to address the data quality issue.

Nothing in this letter should be construed as changing the Contract (DE-AC06-96RL13308). If you have any questions regarding this inspection, please contact me or Pat Carier of my staff on (509) 376-3574.

Sincerely,

D. Clark Gibbs, Regulatory Official
Office of Safety Regulation
of the TWRS-P Contractor

REG:JWM

Enclosures

cc w/encl:
D. W. Edwards, BNFL

# NOTICE OF FINDING

Standard 4, "Safety, Health, and Environmental Program," of Contract DE-AC06-RL13308, dated August 24, 1998, between BNFL Inc. (the Contractor) and the U.S. Department of Energy (DOE), defines the Contractor's responsibilities under the Contract as they relate to conventional non-radiological worker safety and health; radiological, nuclear, and process safety; and environmental protection.

Standard 4, Section c. 2) (a) of the Contract requires the Contractor to develop and implement an integrated, standards-based, safety management program. Requirements in DOE/RL-96-0003, *DOE Regulatory Process for Radiological, Nuclear, and Process Safety for TWRS Privatization Contractors*, which is incorporated by reference in the Contract, state that the integrated-standards-based safety management program is to be documented in an Integrated Safety Management Plan (ISMP) that is reviewed and approved by the Office of Safety Regulation of the TWRS-P Contractor (Regulatory Unit). Standard 4, Section b, and DOE/RL-96-0003, Section 3.3.1, "Standards Approval," establish that the ISMP shall be implemented by the Contractor during Part B of the Contract.

Standard 4, Section c. 2) (b) of the Contract requires the Contractor to comply with the specific nuclear regulations defined in the effective rules of the 10 CFR 800 series of nuclear requirements.

Title 10 of the Code of Federal Regulations, Part 830, "Nuclear Safety Management," Section 120, "Quality Assurance (QA) Requirements," requires the Contractor to conduct work in accordance with the requirements of Section 120 and to develop a QA Program that reflects the requirements of Section 120.

The Contractor's QA Program is defined in BNFL-5193-QAP-01, Rev. 4, "Quality Assurance Program and Implementation Plan," dated May 1998.

During performance of an inspection of the Design Process conducted January 10-14, 2000, at the Contractor's offices, the Regulatory Unit (RU) identified the following:

1. Section 5.3.2, "Instructions and Procedures," of the Quality Assurance Program and Implementation Plan (QAPIP) requires processes that affect quality be conducted using approved instructions and procedures.

    a. Procedure K70P003_0, "Design Review," dated November 1998, states under the Section titled "Activity," that the Design Manager/Functional Lead ensures that a Design Control Checklist (DCCL) is completed for design presented for review.

       Contrary to the above, as of January 14, 2000, DCCLs were not used in design reviews conducted from May 1999 through January 14, 2000, based on interviews with Contractor staff, review of design review meeting minutes, and records in

Project Document Control.

b. Procedure K70P003_0, "Design Review," dated November 1998, states under the Section titled "Activity," that actions from the review are progressed through routine project control meetings and completion is recorded with the review record. The Section titled "Records," states that documentation generated by this procedure shall be submitted to Project Document Control.

Contrary to the above, during the inspection, the inspectors found that not all actions were being statused, many open actions were no longer applicable based on major design changes, and not all action closures were being documented in Project Document Control.

c. Procedure K13P053_1, "Quality Assurance Surveillance," dated August 1999, Milestone 1, requires the QA staff to prepare and the Project QA Manager to approve, a surveillance schedule.

Contrary to the above, during the inspection, the inspectors were informed that no approved surveillance schedule had been issued.

d. Procedure K13P053_1 required in Appendix 2, that personnel performing surveillance activities are to plan the surveillance and prepare the checklists or requirement documents for use during the surveillance.

Contrary to the above, checklists or requirement documents were not prepared for the three surveillance activities documented in the following surveillance reports: SV-W375-99-QA00018, "Surveillance of Design Change Control Process", Rev. 0, dated September 7, 1999; SV-W375-99-QA00020, "Surveillance of Design Change Control Process," Rev. 0, dated November 29, 1999; and SV-W375-99-QA00024, "Surveillance of Engineering Calculations," Rev. 0, dated December 14, 1999.

The four examples of failure to follow procedures, as described above, are considered a Finding.

2. Section 3.13, "Reliability, Availability, Maintainability, and Inspectability (RAMI)," of the Contractor's Integrated Safety Management Plan (BNFL-5193-ISP-01, Rev. 4, dated December 2, 1998), requires that testability and inspectability of Safety Design Class systems and components be facilitated during design by such features as redundancy, that allow for a system or component to be removed from service for maintenance or testing without loss of safety protection and provisions, and inspection for preventative maintenance or assessment of conditions.

Contrary to the above, the Contractor had neither proceduralized nor implemented the requirement to consider inspectability and testability into the ongoing Integrated Safety Management process in support of the evolving facility design.

This is considered an inspection Finding.

3. Section 6.2.2 and 6.3 of the QAPIP requires that the Quality Assurance (QA) organization review selected design documents and design review activities to ensure that appropriate quality requirements and criteria were adequately being addressed.

   Contrary to the above, the QA design document oversight program was not fulfilling the QAPIP requirement in that it did not include an adequate review of design documents and design review activities. For example, the QA organization was not reviewing engineering documents and activities, such as, drawings, design review efforts, ISM (Integrated Safety Management) reviews, design input/output verification activities, DIM (Design Input Memorandum) development, and SIPD (Standards Identification Process Database) development.

   This is considered an inspection Finding.

The RU requests that the Contractor provide, within 30 days of the date of the cover letter that transmitted this Notice, a reply to the Findings above. The reply should include: (1) admission or denial of the alleged Findings, (2) the reason for the Findings, if admitted, and if denied, the reason why, (3) the corrective steps that have been taken and the results achieved, (4) the corrective steps that will be taken to avoid further Findings, and (5) the date when full compliance with the applicable commitments in your authorization base will be achieved. Where good cause is shown, consideration will be given to extending the requested response time.

Enclosure 2
IR-00-001

# U.S. DEPARTMENT OF ENERGY

Richland Operations Office
Office of Safety Regulation
of the TWRS-P Contractor

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|---|---|
| INSPECTION: | DESIGN PROCESS ASSESSMENT |
| REPORT NO: | IR-00-001 |
| FACILITY: | BNFL Inc. |
| LOCATION: | 3000 George Washington Way<br>Richland, Washington 99352 |
| DATES: | January 10-14, 2000 |
| INSPECTORS: | J. McCormick-Barger (Lead), Senior Regulatory Technical Advisor<br>R. Griffith, Senior Regulatory Technical Advisor<br>R. Gilbert, Senior Regulatory Technical Advisor<br>C. K. Liu, Senior Regulatory Technical Advisor<br>R. Pate, Regulatory Unit Consultant |
| OBSERVER: | N. Baker, Nuclear Regulatory Commission<br>D. Ryder, Pacific Northwest National Laboratory |
| APPROVED BY: | P. Carier, Verification and Confirmation Official<br>Office of Safety Regulation of the TWRS-P Contractor |

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# EXECUTIVE SUMMARY
## Design Process Assessment
## Inspection Report Number IR-00-001

## INTRODUCTION

This inspection of the BNFL Inc. (the Contractor) design process program covered the following specific areas:

- The adequacy of the Contractor's design program as it relates to selected commitments in the authorization basis.
- The adequacy of implementation of the design program as it relates to design reviews and hazard and accident analyses.
- The adequacy and effectiveness of the quality assurance reviews of design activities.
- The adequacy of implementation of configuration management as it relates to design activities.
- The adequacy of the Contractor's control of design inputs and outputs, and identification and control of important-to-safety structures, systems and components (SSCs).
- The adequacy of the Contractor's actions to address human factors considerations during design of the facility.

## SIGNIFICANT OBSERVATIONS AND CONCLUSIONS

- The design information transmitted across interfaces was identified and controlled. However, design information transmitted across interfaces was documented by varying methods across the project. Methods to document design interface information included meeting minutes, memoranda, sample schedules, system descriptions, drawings, internal interface descriptions, and external interface control documents. Failure to have a consistent method to identify and control internal design interface information across the project is considered a design program weakness (Section 1.2).
- Changes to the design were controlled by measures commensurate with those applied to the original design. Design changes were receiving appropriate cross-cutting reviews and had good documentation of impacts (Section 1.2).
- With the exception of the Quality Assurance (QA) overview discussed in Section 1.4, engineering documents were receiving appropriate review. Review of documents and the associated Document Review Request forms provided evidence that appropriate reviewers were specified, reviewers were responsive, and comments were addressed with their resolution agreed to by the reviewers. Personnel not involved in the generation of

the document but qualified to have prepared the document, checked documents (Section 1.2).

- The Contractor was not following procedures for conduct of design reviews. For example, the Contractor was not using Design Control Checklists (DCCLs) to document review and approval of design media. In addition, some actions identified during design reviews were not actively statused and action closure was not consistently documented in Project Document Control (PDC). The procedural issues discussed above were considered examples of a Finding against the Contractor's Quality Assurance Program and Implementation Plan (QAPIP) for failure to follow procedures (Section 1.2).

- The Contractor had an ISM (Integrated Safety Management) program and design process in place that was adequate to analyze and implement into the design, the hazards, and hazardous situations associated with normal operations, anticipated operational occurrences, maintenance, testing, external events, natural phenomena hazards, and postulated accidents (Section 1.3).

- A process was in place to establish target reliabilities for important-to-safety SSCs that implement control strategies for preventing or mitigating hazards and hazardous situations. The Contractor was aware of the need and was planning to account for system unavailability as part of the risk/reliability modeling (Section 1.3).

- A design program weakness was identified regarding the failure to fully address the QAPIP requirement for use of independent specialists in the review of important-to-safety design documents (Section 1.3).

- A Finding was identified for failure to develop procedures and implement the ISMP requirement to consider testability and inspectability in the evolving facility design (Section1.3).

- A Finding was identified for failure of the QA organization to have an effective program to ensure that engineering documents were adequately addressing QAPIP requirements (Section 1.4).

- Two examples of a Finding against QAPIP Section 5.3.2 for failure to follow procedures, were identified regarding the lack of an approved surveillance schedule, and for not developing surveillance checklists or other requirement documents prior to the performance of surveillance activities (Section 1.4).

- Procedures adequately prescribed methods for ensuring that configuration management was introduced at the outset of the design and continued configuration control was ensured by procedural requirements for appropriate review and approval of design changes (Section 1.5).

- The design staff engineers interviewed were satisfactorily implementing the procedures for configuration control in regards to design inputs and design changes (Section 1.5).

- Procedures adequately described methods for identifying and documenting design inputs originating within the design organization. The design staff were satisfactorily implementing the procedures. Documents were receiving appropriate review and approval (Section 1.6).

- The contractor had not developed an adequate process to ensure the integrity and validity of analytical data for the research and technology testing program. Since this issue had been previously identified, follow-up of corrective actions will be tracked an open item (Section 1.6).

- Human factor considerations have been included in the design of the facility, although not in all areas. Human factor input by the operations and engineering staff and the use of Sellafield designs have compensated for the absence of task analysis and human factor reviews. However, task analyses and human factor reviews are required and the Contractor was taking action to procure a human factors specialist to address human factors considerations prior to detailed design of areas requiring operator/facility interfaces (Section 1.7).

# DESIGN PROCESS ASSESSMENT
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# DESIGN PROCESS ASSESSMENT INSPECTION REPORT

## 1.0 REPORT DETAILS

### 1.1 Introduction

The Tank Waste Remediation System-Privatization (TWRS-P) Contract,[1] Section C.5, Standard 4, "Safety, Health, and Environmental Program," Table S4-1, p. C-61, item 1, commits the Contractor to implement the requirements of the authorization basis which include the requirements of an approved Quality Assurance Program and Implementation Plan (QAPIP) and an approved Integrated Safety Management Plan (ISMP).

Section 1.3.11 of the ISMP describes the Quality Levels applied to the structures, systems, and components (SSCs) of the TWRS-P facilities. Safety Design Class (the highest level of quality) will have the requirements of Quality Level 1 (QL-1) applied to provide added assurance that the SSCs can perform their specified safety function. Safety Design Significant (the second highest level of quality) will have the requirements of Quality Level 2 (QL-2) applied to provide adequate assurance that the SSCs can perform their specified function. This inspection is a part of the RU's overall effort to evaluate the Contractor's design program and assessed the adequacy of the Contractor's (BNFL Inc.) design process and the implementation of the design procedures applied to Safety Design Class and Safety Design Significant SSCs.

The inspectors reviewed the Contractor's design process as it relates to authorization basis commitments. Specifically, the inspectors assessed:

- The adequacy of the Contractor's design program as it relates to selected commitments in the authorization basis.
- The adequacy of implementation of the design program as it relates to design reviews and hazard and accident analyses.
- The adequacy and effectiveness of the quality assurance reviews of design activities.
- The adequacy of implementation of configuration management as it relates to design activities.
- The adequacy of the Contractor's control of design inputs and outputs, and identification and control of important-to-safety SSCs.
- The adequacy of the Contractor's actions to address human factors considerations during design of the facility.

[1] Contract DE-AC06-96RL13308 between DOE and BNFL Inc., dated August 24, 1998.

The inspectors reviewed records, interviewed staff, and observed related activities to determine if the Contractor was adequately establishing, implementing, and maintaining the design process in accordance with the Contract requirements.

During the inspection of Contractor's activities associated with the design process, the inspectors reviewed the documents listed in Section 3.4 of this report.

## 1.2 Design Program Implementation of Authorization Basis Commitments (Inspection Technical Procedure (ITP) I-104)

### 1.2.1 Inspection Scope

The inspectors assessed elements of the Contractor's design program that relate to the handling and controlling of design information, and incorporating environmental information into the design and specifications of SSCs. To perform this assessment, the inspectors interviewed Contractor staff, reviewed design implementing procedures, and observed design work in progress.

### 1.2.2 Observations and Assessments

#### 1.2.2.1 Handling and Controlling Design Information

The inspectors reviewed procedures, design change applications, design change notes, and document review requests to evaluate handling and control of design information. Procedures reviewed included K70P557_0, "Design Inputs," dated December 1998, K70P030_4, "Design Change Control," dated December 1999, K70P033_2, "Design Change Note," dated August 1999, and K60P016A_0, "Change Control," dated January 1999. These procedures documented requirements for identifying design inputs and controlling changes to design and design inputs. The inspectors also reviewed design change notes, design change applications, and document review requests. The inspectors observed that review of design change note DCN-W375-99-00038, Rev. 0, and design change applications DCA-W375-99-00094, Rev. 0, and DCA-W375-99-00012, Rev. 0, included impacted organizations and responsible management. Reviews were complete and the safety reviews included significant detail. Review of the "System 832 In-cave Lighting System Description," SD-W375SH-E00001 Rev. A, dated August 30, 1999, indicated that initial design documents received the same level of review as changes.

The QAPIP required procedures to provide for the appropriate level of review, checking, and approval for specific aspects of design and engineering work. Interviews with Contractor design managers indicated design and engineering work is checked by personnel who are not the supervisor, were not involved in preparation of the design material, and who were qualified to have been the producer of the design material.

Design reviews were performed in accordance with procedures K70P003_0, "Design Review," dated November 1998, and K70C013_0, "Code of Practice for Design Review Meetings," dated November 1998. The Contractor was conducting both single- and multi-discipline design reviews. The Contractor prepared minutes documenting the material reviewed, significant observations, and action items. The Design Review procedure required actions to be progressed through routine project control meetings and required completion to be recorded with the review record and be submitted to Project Document Control. The Code of Practice for Design Review Meetings required the Functional Engineer to ensure actions were addressed and closure recorded with the report in Project Document Control. Interviews were conducted with Functional and Design Managers to understand how action items were handled. The inspectors were informed that not all actions were being statused, many open actions were no longer applicable based on major design changes, and not all action closures were being documented in Project Document Control. Review of design review meeting minutes identified inconsistencies in treatment of action items. Some meetings provided status and documented closure of action items while others did not review actions. Failure to document closure of actions and submit the documents to project document control as stated in procedure K70P003_0, is an example of a Finding against Section 5.3.2 of the QAPIP regarding the requirement to perform quality related activities in accordance with procedures (IR-00-001-01a-FIN).

The Design Review procedure required use of design control checklists (DCCLs) in single-discipline design reviews to document review and approval of design media. Review of records in Project Document Control indicate that DCCLs were not used in design reviews from May 1999 to January 14, 2000. Interviews with Functional and Design Managers confirmed that DCCLs were not used. On January 13, 2000, the inspectors were informed that the Design Review procedure was being revised to provide better direction on the use of DCCLs. The Contractor stated that it planned to resume single-discipline design reviews in April 2000 and planned to use DCCLs. Failure to use DCCLs during design reviews, as stated in procedure K70P003_0, is another example of a Finding against Section 5.3.2 of the QAPIP regarding the requirement to perform quality related activities in accordance with procedures (IR-00-001-01b-FIN).

#### 1.2.2.2 Incorporating Environmental Information into the Design

Requirements for incorporation of environmental information into the design are found in multiple places. Specific examples identified include procedure K70C503A_0, "Code of Practice for the Hazard Analysis Process," dated May 1999, "BNFL Inc. Basis of Design Document," DB-W375-EG00001, Rev.1, dated June 18, 1999, and "Design Guide for Integrated Safety Cycles 1 and 2," K70DG528A, dated September 1999.

The Contractor is currently performing the Integrated Safety Management (ISM) Cycle 2 in accordance with K70DG528A. This effort required prerequisite information including abnormal environmental/service conditions in which SSCs associated with the control strategy must function (passively or actively), including radiation, temperature, pressure, humidity, or chemical. It also requires SSCs to be assessed for abnormal service conditions in which the SSC must function. The ISM Cycle 2 process uses Hazards and Operability Analyses (HAZOP) guidewords that trigger evaluation of extreme environmental conditions. An example is high-, low-, no-, more-, and less-pressure.

### 1.2.2.3 Design Interface Control

Requirements for interface control are found in procedure K70P554_1, "Interface Control," dated August 1999. The inspectors evaluated four types of design interfaces. These included: external interfaces between the Contractor, DOE-Office of River Protection, and Hanford Site contractors; internal interfaces within a design area; internal interfaces between design areas; and interfaces between the safety and design organizations. For all types of interfaces, the inspectors concluded QAPIP requirements to identify, document, and control design interfaces were satisfied.

External interfaces were managed and documented according to requirements established in the TWRS-P Contract. The Contract specified use of Integrated Product Teams to manage the interfaces and required development of Interface Control Documents (ICDs) documenting physical and administration aspects of each interface. Members from the design teams were part of the Integrated Product Teams, and ICDs were used by the design teams as a source of requirements. The ICDs were updated at least every six months.

Internal interfaces between design areas and within design areas were treated similarly by the Contractor. The inspectors interviewed Process Lead Engineers and Functional and Design Managers to identify how internal interfaces were managed. The inspectors followed these interviews with evaluation of documents that contain design details at interfaces. Contractor staff did not have a common understanding of how internal design interfaces were managed. All design areas relied to some extent on meetings followed with documentation in E-mail or meeting minutes. Other primary means to manage interface requirements included design reviews, weekly meetings, data sheets, system description, Design Committee meetings, and Functional Managers providing oversight of design in multiple areas. The High-level waste (HLW) vitrification facility was conducting a pilot to use internal interface control documents. At the present time, the Contractor was reliant on design engineers selecting the appropriate interface areas to maintain control of design interfaces. The Contractor's self assessment SA-W375099-00253, "QAP BNFL-5193-QAP, Rev. 4," dated December 1999, identified that procedure K70P554_1, "Interface Control," dated August 1999, should clearly identify distribution requirements for review of documents. Failure to have a consistent method to identify and control internal design interface information across the project is considered a design program weakness.

The Standards Identification Process Database (SIPD) required by procedure K71P508_0, "Standards Identification Process Database," dated September 1999, was the tool used to record and track information generated in interactions between safety and design functions. The data within SIPD was being generated as part of the ISM Cycle 1 and 2 process by an integrated team comprised of design engineers, safety engineers, and others. The SIPD contained requirements associated with important-to-safety SSCs. Designers were required to use SIPD as a source of requirements. The inspectors interviewed design engineers regarding use of SIPD. Some design engineers within the pretreatment area were not familiar with SIPD and stated that they had requested training. The Low-activity waste (LAW) vitrification design engineers did not have access to SIPD but were provided a report with requirements applicable to their area of design.

### 1.2.3 Conclusions

The inspectors concluded that the Contractor's design program to handle and control design information was effective in handling design inputs and changes. Two examples of a Finding for failure to follow procedures was identified regarding not using DCCLs during design reviews and not documenting closure of design review actions and submitting the documents to project document control.

The Contractor had procedures in place that should incorporate environmental information into the design. However, the ISM Cycle 2 process was not far enough along for the inspectors to evaluate the incorporation of environmental information into the design.

The inspectors found evidence that design information transmitted across interfaces was identified and controlled. However, the method to identify and control internal design interface information across the project was not consistent and considered a design program weakness.

## 1.3 Design Reviews and Hazard and Accident Analyses (ITP I-104)

### 1.3.1 Inspection Scope

The inspectors assessed the Contractor's procedures and performance as it related to the conduct of design reviews and hazard and accident analyses. In addition, the inspectors evaluated the effectiveness of the Contractor's efforts to incorporate the input from the reviews and analyses into the design of the facility and to consider testability and inspectability in the design process. The inspectors reviewed procedures, observed related design activities, and interviewed selected design staff and management.

### 1.3.2 Observations and Assessments

The inspectors reviewed Contractor procedure K70C514A_0, "Code of Practice for Development of Hazard Control Strategies and Identification of Standards," dated May 1999, the Implementing Standard for Safety Standards and Requirements Identification (Appendix A of the Safety Requirements Document, Rev. 2, dated December 2, 1998), Code of Practice K70C503A_0, "Code of Practice for the Hazard Analysis Process," dated May 1999, and engineering design guide K70DG528A_0, "Design Guide for Integrated Safety Management Cycles I & II," dated September 1999. From this review, the inspectors determined that the Contractor specified requirements for the analysis of a comprehensive set of hazards and hazardous situations, including those from normal operations, anticipated operational occurrences, maintenance, testing, external events, natural phenomena, and postulated accidents.

The Contractor identified in their self-assessment that the hazards analysis procedure (K70P503A_0, "Hazard Analysis," dated May 1999) and accident analysis procedure (K70P505B_0, "Accident Analysis," dated May 1999) needed to be revised to specifically identify the need to consider the comprehensive set of hazards, hazardous situations, and potential accidents described above. Although not considered to be a programmatic weakness by the inspectors, such revision would serve to further clarify Contractor requirements and expectations. Accident analysis had not yet been performed and could not be evaluated by the inspectors. Hazard analysis results were being documented in workbooks that were currently in the possession of responsible safety personnel. The inspectors had previously performed oversight for many of the hazards analysis team meetings and observed that the process was adequately considering hazards and hazardous situations for normal operation, anticipated operational occurrences, maintenance, testing, and postulated accidents. However, the hazards analysis of systems was not fully considering the affects from external events and natural phenomena at the time of the inspection. The Contractor planned to assess these impacts generically (i.e., on a facility-wide basis) and to then reassemble the hazards analysis teams to determine or confirm system impacts. Facility seismic analysis was currently ongoing. Fire hazards and loss of power analyses had begun. Verification that the facility design had considered the impacts of and controls for internal, external, and natural phenomena hazards should be achievable at the next scheduled design process inspection.

The tool used by the Contractor to communicate hazard and accident analysis results to the design team, was the standards identification process database (SIPD). The inspectors reviewed the SIPD procedure (K71P508_0, "Standards Identification Process Database," dated September 1999) and observed a demonstration of the database. The inspectors confirmed that SIPD was designed to contain the salient design requirements and assumptions [e.g., safety case requirements, linkages between hazard analyses, control strategies, quality levels, and SSCs which implement the control strategies]. The database was in its infancy and a large percentage of the hazards analysis results had yet to be entered. The inspectors confirmed through design guide review (K70DG528A) and from observation of previous hazard analysis meetings, that responsible design personnel were members of the hazard analysis teams. This was the other significant way in which the design process was able to factor results from the analyses into the design. The inspectors identified an observation relative to SIPD, in that current Contractor plans did not appear to call for all cognizant design personnel to be trained on and have access to the database. The Contractor had not provided to cognizant design personnel read only access to the database, but rather was relying on a courier to provide hard copies of SIPD information to the personnel.

The inspectors determined that the QAPIP requirement in Section 6.2.2, "Design Process," for independent specialists review of important-to-safety design documents had not been incorporated into Contractor procedures. Interviews with cognizant Contractor engineering managers indicated that the QAPIP requirement was being confused with the QA requirement for independent verification of design documents. The Project QA Manager confirmed that the independent inspector requirement was distinct from the independent verification requirement and was based upon the "wild card" process used in the United Kingdom. Because the inspectors saw evidence that the Contractor had been using independent specialists in the TWRS-P design effort (e.g., seismic and fire protection), the lack of proceduralization of the QAPIP requirement was categorized as a design program weakness rather than a Finding.

The inspectors confirmed that the Implementing Standard for Safety Standards and Requirements Identification (Appendix A of the Safety Requirements Document) and engineering design guide K70DG528A_0, contain adequate requirements for determining and documenting target reliabilities for SSCs that implement the control strategies for the prevention and mitigation of hazards and hazardous situations. The inspectors confirmed that target frequencies, when determined, will be included in SIPD or in Safety Implementation Notes

(SINs) referenced in the SIPD. Based upon interviews with Contractor safety management, it was determined that Cycle 2 of the Integrated Safety Management (ISM) process had only progressed to the point of control strategy selection. Systems, structures, and components which implement the control strategies and which will be assigned the target frequencies resulting from the hazards analysis have not yet been determined. The initiating event frequencies, which are prerequisites to establishing the target frequencies, will be determined at the end of ISM Cycle 2 (around the end of March 2000). The target frequencies will be confirmed by the accident analyses and included in the Hazard Analysis Report (HAR) included with the Construction Authorization Request (CAR). As such, confirmation that SSC target reliabilities were determined and input to SIPD, directly or via referenced SINs, for use in the facility design process should be achievable during the next design process inspection.

The inspectors interviewed the Contractor reliability lead and determined that the calculation of system availability to determine the potential for equipment downtime will be included with the reliability/risk modeling to be performed by the Contractor. Development of this modeling was in the conceptualization stage at this time; however, the modeling will be unique to TWRS-P. There was no consensus standard upon which the modeling would be based, nor would it be developed from modeling used elsewhere. The reliability lead stated that the Contractor planned to issue a procedure for the modeling. A subsequent design process inspection should be able to verify the adequacy of system availability and reliability calculations, which support the risk/reliability modeling, as a design tool for determining the adequacy of specified SSCs.

Section 3.13, "Reliability, Availability, Maintainability, and Inspectability (RAMI)," of the Contractor's Integrated Safety Management Plan (BNFL-5193-ISP-01, Rev. 4, dated December 2, 1998), required that testability of Safety Design Class systems and components be facilitated by such features as redundancy that allow for a system or component to be removed from service for maintenance or testing without loss of safety protection. Based upon review of Contractor design guide K70DG528A, the inspectors determined that the hazard analysis process required the guideword "testing" to be used in identifying hazards and hazardous situations. Interviews with safety management and personnel indicated that the consideration of testing was limited to hazards presented by the testing activities and hazards to personnel performing the testing. The control strategy selection element of the ISM process, as reflected in K70DG528A and implemented by the hazard analysis teams, did not include consideration of the impacts of removing important-to-safety SSCs from service for testing and the resulting potential loss of safety protection. Section 3.13 also specified the requirement to address inspectability, particularly as it is related to the ease with which items or systems can be inspected for preventative maintenance or assessment of conditions, however, the Contractor was again not considering this element during the design process. The lack of proceduralization or implementation of the ISMP, Section 3.13 requirements for testability and inspectability consideration in the design process was identified as a Finding against Section 3.13 of the ISMP (IR-00-001-02-FIN).

### 1.3.3 Conclusions

The inspectors found evidence that the Contractor had an ISM program and design process in place that was adequate to analyze and implement into the design the hazards and hazardous situations associated with normal operations, anticipated operational occurrences, maintenance, testing, external events, natural phenomena hazards, and postulated accidents. A process was in place to establish target reliabilities for important-to-safety SSCs that implement control strategies for preventing or mitigating hazards and hazardous situations. The Contractor was aware of the need and was planning to account for system unavailability as part of the risk/reliability modeling. A design program weakness was identified regarding the failure to fully address the QAPIP requirement for use of independent specialists in the review of important-to-safety design documents.

A Finding was identified for failure of the Contractor to develop procedures and implement the ISMP requirement to consider testability and inspectability in the evolving facility design.

### 1.4 Quality Assurance Reviews of Design Activities (ITP I-104)

#### 1.4.1 Inspection Scope

The inspectors assessed the adequacy and effectiveness of the quality assurance (QA) department's efforts at reviewing important-to-safety design documents. The inspectors reviewed related procedures and records, and interviewed selected quality assurance staff and management.

#### 1.4.2 Observations and Assessments

Sections 6.2.2 and 6.3 of the QAPIP specified that QA will review selected design documents and design review activities to ensure that appropriate quality requirements and criteria were adequately being addressed. From interviews with QA management and staff, the inspectors learned that this responsibility was being accomplished via the QA surveillance program and through audits and formal reviews of various engineering programs and procedures.

The inspectors reviewed procedure K13P053_1, "Quality Assurance Surveillance," dated August 1999. This procedure provided guidelines to QA staff for conducting, documenting, and following-up on surveillance activities, to assess the compliance and adequacy of implementation of quality program elements of in-process activities. The procedure specifically required the development of a surveillance schedule that was to identify activities to be surveyed. The schedule was required to be developed by personnel assigned to perform the surveillance activities and approved by the Project QA Manger. In addition, in accordance with Appendix 2 of K13P053_1, personnel performing the surveillance activities were to prepare checklists or requirement documents for use during the surveillance.

The inspectors interviewed the QA Engineering Lead, responsible for design engineering overview activities, and was informed that surveillance activities were being conducted in the area of design. The Lead provided the inspectors with a copy of the schedule of surveillance activities that covered this area. The inspectors determined that the schedule had not been approved by the Project QA Manager, and did not contain a comprehensive plan to sample engineering design documents to ensure that appropriate QA requirements were being implemented.

From the surveillance list, which included scheduled and completed surveillance activities, the inspectors obtained and reviewed three completed surveillance reports associated with design engineering activities. Two reports were programmatic in nature, SV-W375-99-QA00018, "Surveillance of Design Change Control Process," Rev. 0, dated September 7, 1999, and SV-W375-99-QA00020, "Surveillance of Design Change Control Process," Rev. 0, dated November 29, 1999. The third surveillance, SV-W375-99-QA00024, Rev. 0, dated December 14, 1999, was an in-depth review of a large sample of design calculations. This surveillance identified a number of good issues and resulted in the generation of Deficiency Report DR-W375-99-QA0014, Rev. 0. However, checklists were not prepared for any of the three surveillance activities performed. Failure to generate a Project QA Manager approved surveillance schedule (c), and failure to prepare surveillance checklists or other requirements documents (d), are considered two examples of a Finding against QAPIP Section 5.3.2 regarding procedural adherence (IR-00-001-01 c & d-FIN).

Although the unapproved surveillance schedule, provided by the QA Engineering Lead, included a review of a sample of design calculations, it did not include a review of engineering drawings, design review efforts, ISM reviews, design input/output verification activities, DIM development, SIPD development, and other design documents. For example, Section 6.3 of the QAPIP stated that the Project QA Manager is responsible for reviewing the results of technical design reviews for compliance with QAP requirements; however, the QA department did not have a formal program in place to perform these functions. Informally, two QA engineers were observing portions of design reviews associated with HLW, LAW, Pre-Treatment (PT), and Balance of Facility (BOF) designs. No documentation of these observation activities was being generated.

A list of completed QA audits was reviewed by the inspectors to determine the general breadth of the audit program as it relates to design engineering document reviews. The audit program had generally reflected similar areas as the RU inspection program. Although the audits covered most important-to-safety project activities, it did not focus, in any substantial way, on the design documents described above. In addition, formal reviews of selected procedures, design change documents, and procurement documents had not addressed the QAPIP requirements regarding reviewing selected design documents.

Based on the above, the inspectors concluded that the QA organization had not effectively addressed the QAPIP requirements to review selected engineering documents, and technical and design review efforts to ascertain compliance with QAPIP requirements. This is considered a Finding against QAPIP Sections 6.2.2 and 6.3 (IR-00-001-03-FIN).

### 1.4.3 Conclusions

Although the inspectors reviewed evidence that the QA organization was actively involved with the oversight of the design program, the inspectors identified a Finding in that the QA organization did not have an effective program to ensure that engineering documents were adequately addressing QAPIP requirements. In addition, the inspectors identified two examples of a Finding against QAPIP Section 5.3.2, for failure to follow procedures regarding the lack of an approved surveillance schedule, and for not developing surveillance checklists or other requirement documents prior to the performance of surveillance activities.

## 1.5 Design Related Configuration Management (ITP I-104)

### 1.5.1 Inspection Scope

The inspectors assessed the Contractor's configuration management plan, procedures, and implementation as it related to design. Specifically, the inspectors assessed the Contractor's configuration management plan from introduction of configuration management at the outset of design to continued control of the design with design changes. The QAPIP required that configuration control include inputs from the functional specification and design criteria, and control of design changes. To accomplish the scope, the inspectors reviewed procedures and implementation related to configuration management of design activities. The inspectors also interviewed the Contractor's engineering staff and management regarding implementation of design configuration management.

### 1.5.2 Observations and Assessments

#### 1.5.2.1 Review of Procedures and Codes of Practice

The inspectors reviewed the procedures and codes of practice relating to configuration management. Procedures K70P557_0, "Design Inputs," dated December 1998, and K70P551_1, "Preparation, Checking, and Approval of Drawing and Sketches," dated January 2000, were recently changed to require the design inputs to be documented by preparing a Design Inputs Memorandum (DIM). This was an improvement that should provide for better documentation of the design inputs and ensure that adequate inputs are included at the outset of design.

The procedures used for design changes were reviewed. These procedures were adequate to control the design change process and adequately addressed the need to use procedure K70P528_1, "Managing Changes to Control the Authorization Basis," dated October 1999, when making changes that affect the authorization basis.

The procedures for interface controls, that include methods to ensure notification to project engineering by construction, suppliers, and during the startup of discrepant items, were not reviewed. The Manager of Configuration Management said it was too early in the project for these procedures to need to be completed and that the procedures will be completed later in the project and may be provided by a construction sub-contractor.

#### 1.5.2.2 Implementation of Configuration Control Procedures

The following four drawings were selected for review from a list of issued documents:

1. Drawing DWG-W375PT-PR00008, Rev. 1, "Process Flow Diagram LAW Melter Feed Evaporator System PT-130."

2. Drawing DWG-W375HV-HV00020, Rev. B, "HLW Vitrification Building C5 Extract Plant V&ID."

3. Drawing DWG-W375HV-M00212, Rev. B, "HLW Vitrification System 310 MFD Level I Product Canister Handling."

4. Drawing DWG-W375BF-E00504, Rev. A, "Elect. Under GRD. Dist. Plan for LAW Vit Building Section & Detail."

The first drawing listed above was controlled as revision 1 (rather than as alpha revisions which are typical at this stage of design and considered preliminary drawings). The Design Change Applications (DCAs) and Design Change Notes (DCNs), referenced for changing the first drawing from revision 0 to revision 1 were reviewed. The DCAs and DCNs reviewed were found to be consistent with the requirements of the applicable procedure.

The inspectors interviewed the four design engineers responsible for the drawings listed above. The engineers indicated that they were knowledgeable of the design process. For the drawings in question, they were able to identify the sources of the inputs for the design and were familiar with the design change process. However, none of the engineers included in their discussions, a description of the Design Input Memorandum (DIM) process or input from the Standards Identification Process Database (SIPD) when they described the inputs for the design. This is not a deviation from the Contractor's requirements, as the changes to procedures K70P557_1, and K70P551_1, to address the DIM and SIPD, occurred after the drawings in question were issued.

The inspectors did not review the Contractor's efforts to maintain the authorization basis consistent with the design. This area had been reviewed in an earlier RU inspection and documented in inspection report IR-99-007, issued on December 13, 1999.

### 1.5.3 Conclusions

The inspectors determined that the procedures adequately prescribed methods for ensuring that configuration management was introduced at the outset of the design and continued configuration control was ensured by procedural requirements for appropriate review and approval of design changes. The design staff engineers interviewed were satisfactorily implementing the procedures for configuration control in regards to design inputs and design changes.

## 1.6 Identification and Control of Design Inputs and Outputs and SSCs (ITP I-104)

### 1.6.1 Inspection Scope

To assess the effectiveness of the Contractor's efforts to identify and control important-to-safety design inputs and outputs for SSCs, the inspectors interviewed design management and staff, reviewed related procedures and records, and evaluated the Contractor's implementation of the commitments and program requirements related to design inputs and outputs for SSCs.

### 1.6.2 Observations and Assessments

#### 1.6.2.1 Control of Internal Design Inputs and Outputs

The inspectors reviewed the procedures for control of design inputs to ensure that the Contractor's design process had implemented the commitments that design inputs shall be identified, reviewed, and documented and their selection reviewed and approved by the responsible engineering group. The inspectors reviewed procedures K70P557_1, "Design Inputs," dated January 2000, K70P529_1, "Engineering Calculation: Preparation, Checking, and Approval," dated August 1999, and K70P551_1, "Preparation, Checking, and Approval of Drawings and Sketches," dated January 2000.

The procedures used for design inputs established clear requirements for identifying, selecting, and documenting design inputs to conform to the requirements of the project Quality Assurance Plan. Clear responsibility was give to the Lead Design Engineer or designee.

The Lead Process Engineer for Pretreatment described a number of methods for identifying and reviewing design inputs, such as during Design Reviews, and during the development and review of System Descriptions and Process Data Sheets. Several means for documentation were reported to be in place and functioning, such as meeting minutes, status reports, drawings, and design change notes (DCNs). Engineers in the HLW/LAW electrical engineering and HLW Melter (in-cell) engineering groups confirmed these descriptions of the process for identifying and controlling design inputs.

The inspectors reviewed several documents to ensure that the process described above for controlling design inputs was being properly implemented. The inspectors reviewed Process Data Sheet DS-W375HV-PR00035, Rev. A, dated October 1999, which included "HLW Off-gas Mass & Heat Balance," Calculation CALC-W375HV-PR00014, dated July 1999, and "Melter D22301," Process Sketch DS-W375LV-PR00097, dated October 1999; "HLW Melter Specification," SP-W375HV-M00002, dated November 1999, and all attached Interface Documents; and Calculation, "Chemical Reactions & Process Energy for Vitrification of HLW Envelope D Waste: Tank AZ-101 + Pre-treatment Products/98-31 Glass Formers," CALC-W375HV-PR00046, dated December 1999. The Process Data Sheet identified appropriate design inputs and all of the documents described above were reviewed and approved by appropriate design staff.

The inspectors were informed that the Contractor was improving the process for controlling design inputs and ensuring that unverified design inputs would be properly controlled. The new process would include identifying design inputs via the DIM. This new process, once fully implemented, was intended, among other things, to provide an easily identifiable and consistent method of locating design input information and addressing impacts that design input changes would have on the design of the facility.

#### 1.6.2.2 Control of Externally Obtained Design Inputs

The inspectors reviewed the contractor's processes for identifying and controlling design inputs obtained from external sources to ensure that the design inputs were of adequate quality and properly verified prior to use. From interviews with technology managers and review of procurement documents, the inspectors identified problems with externally provided design inputs, particularly as they related to research and technology development. First, the inspectors determined that procedures were not in place to address how to prescribe data quality requirements for design input provided by research and technology development sub-contractors.

Second, the inspectors examined several Westinghouse Savana River Technology Center (WSRTC) procurement documents, including: TWRS-P Contract No. DE-AC06-96RL13308-W375-BNFL, "Ion Exchange Test Specification Document," Table 11-1, "Analytical Requirements for Cs, Tc, and $SO_4$ Eluates," Table 11-2, "Analysis to Support Delisting Petition," Table 11-3, "Analysis to Support Waste Acceptance By ETF," Table 11-4, "Analysis to Support Permitting I 133 Components," and Table 11-5, "Radionuclides;" and TWRS-P Contract No. DE-AC06-96RL13308-W375-BNFL, "Ultrafiltration/Solids Dissolution Test Specification," Rev. 1, Table 1.2, "Analytical Requirements for Filtrate Washed Solids, and Wash Solutions." The inspectors found that the procurement documents did not specify adequate data quality requirements. For example, the procurement documents reviewed specified minimum reportable quantity (MRQ), analyte types, and analytical methodology. Other necessary criteria for data quality, such as accuracy, precision (uncertainty), external performance evaluation participation, internal quality control samples, instrumentation quality control, etc., were needed to ensure the integrity of analytical data for design input information but not specified in the procurement documents reviewed.

Third, interviews with technology managers revealed that BNFL Inc. (BNFL) did not have a procedure or process for verifying the validity or integrity of the data, such as a verification/validation assessment.

Failure to document in procedures and address in procurement documents, adequate requirements to ensure design input data quality, and failure to have a program in place to verify the adequacy of these design inputs, would normally be considered inspection Findings against QAPIP Section 5.3.2, "Instructions, and Procedures," Section 7.2.1, "Technical Requirements" associated with procurement, and Section 6.2.10, " Design Verification." These requirements specify that procedures are required, procurement documents are to specify quality verification requirements, and design inputs are to be verified. However, this issue had been previously identified during an audit performed by DOE, Office of River Protection, Waste Processing and Disposal Project (WP&DP), dated November 30, 1999 (Section 6.13, and Deviation and Corrective Action Report (DCAR) WP&WD-AUE-00-01-1). The RU will review the Contractor's corrective actions associated with this previously identified audit finding; this issue will be tracked as inspection follow-up item (IR-00-001-04-IFI).

### 1.6.3 Conclusions

The inspectors determined that procedures adequately described methods for identifying and documenting design inputs originating within the design organization. The design staff were satisfactorily implementing the procedures and documents were receiving appropriate review and approval However, the contractor had not developed an adequate process to ensure the integrity and validity of analytical data for the research and technology testing program. Since this issue had been previously identified, follow-up of corrective actions will be tracked as an inspection follow-up item.

## 1.7 Human Factors Considerations

### 1.7.1 Inspection Scope

To assess the effectiveness of the Contractor's efforts to consider human factors in the design of the facility, the inspectors interviewed the design manager responsible for implementing human factor assessments, an operations manager, and five design engineers from the Contractor's staff. Also, the inspectors reviewed a report prepared by a senior human factors engineering consultant, "Human Factors Status Report for the River Protection Project-Waste Treatment Plant," dated November 4, 1999, and evaluated the Contractor's implementation of related authorization basis commitments and program requirements.

### 1.7.2 Observations and Assessments

Section 3.12 of the ISMP, stated that task analyses (which include the involvement of a human factors specialist) are to be carried out on operations that involve personnel and are required to maintain safety functions of the facility. Also, the ISMP commits to having human factors specialists conduct human factors reviews of training, operator capabilities, work spaces, and the design of the Safety Design Class and Safety Design Significant SSCs and functions that are judged to be critical to the facility performance and that have a high potential for human error.

To date, no task analysis or human factors reviews have been conducted. There have been limited human factors inputs by a human factors specialist from another BNFL facility, and a review of the status of human factors by a consultant hired by the Contractor. The consultant's report stated that human factors have been considered in the design of the facility. However, the consultant did not find evidence of consideration of human factors in all areas of design.

The Design Safety Implementation Manager, responsible for implementing human factors assessments, stated that he had an open requisition for a human factors specialist and was very close to hiring an individual. No human factors specialist had been hired to date because it had been difficult to fill the position with a qualified individual. According to the Design Safety Implementation Manager, when hired, the human factors specialist will write the procedures for doing the human factors assessments and, when the procedures are approved, use the procedures to perform the assessments.

In discussions with the Design Safety Implementation Manager, he stated that the design was not at a stage that required a detailed human factors review. He said that because it was early enough in the plant design, human factors assessments could be completed to confirm that no important human factors inputs had been missed. It was his position that human factors had been considered by other members of the Contractor's staff and implemented into the design and; therefore, the potential for having to back-fit was not very large.

The inspectors reviewed selected design documents, interviewed the Operations Safety Manager, and interviewed five design engineers. The inspectors found (1) that operations personnel had participated on design reviews and provided comments on the operator interfaces with the facility, (2) in two instances reviewed, design input from Sellafield included human factors considerations, and (3) the prior experience of the engineering staff with similar designs was a source for human factor considerations.

### 1.7.3 Conclusions

Human factor considerations have been included in the design of the facility, although not in all areas. Human factor input by the operations and engineering staff and the use of Sellafield designs have compensated for the absence of task analysis and human factor reviews. However, task analyses and human factor reviews are required and the Contractor was taking action to procure a human factors specialist to address human factors considerations prior to detailed design of areas requiring operator/facility interfaces. This area will be reviewed in detail during a future inspection.

## 2.0 EXIT MEETING SUMMARY

The inspectors presented the inspection results to members of Contractor management at an exit meeting on January 14, 2000. The Contractor acknowledged the observations and conclusions presented. The inspectors asked the Contractor whether any materials examined during the inspection should be considered proprietary information. Although the Contractor stated that some information reviewed during the inspection was considered proprietary, the information presented at the exit meeting did not contain proprietary information.

## 3.0 REPORT BACKGROUND INFORMATION

### 3.1 Partial List of Persons Contacted

S. Amrit, Process Engineer
J. Ard, QA Engineer
J. Copeland, Pretreatment Safety Analysis Lead
L. Curry, Senior Engineer – BOF
B. Davies, Functional Engineering Manager
G. Duncan, LAW Design Manager
H. Ferguson, Engineering Administrative Assistant
M. Fish, Configuration Manager
P. French, Lead Engineer, HVAC
K. W. Gourley, Lead HVAC Designer
J. Hammond, Safety Implementation Manager
R. Hollenbeck, QA Engineer Lead
E. Hughes, Engineering Manager
N. Hunt, Project Reliability Lead
A. Larson, Deputy Design Safety Implementation Manager

P. Lowry, HLW Safety Analysis Lead
R. Moore, QA Engineer
M. Page, Process Functional Manager
I. Papp, Lead Engineer-PT Process Engineering
J. Richardson, Lead Mechanical Engineer, Wet Process
J. Saame, Mechanical Functional Manager
S. Thompson, Safety/Design Coordinator
S. Turner, Client Interface Manager
B. Voke, Lead Engineer – HLW and LAW Process
M. Von Weber, Senior QA Specialist
G. Voyles, QA Manager
M. Washer, Senior Process Engineer, Process Engineering
I. Wheeler, Operations Safety Manager
H. Wong, Senior Electrical Engineer
C. Younger, Safety Process Manager
K. Yu, Lead Engineer, HVAC

### 3.2 List of Inspection Procedures Used

Inspection Technical Procedure I-104, "Design Process Assessment"

### 3.3 List of Items Opened, Closed, and Discussed

<u>Opened</u>

| | | |
|---|---|---|
| IR-00-001-01-FIN | Finding | Four examples of failure to follow procedures: failure to issue an approved surveillance schedule; failure to generate surveillance checklists; failure to use DCCLs; failure to properly control design review actions. |
| IR-00-001-02-FIN | Finding | Lack of proceduralization or implementation of the ISMP, Section 3.13 requirement for testability and inspectability consideration in the design process. |
| IR-00-001-03-FIN | Finding | QA organization not effectively addressing the QAPIP requirement to review selected engineering documents, etc. |
| IR-00-001-04-IFI | Follow-up item | Lack of procedures or implementation of QAPIP requirements to define and specify data quality requirements. |

<u>Closed</u>

None

### 3.4 List of Documents Reviewed During the Inspection

**Procedures Reviewed:**

Code of Practice K13C003D_0, "Code of Practice for the Production of Process Based Procedures," April 1999

Code of Practice K13C023A_2, "Code of Practice for the Internal Review and Approval of Documents," October 1999

Code of Practice K70C013_0, "Code of Practice for Design Review Meetings," November 1998

Code of Practice K70C503A_0, "Code of Practice for the Hazard Analysis Process," May 1999

Code of Practice K70C514A_0, "Code of Practice for Development of Hazard Control Strategies and Identification of Standards," May 1999

Code of Practice K70C515_1, "Code of Practice for Computer Program Use," October 1999

Code of Practice K70C518B_1, "Code of Practice for Engineering Calculations," October 1999

Code of Practice K70C528A_1, "Code of Practice for Managing Changes to the Authorization Basis," September 1999

Code of Practice K70C552B_0, "Code of Practice for Procurement Specifications, Data Sheets, and Bills of Material," November 1999

Code of Practice K70C553_0, "Code of Practice for Item Naming Conventions," March 1999

Procedure K13P026_0, "Logging of Documents," June 1999

Procedure K13P053_1, "Quality Assurance Surveillance," August 1999

Procedure K60P016A_0, "Change Control," January 1999

Procedure K70P003_0, "Design Review," November 1998

Procedure K70P009_0, "Control of Technical Queries," November 1998

Procedure K70P030_4, "Design Change Control," December 1999

Procedure K70P033_2, "Design Change Note," August 1999

Procedure K70P503A_0, "Hazard Analysis," May 1999

Procedure K70P505B_0, "Accident Analysis," November 1999

Procedure K70P528_1, "Managing Changes to Control the Authorization Basis," October 1999

Procedure K70P529_1, "Engineering Calculations: Preparation, Checking, and Approval," August 1999

Procedure K 70P550A_0, "Design Committee," August 1999

Procedure K70P551_1, "Preparation, Checking, and Approval of Drawing and Sketches," January 2000

Procedure K70P552A_0, "Preparation, Checking, and Approval of Procurement Specifications, Data Sheets, and Bills of Material," November 1999

Procedure K70P554_1, "Interface Control," August 1999

Procedure K70P555_0, "Design Verification," November 1998

Procedure K70P557_0, "Design Inputs," December 1998

Procedure K70P557_1, "Design Inputs," January 2000

Procedure K71P505B_0, "Safety Standards and Requirements Identification," November 1999

Procedure K71P508_0, "Standards Identification Process Database," September 1999

**Other Documents Reviewed:**

Design Guide K70DG528A, "Design Guide for Integrated Safety Management Cycles 1 and 2," September 1999

BNFL Organization Chart, September 1999

BNFL Self Assessment Records:

> SA-W375-00257, Rev. 0, December 1999, "Design Process/QAP BNFL-5193-QAP, Rev.4"
>
> SA-W375-99-00259, Rev. 0, December 1999, "K70P505, K70P503, K70C514, K70C503, K70P557"
>
> SA-W375-99-00253, Rev. 0, December 1999, "QAP BNFL-5193-QAP, Rev.4"

DB-W375-EG00001, Rev. 1, "Basis of Design," June 1999

Design Change Application DCA-W375-99-00012, "Add Provisions for Adding Sugar to LAW Melters," Rev. 0, July 1999

Design Change Application DCA-W375-99-00062, Rev. 0, "Replacement of LAW Feed Evaporator Constant Volume Feeder with a Breakpot in the LAW Feed Evaporator System"

Design Change Application DCA-W375-99-00063, Rev. 0, "Addition of Breakpot to Product Transfer Line from LWA Feed Evaporator System"

Design Change Application DCA-W375-99-00064, Rev. 0, "Deletion of LAW Feed Receipt Vessel Breakpots from LAW Feed Evaporator System"

Design Change Application DCA-W375-99-00066, Rev. 0, "Transfer of the LAW Feed Evaporator Overheads System to a C3/R3 Area"

Design Change Application DCA-W375-99-00067, Rev. 0, "Removal of the LAW Feed Evaporator Product Cooler E12004"

Design Change Application DCA-W375-99-00068, Rev. 0, "Steam Ejector Added to W11003 and W11004 in the LAW Feed Evaporator System"

Design Change Application DCA-W375-99-00069, Rev. 0, "Transfer of Gamma Monitor from the Condenser Pot to the Primary Condenser Outlet for the LAW Feed Evaporator System"

Design Change Application DCA-W375-99-00070, Rev. 0, "Addition of a Lute Pot to the LAW Feed Evaporator System"

Design Change Application DCA-W375-99-00083, Rev. 0, "Routing of Overflow from the LAW Feed Evaporator Feed Breakpot (V11004)"

Design Change Application DCA-W375-99-00094, "Including Bypass Pipeline for the Cs and Tc Ion Exchange Systems," Rev. 0, December 1999

Design Change Note DCN-W375-99-00028, Rev. 0, "Removal of the RAD Monitor from the Demister Vent Line.  RAD Monitor R110066 will be removed from System PT-120 (LAW Feed Evaporator System) and RAD Monitor R110065 will be removed from System PT-130 (LAW Melter Feed Evaporator System)"

Design Change Note DCN-W375-99-00030, Rev.0

- "Addition of a Clean Effluent Line from Vessel V15028A/B to the LAW Feed Evaporator Lutepot (System PT-120, PIN: V11053)" and

- "Addition of a Clean Effluent Line from Vessel V15025A/B to the LAW Melter Feed Evaporator Lutepot (System Pt-130, PIN: V11053)"

Design Change Note DCN-W375-99-00038, "Add overflow routing lines between the Feed Receipt Vessels," Rev. 0, December 1999

SD-W375SH-E00001, "Document Review Request – System 832 In-cave Lighting System Description," Rev. A, September 1999

DCCL-W375-99-00001, "HLW/Process," April 1999

DCCL-W375-99-00005, "Pretreatment," April 1999

Design Review Action Report, page 1, January 2000

Drawing DWG-W375PT-PR00003, Rev. 1, "Process Flow Diagram LAW Feed Evaporator System PT-120"

Drawing DWG-W375PT-PR00008, Rev. 1, "Process Flow Diagram LAW Melter Feed Evaporator System PT-130"

Drawing W375PT-PR00017, Rev. 0, "Master Distribution Schedule"

Drawing DWG-W375HV-HV00020, Rev. B, "HLW Vitrification Building C5 Extract Plant V&ID"

Drawing DWG-W375HV-M00212, Rev. B, "HLW Vitrification System 310 MFD Level I Product Canister Handling"

Drawing DWG-W375BF-E00504, Rev. A, "Elect. Under GRD. Dist. Plan for LAW Vit Building Section & Detail"

"Human Factors Status Report for the River Protection Project-Waste Treatment Plant," November 4, 1999

Surveillance Reports:

> SV-W375-99-QA00018, "Surveillance of Design Change Control Process," Rev. 0, September 7, 1999
>
> SV-W375-99-QA00020, "Surveillance of Design Change Control Process," Rev. 0, November 29, 1999
>
> SV-W375-99-QA00024, "Surveillance of Engineering Calculations," Rev. 0, December 14, 1999

Process Data Sheet DS-W375HV-PR00035, Rev. A, dated October 1999, which included:

- "HLW Off-gas Mass & Heat Balance," Calculation CALC-W375HV-PR00014, July 1999
- "Melter D22301," Process Sketch DS-W375LV-PR00097, October 1999

"HLW Melter Specification," SP-W375HV-M00002, November 1999, and all attached Interface Documents

Calculation, "Chemical Reactions & Process Energy for Vitrification of HLW Envelope D Waste: Tank AZ-101 + Pre-treatment Products/98-31 Glass Formers," CALC-W375HV-PR00046, dated December 1999

TWRS-P Contract No. DE-AC06-96RL13308-W375, BNFL, "Ion Exchange Test Specification Document"

- Table 11-1, "Analytical Requirements for Cs, Tc, and $SO_4$ Eluates"
- Table 11-2, "Analysis to Support Delisting Petition"
- Table 11-3, "Analysis to Support Waste Acceptance By ETF"
- Table 11-4, "Analysis to Support Permitting I 133 Components"
- Table 11-5, "Radionuclides"

TWRS-P Contract No. DE-AC06-96RL13308-W375-BNFL, "Ultrafiltration/Solids Dissolution Test Specification," Rev. 1

- Table 1.2, "Analytical Requirements for Filtrate Washed Solids, and Wash Solutions"

## 3.5 List of Acronyms

| | |
|---|---|
| BNFL | BNFL Inc. |
| BOF | Balance of Facility |
| CAR | Construction Authorization Request |
| DCA | Design Change Application |
| DCAR | Deviation and Corrective Action Report |
| DCCL | Design Control Checklist |
| DCN | Design Change Note |
| DIM | Design Input Memorandum |
| DOE | U.S. Department of Energy |
| HAR | Hazards Analyses Report |
| HAZOP | Hazards and Operability Analyses |
| HLW | High-level waste |
| ICD | Interface Control Document |
| ISM | Integrated Safety Management |
| ISMP | Integrated Safety Management Plan |
| ITP | Inspection Technical Procedure |
| LAW | Low-activity waste |
| PDC | Project Document Control |
| PT | Pretreatment |
| QA | quality assurance |
| QAP | Quality Assurance Program |
| QAPIP | Quality Assurance Program and Implementation Plan |
| QL | Quality Level |
| RAMI | reliability, availability, ,maintainability, and inspectability |
| RU | Regulatory Unit |
| SINs | Safety Implementation Notes |
| SIPD | Standards Identification Process Database |
| SRD | Safety Requirements Document |
| SSCs | structures, systems, and components |
| TWRS-P | Tank Waste Remediation System-Privatization |
| WTP | Waste Treatment Plant |

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