



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
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ATLANTA, GEORGIA 30303-1257

June 2, 2010

Mr. David B. Amerine
President
Nuclear Fuel Services, Inc.
P. O. Box 337, MS 123
Erwin, TN 37650

SUBJECT: NRC RESTART READINESS ASSESSMENT TEAM REPORT NO. 70-
143/2010-005

Dear Mr. Amerine:

On January 7, 2010, the Nuclear Regulatory Commission (NRC) issued Confirmatory Action Letter (CAL) 2-2010-001 in response to your letter dated December 30, 2009. Your letter contained additional actions (commitments) to ensure that the root causes of the October 13, 2009, process upset had been adequately evaluated and appropriate corrective actions have been implemented for all potentially affected processes before you resumed operations of those processes.

The Restart Readiness Assessment Team was established to assure that the "Actions Prior to Restart of Operations" which you identified in your December 30, 2009 letter were satisfactorily completed. The team also evaluated whether your actions adequately addressed the four management issues identified as concerns in the CAL. These concerns involved the adequacy of Nuclear Fuel Services' (NFS') management oversight of facility process changes, perceived production pressures, lack of questioning attitude by workers and management, and poor communications. Additionally, the team assessed your readiness to restart the Navy Fuel line through a detailed review of your procedures, open work orders, open corrective actions and on-going investigations. The team began on-site inspection activities on February 22, 2010, and concluded on March 22, 2010. The enclosed report documents the inspection results which were discussed with you and other members of your staff in a public exit meeting on April 22, 2010, in Erwin TN.

The team concluded that the corrective actions implemented by NFS were reasonable and had sufficient likelihood of being effective to support safe operation of the Navy Fuel line upon restart. The team determined that the fifteen "Actions Prior to Restart of Operations" contained in the CAL were satisfactorily completed. The team had a number of observations associated with your execution of these items; however, none were safety significant nor would preclude a safe startup of the Navy Fuel line. The team noted that NFS completed a broad set of corrective actions which adequately addressed the four management issues described in the CAL. A review of procedures, maintenance and the corrective action program by the inspection team demonstrated a readiness to safely restart the Navy Fuel line.

By letter dated March 23, 2010, Luis A. Reyes, the Region II Regional Administrator authorized restart of the Navy Fuel Line.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, and its enclosure not otherwise withheld from public disclosure will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

Should you have any questions concerning this inspection, please contact us.

Sincerely,

/RA/

Joseph W. Shea, Director
Division of Fuel Facility Inspection

Docket No. 70-143
License No. SNM-124

Enclosure:
NRC Inspection Report No. 70-143/2010-005

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U.S. NUCLEAR REGULATORY COMMISSION
REGION II
RESTART READINESS ASSESSMENT TEAM

Docket No.: 70-143

License No.: SNM-124

Report No.: 70-143/2010-005

Licensee: Nuclear Fuel Services Inc.

Location: Erwin, Tennessee 37650

Dates: February 22, 2010 through March 22, 2010

Inspectors: M. Ernstes, Chief, Plant Support Branch 2, DRS (Team Leader)
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Approved by: Joseph W. Shea, Director, Division of Fuel Facility Inspection

Enclosure

EXECUTIVE SUMMARY

NRC Inspection Report No. 70-143/2010-005

The purpose of the Restart Readiness Assessment Team (RRAT) was to evaluate the completion of the licensee's actions associated with the January 7, 2010, Confirmatory Action Letter (CAL) and assess the licensee's readiness to restart the Navy Fuel line. The RRAT conducted inspection activities associated with NFS' plans to restart the Navy Fuel line from February 22 - March 22, 2010.

The RRAT determined that NFS satisfactorily completed the CAL items designated "Actions Prior to Restart of Operations." The NRC had a number of observations associated with the completed CAL items; however, none of the observations were safety significant and none of the observations would preclude a safe startup of the Navy Fuel line. The licensee has taken corrective actions to address the NRC's observations.

The licensee completed a broad set of corrective actions to address concerns over four management issues identified in the CAL. These issues involved NFS' management oversight of facility process changes, perceived production pressures, lack of questioning attitude by workers and management and poor communication. The NRC inspected the effectiveness of the licensee's corrective actions for the management issues with a focus on the readiness to restart the Navy Fuel line. The NRC will conduct additional inspections associated with these corrective actions for other process lines when NFS indicates its readiness to restart those lines to the NRC. The NRC concluded that the set of corrective actions implemented to date by the licensee were reasonable and had sufficient likelihood of being effective to support a determination that the Navy Fuel line can be operated safely upon restart.

Through a review of procedures, maintenance records, and the corrective action program, the team found that the licensee had demonstrated a readiness to safely restart the Navy Fuel line. The team conducted a detailed review of Navy Fuel line operating procedures and concluded that they would support safe operations. The team concluded that the licensee had appropriately prioritized and completed work orders to support restart of the Navy Fuel Line. The team noted that the licensee's initial review of outstanding minor work orders was not thorough enough to identify all items and that their method for tracking open work orders lacked the rigor to assure all items were complete. However, these concerns were appropriately addressed prior to restart. The team determined that the licensee had properly prioritized all open items, specific to the Navy Fuel line, within their Corrective Action Program (CAP). Assessment of licensee's on-going investigations showed an improved ability to identify causes and develop effective corrective actions.

REPORT DETAILS

BACKGROUND:

On October 13, 2009, an unexpected exothermic reaction occurred within the Uranium Aluminum (U-Al) processing portion of the Blended Low Enriched Uranium (BLEU) Prep Facility (BPF) at Nuclear Fuel Services Inc., (NFS) in Erwin, TN. The NRC chartered an Augmented Inspection team in October 2009, to review the circumstances of the event. In December 2009, based on preliminary results from the Augmented Inspection Team (AIT), the NRC undertook a review of NFS' operations and performance dating back to the issuance of a Confirmatory Order in February 2007. On the basis of the interim review of NFS performance, the NRC determined that additional actions needed to be taken by NFS to provide reasonable assurance that the NFS facility could be operated safely.

The NRC engaged the management of NFS with the results of this assessment and obtained a commitment from NFS to maintain the facility process lines shutdown until certain specific actions were completed. The licensee submitted its commitments in writing by letter dated December 30, 2009. The NRC confirmed these commitments in CAL No. 2-2010-001, dated January 7, 2010.

By letter dated February 9, 2010, NFS notified the NRC that it had completed those actions listed in the CAL as "Actions Prior to Restart of Operations." In a subsequent letter, dated March 11, 2010, NFS provided additional details regarding its approach to restarting the process lines at the facility. Specifically, NFS informed the NRC of its intent to resume operation of one process line at a time. NFS indicated that it planned to restart the Navy Fuel line first and that only after achieving a satisfactory level of performance in the Navy Fuel line would it proceed to restart other process lines.

Inspection Scope:

On February 22, 2010, the NRC commenced inspection of NFS' readiness to restart production with a focus on readiness to restart the Navy Fuel line. The NRC dispatched a team of six inspectors and supplemented that team with additional specialist inspectors as needed. The objectives of the inspection were to:

- Assure that the "Actions Prior to Restart of Operations", were satisfactorily completed.
- Verify that the licensee's assessment and corrective actions adequately addressed the concerns involving the adequacy of NFS' management oversight of facility process changes, perceived production pressures, lack of questioning attitude by workers and management and poor communication.
- Assess the licensee's readiness to restart the Navy Fuel line.

A. ACTIONS PRIOR TO RESTART OF OPERATIONS

1. The restriction NFS management put in place following the Bowl Cleaning Station Incident prohibiting the processing of granular metallic "fines" in the Uranium-Aluminum process will be institutionalized.

Inspection Scope:

The team identified the procedures used for centrifuge bowl cleaning in the Uranium-Aluminum (U-AI) area of the Blended Low Enriched Uranium (BLEU) Preparation Facility (BPF). The team reviewed the two relevant procedures, Standard Operating Procedure (SOP) 409, Section 10, "Uranium Aluminum Dissolution" and SOP 409, Section 27, "Centrifuge Bowl Cleanout Process." Both of these procedures were revised twice since the bowl cleaning station event. The team reviewed and discussed the two procedure revisions with the procedure author and operators in the U-AI area of BPF. The team conducted interviews with the BPF Manager, the U-AI Process Engineer, the Principle Scientist and Director of Applied Technology, and three BPF hourly operators who have worked in the U-AI centrifuge bowl cleanout area. The team assessed both the staff's and management's understanding of the incident and the new procedural changes. The team reviewed the training that the area management and operators completed related to these changes. The team reviewed the Problem Identification, Resolution, and Correction System (PIRCS) database for questions or evidence of confusion concerning the changes. The team walked down the U-AI area to verify the operator aid was displayed in a clear and prominent place.

Observations:

The team reviewed procedure SOP 409, Section 10, Revision (Rev.) 28, dated November 30, 2009, and Rev. 29, dated January 29, 2010, particularly sections 3.2, 5.2.15, and Attachment VII. They also reviewed SOP 409, Section 27, Rev. 16 dated, November 30, 2009, and Rev. 17, dated January 29, 2010, particularly section 2.0. Through the procedural reviews and the interviews with the cognizant process engineer and procedure writer as well as several users, the team concluded that the initial revisions in November 2009 were adequate to address the issue of the restriction on processing granular metallic fines; however, they did not fully meet the facility management expectations for clarity and recognition. Moreover, the U-AI Dissolution procedure did not have the picture of the fines as an attachment. Finally, these changes were not initially captured in the procedures as "Commitments," making it vulnerable to change in the future.

During an interview, the procedure writer indicated that the initial revisions in November 2009 needed to be "beefed up" and "clarified" to meet management expectations. This included the addition of prominent "warning banner" in applicable sections and an appendix with the picture and description of material that can and cannot be processed. The team also noted that the banner promotes a "questioning attitude" in that it specifically states "Contact Building Supervisor or Process Engineer if you are not sure if the material in the container is granular. Stop work until a final determination of the material may be made." In addition, these changes were captured as Commitments and an appendix was added to SOP 409, Section 10 "U-AI Dissolution," depicting material that can and cannot be processed in the area.

SOP 409, Section 10 specifically restricts the fines from being placed in the dissolution process. Section 10 is performed prior to Section 27. Therefore, if Section 10 is followed, there

will not be any fines introduced to the Bowl Cleanout Station (BCS). The team verified the statement was placed in the Scope of Section 27 that states it will be performed "*following caustic dissolution.*" The team verified that these changes were marked as "Commitments" in the latest revisions of the two procedures, assuring that they cannot be changed in subsequent revisions. In addition, the licensee committed to the development of training materials to train applicable NFS staff on the BCS incident in order to institutionalize the lessons learned from this event by May 30, 2010.

Interviews demonstrated that the staff had good knowledge of the event and the restriction on the processing of granular metallic fines. The interviews included a wide range of experience levels in BPF. The team also interviewed the U-AI Process Engineer and Director of Applied Technology/Principle Scientist. All had received the toolbox training. They had reviewed and understood the procedures, the BCS incident, and the commitment to not processing granular metallic fines. The team determined that appropriate training was provided and that appropriate changes were made to institutionalize the prohibition of processing granular metallic fines.

The team also reviewed the Letter of Authorization (LOA) for the repacking of the remaining granular metallic fines and discussed it with the BPF Manager. The team discussed the temporary process of repacking the fines for waste; once repackaged, they were sealed and placed on the racks for the non-destructive assay personnel to scan and send to waste. The team verified that this LOA expired February 10, 2010 and the procedure in place (SOP 409 Section 10 Rev. 29) currently will not allow the repackaging; it states "bagout" the container of fines, seal, and place in approved storage. The team observed the operator aid in place at the BCS. The picture and the description of the materials that can and cannot be processed in the bowl cleaning stations are both clear and in a conspicuous location on the desk between two bowl cleanout stations.

Conclusions:

No findings of significance were identified. The team determined that the restriction NFS management put in place prohibiting the processing of granular metallic "fines" in the U-AI process was properly institutionalized. The licensee revised the applicable procedures, included several Commitments, re-trained staff, provided a detailed explanation of the event to employees at an all hands meeting, promoted a questioning attitude, and prominently affixed an operator aid in the BCS area. The team concluded that these changes provided effective and detailed guidance for institutionalizing the prohibition of the processing of granular metallic fines.

2. **NFS will institutionalize improvements to the change control process, which was delineated in a temporary procedure. Training on the process will be provided to appropriate operations, technical, oversight and management staff.**

Inspection Scope:

The team reviewed the licensee's corrective actions to institutionalize the improvements to the change control process to address the problems identified from the BCS event. This included review of the licensee PIRCS documents for implementing the change control process enhancements, temporary procedures that were implemented as interim corrective measures, as well as permanent revisions to the plant-wide change control process and configuration management procedures that were implemented in January 2010. The team interviewed engineering and operations personnel responsible for implementing the plant change control

and configuration management process revisions. In addition, the team reviewed licensee training provided to engineering, operations, technical oversight, and management staff on the implementation of the revised process.

Observations:

Following the BCS event, the licensee implemented a temporary procedure via LOA No. MISC-09-066, dated October 26, 2009, to provide interim change process control directions until the formal root cause analysis (RCA) investigation into the event was completed and permanent program enhancements could be institutionalized. As insights from the RCA investigation were obtained, further enhancements to these interim change process control directions were implemented between October and December 2009 via LOAs MISC-09-074, MISC-09-074-1, and eventually MISC-09-083.

The licensee implemented permanent changes to the plant-wide change process control procedure with the issuance of NFS-CM-004, "NFS Change Control Process," Rev. 4, dated January 15, 2010. Based on review of this procedure, the team determined that with one exception, the licensee had adequately incorporated the aforementioned enhancements from the final temporary procedure (i.e., LOA-MISC-09-083) into NFS-CM-004. Specifically, the team noted that the new definition of an urgent change was not implemented as intended. As background, prior to the BCS event, an urgent change was defined in NFS-CM-004, Rev. 3, as "the priority of a change addressing failures which are adversely impacting personnel safety or significantly impacting operations." The licensee's RCA investigation into the BCS event identified Contributing Cause #1 to be the inappropriate implementation of the process change associated with the event, i.e., revision to SOP-409 allowing the processing of granular metallic fines in the BCS, as an "urgent" change. A process change that is expedited as urgent allows bypass of the Change Control Board (CCB) review process, whose purpose is to ensure the proper review and identification of items affected by the change. The RCA identified that many process changes, i.e., enterprise change requests (ECRs), were being processed inappropriately as urgent. As part of the licensee's interim corrective actions taken to address this problem, the definition of urgent change was revised to prevent similar misuse of the urgent change provision. In temporary procedure LOA-MISC-09-074-1, dated December 7, 2009, this definition was revised to "changes that if not implemented in an expeditious manner would result in harm to personnel or damage to equipment." In the final temporary procedure, i.e., LOA-MISC-09-083, dated December 9, 2009, the definition of an urgent change remained unchanged. However, when the licensee revised the plant-wide change process procedure, NFS-CM-004, Rev. 4, to institutionalize the process change enhancements from LOA-MISC-09-083, the word "would" in the urgent change definition was inadvertently changed to "could." No explanation of how or why this change in language was made could be provided by the licensee. The team determined that the use of "could" was less restrictive than "would," and subject to greater mis-interpretation, therefore, could result in future non-conservative decision-making when utilizing the urgent change provision. This was contrary to the intention of the licensee's corrective action.

The licensee initiated PIRCS #C11975 to address the problem with the urgent change definition that was identified by the team. As corrective action, the licensee revised NFS-CM-004, (Rev. 6, dated March 22, 2010), to modify the definition of an urgent change to, "The priority of a change that if not implemented in an expeditious manner would result in an immediate risk of harm to personnel, safety and regulatory non-compliance, or damage to equipment." The team determined that this adequately addressed the concern that future process changes would be expedited under the appropriate circumstances.

The team reviewed PIRCS #C11384, which documented details of the licensee's training on the plant-wide change control program enhancements to plant personnel. Two separate formal training courses were developed, SA-CHANGECONTROL and SA-CMPROCCHNG. SA-CHANGECONTROL involved specific training on the changes to the plant-wide change process procedure NFS-CM-004, Rev. 4, and SA-CMPROCCHNG was for specific training on procedure NFS-TS-009, "Configuration Management of Process Change," Rev. 1. NFS-TS-009 was a newly implemented procedure for conducting enhanced technical basis reviews of process changes that are not bounded by existing process designs, parameters, or inputs as documented in existing technical basis documentation. From January 13-15, 2010, several training sessions were conducted on these two courses with operations, engineering, and management personnel involved with the change control process. Upon completion of the training, written tests were administered requiring a minimum score of 80 percent for course completion credit. The team reviewed training records that documented 212 individuals were initially trained on SA-CHANGECONTROL and 88 individuals were initially trained on SA-CMPROCCHNG. Based on review of the training materials used and personnel qualification records, the team determined that the training was comprehensive, detailed, and included appropriate plant staff involved with the process change program.

Conclusions:

The team concluded that with one exception, the licensee had adequately identified improvements to the change control process based on their investigation into the October 13, 2009, BCS event and institutionalized these improvements into their plant-wide change control process procedure. The exception involved the failure to properly incorporate the new definition of an urgent process change from the temporary procedure to the plant-wide change process program procedure. This error could have allowed less restrictive use of the urgent change provision which was contrary to the licensee's intended action. The licensee corrected the urgent change definition prior to the completion of the NRC inspection. In addition, the team concluded that the licensee provided adequate training on the change control process enhancements to appropriate operations, engineering, and management staff.

3. The incident investigation, including detailed causal analysis, of the Bowl Cleaning Station Incident will be completed.

Inspection Scope

The team reviewed the licensee's initial RCA investigation report of the BCS event and interviewed several members of the investigation team to understand the approach and methodology for conducting the investigation and identifying the root and contributing causes. The team evaluated whether the level of detail of the investigation was commensurate with the significance of the problem, included consideration of prior occurrences of the problem and knowledge of prior operating experience, addressed the extent of condition and extent of cause, and appropriately considered the safety culture components of the problem.

Observations:

The licensee's initial RCA investigation was conducted from October 13 through November 11, 2009, and documented in PIRCS #I10059. This RCA involved a TapRoot investigation methodology that concentrated on gathering technical and operational details leading up to the event; interviewing personnel involved in the event; and reviewing procedures, emails, ECR packages, lab reports, and other relevant documentation. The TapRoot investigation

developed a detailed chronological timeline, Events and Causal Factors Chart, and identified causal factors, contributing causes, and lessons learned. Based on review of the licensee's TapRoot investigation, the team determined that the RCA techniques and methodologies were consistent with expected investigation practices commensurate with the safety significance of the event. However, the team noted that the RCA did not conduct a detailed internal operating experience (OE) review, i.e., specifically search the PIRCS database for past change process problems to determine if they had similarities to this event. The team considered this important in order to ensure precursor problems were adequately identified and addressed in the analysis so that comprehensive corrective actions would be implemented. The TapRoot team leader stated that interviews with personnel involved with the event and personal historical knowledge of the RCA team members of past change process issues was the integral part of the investigation that relied on internal OE reviews. When questioned why a review of the PIRCS database was not considered, the TapRoot team leader stated that the database was too complex and not conducive to performing effective searches. He also indicated that root cause personnel were not trained on conducting PIRCS database searches. Based on review of the licensee's procedures for the conducting investigations, the team noted that there were currently no licensee requirements that root cause investigations formally review internal OE via searches of the PIRCS database. However, the corrective action program manager indicated that investigative techniques such as formalized internal OE reviews would be considered for including in their ongoing corrective action program improvement initiative.

The licensee's TapRoot investigation identified three causal factors (CFs), two contributing causes (CCs), and three lessons learned (LL) associated with the event as follows:

- CF#1: Failure to implement the plant-wide project management control procedure NFS-TS-009, "Configuration Management of Process Change," originally issued in 2007, which led to an inadequate review of the chemical process change associated with the procedure revision to process granular aluminum fines in the BCS.
- CF#2: Inadequate review of the process change by the Integrated Safety Analyst (ISA) Team Leader which led to the failure to request a review by the chemical analyst.
- CF#3: Inadequate technical basis documentation to support the process change which led to the failure to understand its impact.
- CC#1: Workload, production pressure, and competing priorities contributed to the development, approval, and implementation of a major process change without appropriate attention to detail.
- CC#2: The option to process aluminum fines in the BCS was implemented to prevent generating what was perceived to be a large number of waste containers.
- LL#1: Investigate reports of problems with the electronic procedure change software resulting in unexpected changes to the word processing documents.
- LL#2: Routing mark-up copies of the procedure as part of the process change package would facilitate a more thorough review and reduce errors.

- LL#3: Significant process changes should not be implemented on an off-shift without ensuring adequate technical support.

The team concluded that specific causal factors, contributing causes, and lessons learned identified by the investigation were appropriate and relevant based on the details of the event. However, as previously discussed in NRC AIT Report No. 70-143/2009-011, the licensee's causal factors and contributing causes did not focus on the lack of management oversight or the lack of questioning attitude that was demonstrated by the licensee's staff and management throughout the review and approval of the ECR that allowed the processing of granular fines in the BCS. To address these safety culture aspects of the event, the licensee performed a separate Safety Culture Implication Review (SCIR) investigation. The results of the SCIR were documented in PIRCS #110252. The SCIR reviewed the results of the TapRoot investigation and used a predefined list of safety culture attributes to categorize the performance issues according to these attributes. Based on this, the SCIR identified several safety culture components that contributed to the performance issues, including: decision-making, accountability, operating experience, resources, work control, work practices, continuous learning environment, organizational change management, and safety policies. A gap analysis was conducted to compare the TapRoot corrective actions to the attributes and causal insights identified by the SCIR resulting in additional corrective actions being developed to address the identified gaps. These additional corrective actions were entered into the licensee's PIRCS database. The team concluded that the SCIR effectively identified safety culture weaknesses that were not addressed by the original RCA associated with the licensee's TapRoot investigation.

In addition to the TapRoot and SCIR investigations, the licensee conducted the following investigations associated with the BCS event:

- An extent of condition evaluation of the Navy Fuel line, BPF, and Commercial Development Line (CDL) product lines to identify if any potential areas existed where similar events might occur involving uncontrolled chemical reactions that could challenge the safety basis and systems. (PIRCS #110037, 110038, 110446, and 110445)
- An extent of condition evaluation of ISA nitric oxide calculations for all areas of the plant to verify that the calculations were adequately conservative. (PIRCS #110071)
- An extent of condition evaluation of all facility procedures that were not connected to a specific job function like procedure NFS-TS-009 which was associated with the TapRoot CF #1. (PIRCS #110153)
- An extent of cause analysis which evaluated the root causes and corrective actions from the TapRoot investigation to assess their impact across other plant disciplines or organizations to prevent the occurrence of similar events. (PIRCS #110408)
- A multi-disciplinary team to review the associated criticality, radiological, chemical and fire safety basis documents associated with potentially vulnerable process areas of the Navy Fuel line, BPF, and CDL to assess if the safety basis documents bounded current operations and review the adequacy of the change evaluation process. (PIRCS #110073 and 110389)
- A detailed reportability review of the BCS event. (PIRCS #110184)

The team reviewed the details of the above investigations which were documented in the referenced PIRCS. The team determined that each of the investigations were performed based on reasonable approaches, adequate depth and detail, and with adequate engineering support and rigor.

Conclusions:

No findings of significance were identified. The team concluded that the licensee completed an adequate root cause analysis of the BCS event that involved techniques and methodologies generally consistent with expected investigation practices. The level of detail associated with the RCA investigations was adequate; however, a formal internal OE review utilizing the licensee's corrective action database to search for similar change process issues was not conducted as part of the original investigation. The team concluded that specific causal factors, contributing causes, and lessons learned identified by the TapRoot investigation were appropriate and relevant based on the details of the event. Subsequent investigations following the original TapRoot investigation adequately addressed the extent of condition, extent of cause, and safety culture components of the event.

4. **The near-term corrective actions needed to address the causal factors identified by the investigation of the BCS incident will be determined and implemented.**

Inspection Scope:

The team reviewed the licensee's corrective actions identified from the RCA investigation of the BCS event. The team verified that appropriate near-term corrective actions were specified for each causal factor with due dates commensurate with the significance of the issue. The team verified that the corrective actions were prioritized with consideration of risk significance and regulatory compliance. In addition, the team verified that appropriate quantitative or qualitative measures of success were developed for determining the effectiveness of the corrective actions to prevent recurrence.

Observations:

The team reviewed the corrective actions developed by the licensee's RCA of the BCS event which was documented in PIRCS #110059 associated with their TapRoot investigation. The corrective actions developed by the TapRoot investigation included the following:

Causal Factors:

- Develop and implement a project management program to be executed for all new projects or major process changes to current processes. Include in the program, at a minimum, the major components currently found in NFS-TS-009. (PIRCS #C10616)
- Develop and implement a process to ensure formal communications between Operations and Laboratory personnel to minimize confusion of technical information. (PIRCS #C10617)
- Revise the CAP to establish the requirements for the development and implementation of corrective actions. (PIRCS #C10618)

- Provide training on the improvement to the change control process to appropriate operations, technical oversight, and management staff. (PIRCS #C11384)
- Enforce the requirements of NFS-GH-911 and NFS-HS-A-67 regarding the ISA chemical analyst review of process changes. (PIRCS #C10622)
- Evaluate current ISA Team Leader screening process against standard industry practice and update NFS-GH-911 and NFS-HS-A-67 accordingly. (PIRCS #C10762)
- Revise the Configuration Management Program to provide the requirements for a technical basis with sufficient detail to facilitate the risk and hazard assessments of basis with sufficient detail to facilitate the risk and hazard assessments of process the risk and hazard assessments of process changes. (PIRCS #C10623)

Contributing Causes:

- The Human Performance Group should review the working environment of the Process Engineers, including the number of systems for which each is responsible, the number of hours worked, the simultaneous task load, perceived production pressures, etc., since numerous error precursors in the Human Performance Tools Handbook appear to be involved and are possible contributors to this event. (PIRCS #C10680)
- Evaluate the waste handling capability and the impact on production processes. Ensure that waste handling is considered as an integral part of project management and proposals by responsible engineers and project managers. (PIRCS #C10681)

Lessons Learned:

- Review and evaluate the configuration control software and implementation to eliminate the possibility of unexpected changes occurring in documents and processes controlled by the software. (PIRCS #C10720)
- Require routing of mark-ups with copies of procedures and documents for approval of changes. (PIRCS #C10682)
- Write and implement a document providing guidelines to help ensure process changes made on off-shifts have adequate technical support and oversight. (PIRCS #C10683)

The team determined that each of the corrective actions was adequately supported by the TapRoot's findings and would adequately address the identified causal factors, contributing causes, and lessons learned. The actions were entered appropriately into the licensee's CAP as referenced by the associated PIRCS identification numbers. Each action was assigned a priority status, responsible implementing department, and required due date for completion. By virtue of their assigned completion due dates, all of the actions were prioritized as near-term except PIRCS #C10618, C10680, and C10681. The team determined that the assignments were appropriate to the significance and nature of the corresponding actions. The licensee indicated that each action had been reviewed and approved by the licensee's Corrective Action Review Board (CARB), although documentation of this review was frequently not evident based on review of the PIRCS document. In addition, during the CARB reviews, those actions that

were considered significant were assigned to have effectiveness evaluations performed to ensure the completed actions would be effective to prevent recurrence. Based on a detailed review of each action, the team determined that each was properly implemented, although the following weaknesses or comments were identified during this review:

- PIRCS #C10680 (Review of potential adverse work environment of personnel in Process Engineering department): The team noted that the original due date for the completion of this corrective action was January 15, 2010, prior to restart of the facility. However, the assigned due date was changed to May 1, 2010, which changed the completion priority to a post-restart action. The only documentation regarding the change in PIRCS #C10680 was a note that the due date was changed at the request of the Vice President of Operations. There was no other documentation that provided any basis for the decision-making. In addition, there was no indication in the PIRCS document that the licensee's CARB evaluated the decision to change the due date. Based on subsequent discussions with the licensee, the team learned that the decision to change the due date was conducted outside of the CARB on January 2, 2010, during a Recovery Plan Update meeting. Additionally, the licensee indicated that the CARB did review PIRCS #C10680 upon its completion, albeit, after the due date change, and there was no CARB concern raised at the time. The team determined that while the CARB was not specifically involved with the initial decision to change the due date, it appeared that appropriate management personnel were in attendance at the Recovery Plan Update meeting to provide oversight of the decision. The team noted that this was one of several corrective action commitment details or due dates that were changed without thorough documentation or evidence of initial CARB reviews. The licensee initiated PIRCS #C11978 to address this and similar issues.
- PIRCS #C10616 (Develop and implement a project management program to be executed for new projects or changes to current processes): The licensee's TapRoot investigation noted that a Quality Assurance (QA) Audit in 2008 identified the lack of procedural guidance for providing the technical basis of process changes (PIRCS #P15957). The proposed corrective action for this QA issue, documented in PIRCS #C7816, was to create such a document. As a result, a draft engineering department "How-To-Guide" was created titled "Preparation of Technical Basis Documentation for ECRs." This guide was never approved and issued. The TapRoot investigation stated that "this issue will also be addressed by the corrective actions for CF#1." Based on review of PIRCS #C10616, as well as the other corrective actions associated with CF#1, the team found no documented evidence that this issue was formally addressed. The corrective actions associated with PIRCS #C10616 involved enhancements to the facility process change program (via revision of NFS-CM-004 and the implementation of NFS-TS-009) which included requirements for conducting and documenting technical basis reviews. While detailed technical basis review guidance was provided in these procedures, the team noted that the draft How-To-Guide contained content and information beyond what had been implemented in the procedures or in the associated training. Following discussions with the licensee on this issue, PIRCS #15957 was updated by QA personnel indicating that the original actions were ineffective and should be corrected. PIRCS #C12046 was initiated to address this problem. The licensee indicated that a review of the technical basis preparation guidance contained in the draft How-To-Guide would be conducted against the guidance currently contained in NFS-CM-004 to determine if NFS-CM-004 should be enhanced.
- PIRCS #C11172 (Conduct a review of procedures, policies, etc, for instances of institutionalized priorities over safety or production pressures): The licensee's review of the sampled facility procedures and policies identified several actions. For example, it was

identified that a more detailed review of the practices associated with SOP-392, "Work Request Procedure" was needed. In addition, it was identified that Process Engineers should be instructed to consider production over safety during their routine procedure walk downs and reviews. However, the team noted that specific PIRCS corrective action items were not created to ensure that these actions would be implemented. To address this issue, the licensee initiated PIRCS #C11972.

The team also reviewed the corrective actions identified in the licensee's SCIR investigation, extent of cause evaluation, and extent of condition reviews that were conducted separately and at a later date from the original TapRoot investigation. The SCIR investigation was documented in PIRCS #I10252, the extent of cause evaluation was documented in PIRCS #I10408, and the extent of condition evaluations were documented in PIRCS #I10037, I10038, I10071, I10073, I10153, I10389, I10445, and I10446. The corrective actions developed by the SCIR and extent of cause included the following:

SCIR Investigation Corrective Actions:

- Evaluate internal and external operating experience before initiating significant processing changes. (PIRCS #C11061)
- Ensure Laboratory personnel are given the opportunity to concur in all engineering and safety work products for new or revised processes that rely on test data produced by the lab. (PIRCS #C11062)
- Modify daily conduct of operations to enhance plant management; provide timely, accurate, and complete communications to management on concerns, issues, or problems; establish a more engaged leadership culture to drive accountability; assist in early recognition of potential problems; and aid in the proper decision-making at the appropriate level to address identified issues in a timely and sound manner. (PIRCS # C10627)
- Update corrective action program to include requirements to perform SCIR. (PIRCS # C10103)
- ISA Team Leader decisions that conclude no technical ISA review is required should be peer-checked to eliminate this error-likely situation and single point failure from recurring. (PIRCS #C11113)
- ISA Team Leaders should have a formal procedure or job aide that details how screening should be conducted. (PIRCS #C11114)
- Administrative changes to NFS-GH-A-67 allowing ISA Team Leader to perform technical safety reviews caused it to be in conflict with NFS-GH-911. Correct NFS-GH-A-67. (PIRCS #C11115)
- Implement a Senior Engineering Watch (SEW) program to provide coverage on the process floor by personnel with technical knowledge of operations, have sole duty of providing independent technical oversight of process operations, and report to Vice President of Operations. (PIRCS #C11116)

- A top-down face-to-face communication with management on clear set of behavior standards will be communicated to staff. (PIRCS #C11117)

Extent of Cause Corrective Actions:

- Revise NFS-RM-010 to require training and qualification form originator to route with the associated document as part of the formal review approval process. (PIRCS #C11216)
- Develop a comprehensive Conduct of Operations document based on guidance from industry best practices. (PIRCS #C11217)
- Develop a performance based qualification process to ensure required personnel have a demonstrated capability to prepare technical basis documents. (PIRCS #C11260)
- Validate the ISA process. (PIRCS #C11261)
- Establish procedural guidance for required personnel to have a demonstrated capability to prepare technical basis documents. (PIRCS #C11334)
- Clarify the review requirements for designating Items Relied On For Safety (IROFS) and changing safety basis within the ISA organization. (PIRCS #C11347)

The licensee's investigative approach for both the SCIR investigation and the extent of cause evaluation involved a gap review which compared the causes and corrective actions from the TapRoot investigation, and provided additional corrective actions to address perceived gaps. The team determined that the insights and additional corrective actions identified by these evaluations provided valuable enhancements to the TapRoot investigation. The team noted that besides PIRCS #C11217 and #C12261, associated with developing a comprehensive Conduct of Operations document and validating the ISA process, all of the actions were prioritized with near-term completion due dates. Based on review of each of the near-term actions, the team determined that each was properly implemented, although a weakness was identified during review of PIRCS #C11113 regarding inadequate documentation of the decision to delete this action.

PIRCS #C11113 was associated with a SCIR corrective action to conduct peer-checks of ISA Team Leader decisions that process changes do not require ISA technical reviews. The PIRCS document stated that "instead of requiring a peer-check, Screening Guidelines have been provided in Attachment A of NFS-GH-A-67 to clearly identify under what circumstances no technical ISA review is required." The team noted that there was no explanation or basis documented for this decision or whether the CARB had agreed with this decision. In that there was already a corrective action developed from the SCIR investigation to develop these same Screening Guidelines (via PIRCS #C11114, described above), the change to the action of PIRCS #C11113, effectively deleted the action. The team interviewed one of the SCIR team members who indicated that they had intentionally included both actions due to the importance of eliminating the error-likely situation and single point failure from occurring (i.e., making the same error that occurred in the BCS event). This SCIR team member stated that he was unaware of the decision to revise PIRCS #C11113. The team discussed the concerns with management who subsequently revealed that the decision to revise the action of PIRCS #C11113 was made at the recommendation of the newly appointed Director of Safety and Regulatory based on his experience at another fuel facility. In lieu of the peer-check, it was decided that the Screening Guidelines associated with PIRCS #C11114, alone would provide

adequate actions to address the problem. While this decision was not reviewed by the CARB at the time it was made, the licensee stated that the CARB did review the completed actions at a later date and approved the revised actions. The CARB requested at the time of approval of PIRCS #C11114, that an effectiveness evaluation be conducted. The team concluded that this was another example where corrective actions were revised without clear documentation of the basis for the changes and without CARB involvement in the initial decision-making. As corrective actions to address this issue, the licensee indicated that the CARB would modify its methods to assure more detailed documentation regarding decisions and to assure that investigation teams are properly represented during any changes or other adjudications regarding corrective actions from their investigations.

Conclusions:

No findings of significance were identified. The team concluded that the licensee determined and implemented near-term corrective actions to address the causal factors identified by the investigation of the BCS incident. Corrective actions developed by the licensee's TapRoot investigation, along with the subsequent SCIR investigation, extent of cause and extent of condition evaluations, in total, adequately addressed the specific problems identified from the licensee's review of the BCS event. With the exception of several minor issues related to decision-making documentation of corrective action changes and adequate resolution of technical basis preparation guidance from a previously identified change process problem, the team determined that the licensee had adequately implemented the near-term corrective actions.

5. The extent of condition reviews of process area safety basis conducted after the BCS incident will be expanded to include the BPF U-ox Dissolution Process.

Inspection Scope:

The team performed a detailed evaluation of the licensee's extent of condition analysis. An extent of condition is defined as the extent to which the actual condition exists within other plant processes, equipment, or human performance. The team verified that any associated safety assumptions and controls matched the field conditions and current operations. Additionally, the team assessed the licensee's review of the associated criticality, radiological, chemical and fire safety basis documents (including setpoints and periodic tests) for the Uranium-oxide (U-ox) system. The team interviewed plant personnel, including the ISA program manager, vice president of operations, and safety team leads; and reviewed the licensee's documented response to CAL Item # 5 to confirm completion and adequacy. This included a review of PIRCS investigation I10389, and the U-ox operating procedure, SOP 409, Section 8, "U-Oxide Dissolution," Rev. 8 to verify that this procedure had incorporated lessons learned from the extent of condition analysis. Investigation I10389 was evaluated to determine if the licensee performed an adequate review of the BPF U-ox Dissolution Process as part of an expansion of the extent of condition conducted after the BCS event (PIRCS P21448). The corrective actions reviewed included the eight actions determined by the licensee to be important to responding to the CAL item prior to restart, as well as a sampling of those corrective actions which were determined to be long-term in nature. The associated corrective actions were reviewed to evaluate their adequacy for preventing a similar incident from occurring as well as to evaluate the licensee's approach to conducting an extent of condition review.

The team reviewed an independent assessment conducted by Babcock & Wilcox (B&W) Nuclear Operations Group (NOG), which was performed to verify the assumptions and

conditions used in a sampling (115 of 302) of setpoint analysis for IROFS. The team interviewed personnel associated with the review. Additionally, the team conducted an independent review of eight IROFS setpoint calculations. The intent of the independent NRC review was to evaluate the adequacy of the assumptions used in the calculation. Selection criteria for the sample was based on a cross-section of those setpoints B&W NOG had reviewed, and those they had not; the safety discipline (criticality, chemical, and radiological) of the IROFS; the process line (Navy Fuel, BPF, and CDL); and the type of IROFS (e.g. active engineered, passive, or administrative).

The team reviewed documentation and conducted interviews to assess the procedure change control processes as they relate to IROFS and assumptions used in the ISA.

Observations:

The original extent of condition analysis performed by the licensee following the BCS event utilized what the licensee described as a “vertical slice.” NFS chose to perform the extent of condition review by selecting and analyzing only those systems that might be subject to a variability of material. In this original extent of condition, the licensee addressed the potential for variability of material composition and how this condition could affect other plant processes. However, this initial analysis did not identify that the U-ox system was vulnerable to material variability. Based on the AIT’s review, it was noted that different types of oxides could be introduced into the U-ox system. Hence, the NRC specifically required CAL item #5 to address this concern.

The licensee expanded the extent of condition review to include the U-ox dissolution process. The team reviewed the revised extent of condition analysis described in NFS Investigation PIRCS #I10389 and noted that it was very detailed and evaluated many of the vulnerabilities of the U-ox system. However, it failed to specifically address the failure mode associated with material variability. This deficiency was brought to the attention of licensee management. The licensee then developed a more comprehensive extent of condition analysis that included not only the U-ox system, but addressed the entire plant site. The team evaluated the revised extent of condition analysis along with the U-ox design basis and noted no additional concerns. The team verified that corrective actions were in place such that future material variability issues would be addressed in a more focused and comprehensive manner prior to introducing any new material into any of NFS’ plant processes.

ENG-EPS-A-003, “Setpoint Verification and Design Parameter Documentation” provides guidance on the methods appropriate for determining setpoints, including safety significant setpoints associated with IROFS. Some methods include calculations, vendor data, operational experience, or qualification testing. The methods vary in their degree of rigor, and there was no guidance to match the required degree of rigor to the safety significance of the setpoint. This determination was left up to the engineering judgment of the procedure user and subsequent reviewers instead of being described in the procedure. The licensee captured this concern in their CAP in PIRCS P23812.

The team noted that process engineers were able to make a change to attachments and runsheets in SOPs, as specifically mentioned in SOP 409, Section 1. While attachments and runsheets containing IROFS are controlled via the Configuration Management Program, there is the potential for them to contain items that are assumptions or initial conditions in the ISA. This

is considered a single-point vulnerability in that a single individual may make the decision to change the attachments or runsheets. The licensee has captured this concern in their CAP in PIRCS P11964, P11965, and P11966.

Conclusions:

No findings of significance were identified. The team concluded that, in general, the licensee effectively conducted an extent of condition review for the BPF U-ox dissolution process

6. An extent of cause analysis for each causal factor will be completed and specific interim corrective actions will be identified and implemented as appropriate.

Inspection Scope:

The team performed a detailed review of the licensee's extent of cause analysis. An extent of cause is defined as the extent to which the root causes of an identified problem have impacted other plant processes, equipment, or human performance. For each identified causal factor from the licensee's RCA, the team verified that: appropriate corrective actions were specified for each causal factor; sufficient corrective actions were generated and prioritized with consideration of risk significance and regulatory compliance; a schedule was established for implementing and completing the corrective actions; and quantitative or qualitative measures of success were developed for determining the effectiveness of the corrective actions to prevent recurrence.

The team interviewed plant personnel and reviewed the licensee's documented response to CAL Item #6 to confirm completion and adequacy. This included a review of PIRCS I10408 and the associated corrective actions generated as a result of the investigation. The investigation and extent of cause documents were evaluated to assess the licensee's ability to conduct an adequate extent of cause review. The associated corrective actions were reviewed to evaluate their adequacy for preventing an incident similar to the BCS event from recurring.

In addition to the licensee's extent of cause analysis, the team reviewed the SCIR. The intent of the SCIR was to expand the original TapRoot investigation to include management related, and "softer," less technically oriented causes. Through the SCIR and the extent of cause review, the licensee had evaluated all causal factors, and established specific corrective actions. The team interviewed personnel responsible for conducting the extent of cause review, and verified training records, to evaluate their qualifications to perform the review.

Observations:

The extent of cause review considered each CF (listed in section A.3) as being applicable to all aspects of the plant, with subsequent development of additional corrective actions assuming the causal factor was a global problem. There was only a limited attempt to determine the actual extent of each cause within the organization. However, since the most conservative approach was taken, the extent of cause analysis was determined to be adequate. The licensee acknowledged this approach as a potential vulnerability for future investigations and appropriately captured the concern in PIRCS # P22890.

The licensee proposed five additional corrective actions as a result of the extent of cause analysis.

- Corrective Action (CA) 11216 - Revise procedures to require the document originator to route appropriate training form along with procedure change
- CA 11217 – Develop a comprehensive “Conduct of Operations” document based on industry best practices
- CA 11260 – Develop a performance-based qualification process to ensure personnel are capable of preparing technical basis documents
- CA 11334 – Establish a procedural guidance for training to ensure personnel demonstrate the capability of preparing adequate technical basis documents
- CA 11347 – Clarify the review requirements for designating IROFS and changing the safety basis within the ISA organization

Conclusions:

No findings of significance were identified. The team concluded that the licensee effectively conducted an extent of cause analysis for each causal factor and identified and implemented appropriate interim corrective actions.

7. **Each facility accident scenario involving nitrogen compound gas (NOx) generation will be re-evaluated to ensure appropriate IROFS have been identified and implemented to provide adequate protection and that management measures for those IROFS are sufficient to ensure these IROFS are available and reliable to perform their intended safety function when needed.**

Inspection Scope:

The team performed a review of all NOx accident scenarios and verified that adequate IROFS and associated management measures were in place to ensure compliance with the requirements of 10 CFR 70.61, Performance Requirements. The team interviewed plant personnel, including the ISA program manager, and reviewed the licensee’s documented response to CAL Item # 7 to confirm completion and adequacy. This included a review of PIRCS # 110071 and its associated corrective actions. The corrective actions reviewed included the seven actions determined to be needed prior to restart, as well as a sampling of those corrective actions which were determined to be long-term in nature.

The team reviewed the scope of the evaluation, specifically the processes selected or not selected, and the justification, as well as the initial conditions and assumptions which could precipitate a NOx event. NOx scenarios were analyzed in Area 200 and Area E within the Naval fuel production area. Within the BPF area, NOx scenarios were evaluated in the U-Ox and the U-AI systems. Finally, the team reviewed the NOx scenarios in the CDL which included the CDL column dissolver, CDL tray dissolver and the CDL hoke tube station. The team also reviewed the NOx evacuation instructions to determine their clarity and effectiveness in minimizing exposure.

The team evaluated a sample of the calculations performed, and the additional IROFS generated as a result of those calculations. Management measures for the additional IROFS were evaluated for compliance with site procedures and the site license, SNM-124. The team reviewed the licensee’s verification of those management measures’ sufficiency.

Observations:

The AIT noted that the licensee could not provide an adequate technical basis for IROFS BUA-43. The team noted that, as a result of the AIT review, the licensee created new IROFS in the BPF U-AI system in place of BUA-43 in order to comply with 10 CFR 70.61. However, NFS chose to leave BUA-43 in place as a defense in depth measure though no credit for it is assumed in the ISA. Therefore it is not risk indexed as required by NFS' ISA program. Upon reviewing the Accident Consequence Evaluation (ACE) pertaining to NOx releases, the team noted that the ACE concluded that the NOx potential release was a low consequence event. Based on NFS' ISA program, IROFS would not be required in this case. NFS indicated that in this case for the U-ox system, it would be prudent that these IROFS be in place and maintained as a "good practice." The practice of putting non-risk-indexed IROFS for low consequence events was not specifically addressed in NFS' ISA program documents, and the team brought this to the attention of licensee management. NFS agreed to modify their program to address these types of IROFS. The practice of designating an item as an IROFS when not required will be reviewed as part of the Unresolved Item (URI) identified in the AIT report, URI 70-143/2009-011-08, "Failure to identify engineered or administrative controls as IROFS required by 10 CFR 70.61(e)."

During a review of the newly created IROFS for NOx scenarios, the team noted that NFS developed management measures to ensure their effectiveness. However, the licensee did not address the effectiveness of the management measures associated with these IROFS. As a result of NRC concerns, NFS performed a review of all IROFS failures from 2007 to present and noted no overarching concerns or common-cause themes that would call into question the effectiveness of management measures associated with the newly-created IROFS. The team performed an evaluation of NFS' conclusions and noted no additional concerns.

The team observed that the licensee's ISA program did not consider all initial conditions and assumptions used as inputs to safety calculations to be IROFS. The availability and reliability of IROFS to perform their intended safety function are ensured through the use of specific management measures directed by 10 CFR 70.62(d). A vulnerability could exist because, without appropriate management measures assigned, the results of those safety calculations could be changed in a non-conservative manner by a deviation from any of the stated initial conditions or assumptions. The practice of not including management measures for initial conditions and assumptions will be also reviewed as part of URI 70-143/2009-011-08.

The inspection team concluded that the licensee's ISA and IROFS are adequate to provide the required level of safety. This conclusion is based on the licensee's effective application of the configuration management program to provide adequate review of changes to initial conditions and assumptions that may affect the ISA.

Conclusions:

No findings of significance were identified. The team concluded that, in general, the licensee effectively conducted a review NOx generating scenarios and identified appropriate IROFS and associated management measures.

8. **Following completion of restart actions, NFS will have an independent review conducted to verify implementation of the restart actions. Personnel participating in these reviews will have no responsibility for the conduct or oversight of NFS operations.**

Inspection Scope:

The team reviewed the licensee's Independent Review Team (IRT) members' qualifications to determine if they could provide an independent and critical review of the licensee's restart actions. The team interviewed the IRT lead inspector, reviewed the IRT report dated February 11, 2010, and compared the findings of the IRT with those of the NRC RRAT. The team assessed the licensee's Recovery Plan to determine if they took measures to effectively address the recommendations of the IRT. The team verified that a schedule had been established for implementing and completing the corrective actions.

Observations:

NFS assembled six individuals to conduct the independent review. The team determined that there was an appropriate mix of skills to assess the technical, management and programmatic issues. The Team Leader for the IRT was from the B&W Lynchburg facility. He was aware of NFS's operations through previous assignments.

The on-site portion of the team's assessment was limited to just four days. It appeared to have had an adequate breadth but review of issues may have lacked depth due to the short amount of time spent at NFS. In many cases the assessment consisted of reviewing the supporting documentation supplied by NFS and did not include independent sampling. The lack of depth was illustrated by the types of observations that the NRC evaluation team had that were not identified by the NFS Independent Review Team.

The IRT interviewed individuals from all levels of management to verify the effective communication of changes in the conduct of operations. The NRC team reviewed transcripts of these interviews and determined that they supported the conclusions which were generalized in the IRT report.

In a report dated February 11, 2010, the IRT concluded that NFS had completed the items listed in the CAL. The IRT offered critical observations for several of the licensee's actions. The IRT developed six recommendations and shared three observations. These recommendations and observations were captured in PIRCS # P23388.

Conclusions:

NFS conducted an independent review to verify the implementation of the restart actions. The NRC team concluded that the IRT had a good approach to sample the items but the review lacked the depth needed to ensure that the corrective actions taken were well above the minimum. A review of the IRT members' experience showed that they were appropriately independent and qualified to participate in the review.

9. **NFS will allow sufficient time for NRC to perform inspections of restart actions. The NRC will be provided with a two-week notice prior to the time NFS management would like for the NRC team to arrive at the NFS site.**

On February 9, 2010, David L. Kudsin, President NFS, issued a letter to Luis A. Reyes, NRC Region II Administrator, stating that the IRT had completed their review of restart actions required by the CAL. The letter noted that the IRT concluded that NFS had satisfactorily completed the list of "Actions Prior to Restart of Operations" for the Naval product line and the BLEU Preparation Facility.

10. **Implement a Senior Engineering Watch (SEW), to provide additional technical coverage on the process floor. The SEW will have the sole duty of providing independent technical oversight of process operations to promote the identification, adjudication and resolution of potential safety concerns. The SEW will functionally report to the Vice President of Operations. NFS will maintain this watch for a minimum period of 6-months after restart of all operations.**

Inspection Scope:

The team reviewed the licensee's procedures for implementation of the SEW which were contained in licensee standing order, NFS-SO-09-006, "Enhanced Operations, Management and Communications." To verify that those personnel selected for the SEW possessed the necessary skills and judgment required to provide effective, independent technical oversight, the team reviewed the licensee's selection criteria for the SEW. In addition, the team conducted four interviews with the SEWs to verify that they met the licensee's selection criteria. The team reviewed the roles, responsibilities, and authorities for the SEW contained in NFS-SO-09-006 to assess their appropriateness in providing effective, independent technical oversight. The team also used interviews with the SEWs to assess their knowledge, skills, and abilities as they pertained to the roles, responsibilities, and authorities of the SEW position. Additionally, the team conducted interviews with management and operating staff to assess their understanding of the SEW's roles, responsibilities, and authorities. The team reviewed NFS-SO-09-006 to evaluate the guidance provided for the identification, adjudication, and resolution of safety concerns and assessed, through interviews, the ability of the SEWs to implement this guidance. In addition, the team reviewed NFS-SO-09-006 to assess the guidance provided to the SEWs for reporting their observations to the Vice President of Operations. The team also observed SEW on shift activities to determine if they were meeting the expectations of NFS-SO-09-006 and NFS management.

Observations:

The team determined that the criteria used in selecting personnel to serve as the SEW were appropriate given the responsibilities assigned to this position. The team concluded that the individuals selected to serve as the SEW met the selection criteria set forth in NFS-SO-09-006. The team determined that NFS-SO-09-006 provided adequate guidance regarding the roles, responsibilities, and authority of the SEW and enabled them to provide effective, independent oversight. The team concluded that the SEWs, NFS management, and operators had a consistent understanding of the roles, responsibilities, and authority of the SEW. The team determined that NFS-SO-09-006 contained adequate guidance for the identification, adjudications, and resolution of safety concerns and assessed that the SEWs had ample ability to implement this guidance. The team also concluded that NFS-SO-09-006 contained proper guidance for the reporting of observations and issues to the Vice President of Operations and

that the SEWs were aware of this direction. The team determined that the on shift activities of the SEW were appropriate to the level of activity taking place within the facility. However, the team noted that the decreased amount of activity taking place at the licensee's facility during the inspection period limited the number of opportunities for direct observation of SEW activities.

Conclusions:

No findings of significance were identified. The team concluded that the licensee had put in place appropriate processes, procedures, and personnel to effectively implement the SEW. The team concluded that the SEW position has the potential to provide a strong oversight presence for the licensee's operations. However, based on the limited activities occurring during the inspection period, it was difficult to assess the initial effectiveness of the position. Therefore the effectiveness of the SEW position should continue to be assessed during and after the licensee's restart activities.

11. **Implement an initiative to increase management presence and engagement on the process floor that will better enable open and timely communication of potential safety concerns. This initiative will be structured around a series of daily meetings held by management with processing personnel.**

Inspection Scope:

The team reviewed the licensee's procedures for implementation of an initiative to increase management presence and engagement on the process floor. This guidance is contained in licensee standing order, NFS-SO-09-006. To verify that the initiative to increase management presence and engagement on the process floor was appropriately institutionalized, the team reviewed licensee procedures, conducted interviews, and observed daily activities. The team reviewed specific agenda items for daily meetings, as documented in NFS-SO-09-006, to assess their adequacy in supporting open and timely communication of safety concerns. The team also examined the level of management present at daily meetings to evaluate if it was appropriate with regard to the objectives of the initiative. The team conducted seventeen interviews with licensee personnel, representing various departments and experience levels, to assess their knowledge of the initiative, gather their insights on the level of management presence at daily meetings, and assess their ability to openly communicate with licensee management. In addition, through these interviews, the team evaluated licensee personnel's knowledge of the corrective action program and their willingness to write PIRCS or raise safety concerns. The team also observed daily meetings to determine if they were meeting the expectations of NFS-SO-09-006 and NFS management.

Observations:

The team determined that NFS-SO-09-006 provided adequate direction for the conduct of daily meetings with the goal of increasing management presence and engagement on the process floor. Through review of NFS-SO-09-006, observation of licensee meetings, and interviews with licensee personnel, the team determined that the appropriate level of management was present to allow open and timely communication. The team determined that licensee personnel were aware of the initiative and felt open to communicate with licensee management. Additionally, the team noted that employees, especially hourly employees, had observed a marked increase in management presence on the process floor since the initiative was implemented. The team concluded that, in general, employees understood the corrective action program and felt free to initiate PIRCS or raise safety concerns. The team identified that several employees did not

have a firm understanding of the Employee Concerns Program (ECP). The team also identified that some employees were not aware of their ability to directly contact the NRC in order to raise safety concerns. The team conveyed these issues to the licensee. The licensee initiated PIRCS # P23575 in response. The team also noted that training on the ECP and methods to raise safety concerns were part of the licensee's upcoming preparations for restart.

Conclusions:

No findings of significance were identified. The team determined that the licensee had implemented an initiative to increase management presence and engagement on the process floor to better enable open and timely communication of potential safety concerns. The team concluded that, in general, the licensee had put in place appropriate processes, procedures, and personnel to effectively meet the requirements of this CAL item.

12. Develop updated programmatic guidance to provide specific criteria to invoke Corrective Action Review Board (CARB) review of investigations, corrective actions and effectiveness reviews to help ensure appropriately broad investigations and effective corrective actions.

Inspection Scope:

The team reviewed licensee procedures for the CARB which are contained in NFS-GH-922, "The NFS Problem Identification, Resolution, and Correction System (PIRCS)," Rev. 9. The team reviewed previous revisions of NFS-GH-922 to determine if changes that were made to provide program guidance to the CARB were appropriate. The team reviewed the guidance for composition of the CARB as documented in NFS-GH-922. In addition, the team reviewed the qualifications and experience of CARB members to evaluate if they were commensurate with the responsibility given to the board. The team also reviewed CARB packages and meeting minutes. The team attended a convening of the CARB to assess the rigor and independence that the board applied to their review of PIRCS problem reports, investigations, and corrective actions. The team reviewed selected portions of the licensee's CAP to assess the quality of information provided to the CARB. The team conducted multiple interviews with the licensee's CAP program owner and other members of the licensee staff regarding the CAP. Additionally, the team attended several convening's of the licensee's Problem Review Group (PRG) where PIRCS entries are reviewed and initially evaluated for risk type/level, corrective actions, investigations, and trending.

Observations:

The team determined that NFS-GH-922 contained sufficient requirements for CARB review of investigations, corrective actions, and effectiveness reviews. The team concluded that the composition of the CARB, as specified in NFS-GH-922, was appropriate and that the procedural requirements for a quorum were being followed by the licensee. The team determined that the qualifications and experience of the CARB members were appropriate. The team concluded that the rigor and independence the board applied to their review of PIRCS problem reports, investigations, and corrective actions were adequate. The team identified the following items:

- Stakeholders for most agenda items were not present to provide amplifying information or answer questions. This negatively impacted the effectiveness of the CARB.

- The majority of items reviewed were rejected due to lack of provided documentation. This problem could have been remedied prior to the convening and negatively impacted the effectiveness of the CARB.
- The effectiveness of the meeting was negatively impacted when it was abruptly ended due to licensee scheduling conflicts.

The team conveyed these issues to the licensee and noted that they were being reviewed for incorporation into an ongoing effort the licensee is undertaking to improve their CAP. The team determined that the quality of the information provided to the CARB was adequate. In general, the team concluded that the PRG was effective. The team identified the following items:

- The meeting lacked an expectation of formal communications when assigning ownership of problems, investigations, and corrective actions.
- To an observer, ownership of problems, investigation, and corrective actions were not evident.
- The group facilitator has the potential to affect the rigor with which PIRCS entries are evaluated during the meeting. Some facilitators negatively impacted the rigor of evaluations.
- Some items used during the PRG meeting, such as investigation assignment guidelines and risk definition tables, were not proceduralized.
- The effectiveness of the meeting was negatively impacted multiple times when it was abruptly ended due to licensee scheduling conflicts.

The team conveyed these issues to the licensee and noted that they were being reviewed for incorporation into an ongoing effort the licensee is undertaking to improve their CAP.

The team noted that the licensee recently joined the Institute of Nuclear Power Operations (INPO) and is participating in the INPO CAP owner's group in order to identify and implement improvements to their CAP.

Conclusions:

No findings of significance were identified. The team concluded that, in general, the licensee had put in place appropriate processes, procedures, and personnel to effectively provide criteria to invoke CARB reviews to ensure appropriately broad investigations and effective corrective actions.

13. **Revise and implement the procedure that requires processes, process parameters and process inputs be clearly defined prior to implementation. This program is designed to prevent changes such as a change in the composition and physical characteristics of the feed material that may result in abnormal occurrences during processing.**

Inspection Scope:

The team reviewed NFS-CM-004, "Change Control Process" Rev. 3 which addresses increased management oversight in the change process and NFS-TS-009, "Configuration Management of Process Change," Revs. 1 and 2 which address the increased Technical Review of a subset of those changes. NFS-TS-009 stated that all changes either due to new processes or changes to existing processes must be documented by an approved Technical Basis in accordance with NFS-CM-004. All materials for input to High Enriched Uranium (HEU) processes must be reviewed per NFS-TS-009, and materials must be released by a unique Technology Review for each input material. The team reviewed NFS Commitments, including the commitment to revise and implement NFS-TS-009 and NFS-CM-004 and increase communications between Operations and the Lab.

The team discussed with the Director of Applied Technology/Principle Scientist the design control changes, how ECRs are generated and the technical basis associated with each, as well as how and if that triggers the use of NFS-TS-009. The team also reviewed and discussed the changes made in Rev. 2 of this procedure. The team discussed the levels of reviews with the Director of Applied Technology/Principle Scientist to determine the adequacy of managerial and technical review at each level. The team discussed the new procedure and spreadsheet NFS-TS-012, "Status and Release of Process Starting Materials." The review of the release of each material is documented in this log. The team reviewed and discussed this log with the creator and owner, the Director of Applied Technology and Principle Scientist, as well as those process engineers who currently use it. The team reviewed the training and interviewed the personnel who received the training for these changes.

Observations:

The team reviewed the changes made to NFS-TS-009 in January 2010 and February 2010, and discussed those changes with the Director of Applied Technology/Principle Scientist and the procedure author. The procedure defined the program to maintain configuration control of processes to prevent changes to a process without the appropriate technical evaluation. The team noted the primary changes were to set safety and regulatory compliance as a priority ahead of quality and cost, and to clarify the documentation upon which the changes are evaluated. These changes are labeled as Commitments, to prevent changes in subsequent revisions.

The team discussed PIRCS # C11329 for the addition of new or changed material inputs to process with the Director of Applied Technology and Principle Scientist. He described the creation of a "living document" that encompasses all new, variable or changed material input to the HEU process. Before the licensee may restart any process, the Applied Technology Department examines the feed material through this process (material characterization and process development). The Director of Applied Technology/Principle Scientist stated this was to be formally implemented by a new procedure, NFS-TS-012, "Status and Release of Process Starting Materials." This procedure defines the process for submitting starting materials for technical reviews, information required to support reviews, assignment of tracking numbers,

preparation of the "Starting or Input Material Technology Review Status Log," and the release of materials for processing. The procedure defines the documentation and reporting of the technology review status for materials to be input to processes and the release to process materials approved in accordance with the requirements of NFS-TS-009. The team verified that this procedure and log would be applicable to all uranium bearing materials to be input to the licensee's HEU processes. The team determined this would institutionalize the documentation of these changes. This corrective action was approved by the CARB on March 3, 2010, but concurrence on the procedure and its final implementation had not yet been completed prior to the end of the inspection.

The team interviewed two process engineers and discussed their roles in the management of process changes. One was in the initial stages of completing an outline for a new process as required in NFS-TS-009. The team reviewed the technical basis, process parametric studies, and outline with the process engineer. The team interviewed four operators from both first and second shift. The team reviewed the independent evaluation of the test plans, the composition of the Technology Review Team for appropriate personnel with knowledge of proposed materials, and the approval process with the Process Engineers and the Director of Applied Technology/Principle Scientist. The team also selected two recent Technology Review Documents and reviewed those to ensure they followed the requirements in NFS-TS-009. The team also reviewed the commitment the licensee has made to review all new business opportunities or potential changes to existing HEU contracts through NFS-TS-009. Finally, the team noted the final approval and release of each new or changed material will be from the President of NFS.

The team reviewed the training provided on NFS-TS-009 and NFS-CM-004 and interviewed the training manager and staff. The engineers and operators voiced concern regarding the volume of reviews and approvals for minor procedural changes and work requests. The question of whether the levels of review, attention, and approval were commensurate with the significance of the change was discussed with the licensee. The licensee committed to evaluate this issue. The team reviewed the presentations and the tests given to all staff required to complete the training. The increased emphasis on accountability was noted by the team. The team determined that the training was thorough, tied to the appropriate jobs, provided clear guidance, and the staff interviewed demonstrated good knowledge of the process.

Conclusions:

No findings of significance were identified. The team concluded that the licensee effectively implemented the procedure that requires processes parameters and process inputs to be clearly defined prior to implementation. The team concluded that appropriate changes were made to the procedure, adequate training was provided, and personnel interviewed demonstrated good knowledge of these changes. In addition, the new procedure that formalizes the review of starting materials, the tracking of starting materials, and documents the release of these materials for processing was in place. The release of all new or changed starting material inputs will be authorized by the President of NFS.

14. Conduct an independent review of NFS' investigation processes. This review will be conducted by a subject matter expert (SME) to establish a plan to implement enhancements necessary to ensure adequate breadth and depth of investigations.

Inspection Scope:

The team examined two reports regarding independent reviews of NFS' investigation processes by a SME. The team reviewed the statement of work (SOW) for each review to verify that NFS had procured appropriate review services as required by the CAL. The first report was an evaluation conducted by Systems Improvements Inc., of three licensee root cause evaluations (TapRoot), an analysis of the licensee's use of the TapRoot methodology, and recommended enhancements to maximize the TapRoot method. The second report included an evaluation, conducted by Certrec Corp., of the licensee's investigation processes, among other aspects of the licensee's CAP, and recommended enhancements. The team reviewed the experience and training of personnel who would normally conduct investigations to assess if NFS had an adequate number of appropriately qualified staff to conduct investigations. In addition, the team reviewed licensee procedures NFS-GH-922, "The NFS Problem Identification, Resolution, and Correction System," Rev. 9 and NFS-GH-918, "Directed Investigation Program," Rev. 7 to evaluate the adequacy of their investigation processes. The team also reviewed the licensee's plan to enhance their CAP, which includes investigations, to determine if it appropriately captured the enhancements recommended by the independent reviews to ensure adequate breadth and depth of investigations.

Observations:

The team concluded that the licensee had procured sufficient services to conduct an independent review of their investigation processes. The team determined that, in the aggregate, the two SME evaluations of the licensee's investigation processes and the recommended enhancements adequately identified enhancements to their investigation process. The team noted that the licensee has a current contract with Certrec Corp., for ongoing CAP support as this program, which includes investigations, is improved. The team concluded that the SOW for this project is sufficient to provide necessary enhancements to the licensee's investigation processes. The team identified the following items:

- The licensee's procedures did not contain training requirements for personnel who would normally conduct ACEs.
- The licensee's procedures did not contain any specific guidance or requirements for the conduct of ACEs.
- The licensee's SOW with the Certrec Corp. did not contain specific language requesting a review or assistance with enhancing the licensee's ACE process. It appeared to be understood by both parties that this was indeed part of the Certrec Corp., effort.

The team conveyed these issues to the licensee. The licensee changed the applicable SOW to include specific language to conduct reviews and recommend enhancements for the licensee's ACE process, to include guidance procedures for the conduct of ACEs and training of personnel. The team determined that the licensee had an adequate number of appropriately trained personnel to conduct investigations per their current CAP procedures. The team concluded that the licensee's plan to improve their CAP, which includes investigations, appropriately captured the enhancements recommended by the independent reviews. The

team noted that the licensee's CAP is currently staffed by the program owner and two data analysts. The team identified that the level of effort required to effectively complete the licensee's CAP improvements and support ongoing CAP processes was beyond the resources currently assigned. The team conveyed this concern to the licensee. This issue is addressed in licensee PIRC # P13650.

Conclusions:

No findings of significance were identified. The team concluded that the licensee had put in place appropriate processes, procedures, and personnel to effectively conduct an independent review of their investigation processes and establish a plan to implement enhancements necessary to ensure adequate breadth and depth of investigations. The team noted that this in an ongoing processes that will require additional evaluation.

15. **Revise the procedure that provides guidance for preparation of set-point analysis documentation to enhance the basis of evaluation, specifically to provide guidelines for justifying the basis for critical parameters.**

Inspection Scope:

The team reviewed ENG-EPS-A-003, "Setpoint Verification and Design Parameter Documentation," Rev. 1, dated January 1, 2010, and its preceding 2006 version. The team discussed the changes with the ISA Manager and the procedure author. The team also reviewed and evaluated the input documentation for the changes to the procedure. The setpoint analysis procedure was revised "in its entirety" to align the facility's program to industry standards and provide clarity in justifying the critical parameters addressed in the setpoint calculations.

Observations:

The team noted the improvement in clarity and the requirement for increased documentation in ENG-EPS-A-003. The procedure added commitments related to PIRCS 11289 in Sections 2.0, 4.1, and Appendices C and D. Appendix C, the "Critical Parameter Worksheet", was created to formally document the critical parameters. The team interviewed the ISA manager and two ISA Team Leaders to assess their understanding of the setpoint analysis procedure. Personnel interviewed understood the necessity for measurable, clear and justifiable critical parameters and understood the procedure and its applicability.

The team reviewed the industry documents related to setpoints. The team also reviewed the results of the sample of setpoint analysis calculations performed by the B&W independent review team. The team determined that the review team was appropriately qualified and that their statistical sample and review method were adequate. The team reviewed the licensee's response to the B&W independent review team's report and determined that it adequately addressed the team's observations.

In addition, the team selected a sample of ten setpoint calculations for an NRC subject matter expert to independently analyze. The subject matter expert shared his conclusions with the team, noting that generally the setpoint calculations appeared thorough with some minor issues. The team discussed the specific issues and questions regarding the setpoint calculations with the licensee. Finally, the team noted that in CAL post-restart item 8, the

licensee has committed to “evaluate the ISA program, including benchmarking against similar programs associated with other facilities by December 31, 2010, and implement any necessary enhancements. These actions will be entered and tracked in the corrective action program.”

Conclusions:

The team concluded that the licensee has put in place the appropriate procedure to provide guidance for setpoint analysis documentation, including a new worksheet for critical parameter documentation. Independent reviews, by both the B&W independent review team, and a NRC subject matter expert, resulted in several observations, but no findings of significance were identified.

B. MANAGEMENT ISSUES

During review of the above items, the team assessed whether the licensee’s assessment and corrective actions adequately addressed the management issues listed in the CAL. Those issues involved the adequacy of NFS’ management oversight of facility process changes, perceived production pressures, lack of questioning attitude by workers and management and poor communications. NFS completed a broad set of corrective actions to address the four issues.

1. Management Oversight of Facility Process Changes

Inspection Scope:

The team evaluated whether the change process enhancements would be effective in providing oversight of facility process changes. The team focused on change process enhancements directed at ensuring adequate technical basis reviews were completed and documented with appropriate management approvals and oversight, especially for changes implemented during off-shift and/or for perceived urgent priority situations. The team reviewed a sample of recent change process packages (i.e., ECRs) initiated since implementation of the change process enhancements to ensure they were developed in accordance with the new procedure requirements. The team attended portions of a CCB where recently initiated ECRs were being reviewed, and discussed the change process enhancements related to the CCB functions with the Configuration Management Engineer, as well as with CCB members. The team reviewed Safety and Safeguards Review Council (SSRC) safety evaluations of recent ECRs to ensure the evaluations were conducted in accordance with new procedural guidance. In addition, the team conducted interviews with process and project engineers to verify that licensee training on the new change process program was effectively received, accepted, and understood to ensure its effective implementation.

Observations:

As previously discussed in CAL item #2, the team conducted a review to ensure that the enhancements to the change process that were developed as interim guidance were institutionalized into the licensee’s plant-wide change process procedure NFS-CM-004, Rev. 4. Based on that review, it was determined that, except for the weakness in properly incorporating the more restrictive definition of an urgent facility change, the licensee had effectively institutionalized the enhancements from the interim guidance. The major components of the final change process enhancements included the following:

- Proposed change process packages are required to include a technical basis in sufficient detail to determine the impact of the change on safety, health, regulatory compliance, quality, and production. Explicit criterion in the form of six fundamental technical basis questions was added for reviewing and documenting the safety basis of all proposed changes. If the proposed change is determined to involve equipment or facility changes, additional technical basis questions have to be addressed. If the proposed change involves a new process or change to an existing process that is not bounded by the existing process parameters, process inputs or process designs, the change is required to have an enhanced technical basis review conducted using the newly implemented procedure NFS-TS-009, "Configuration Management of Process Change."
- Detailed criterion was added to clarify which proposed changes are required to include the above mentioned detailed technical basis review.
- Management approvals of off-shift changes via telecom are limited to situations where it is clear that the change could have no impact of the safety basis or the safety basis has previously been reviewed/approved and determined not to be impacted.
- The process of expediting the approval of changes under urgent conditions is limited via a more restrictive change in its definition.
- A change that is determined to have an impact of the safety and regulatory basis must be approved in writing by the Vice President of Operations, Director of Safety and Regulatory, Director of Fuel and Operation, and Director of Applied Technology, prior to commissioning the change.

The team evaluated the enhancements to NFS-CM-004 and determined that they would be effective in addressing the causal factors identified in the licensee's RCA. However, a minor weakness was identified regarding the clarity of the criteria in NFS-CM-004 for initiating the enhanced technical basis reviews associated with the conduct of NFS-TS-009. Reviews under NFS-TS-009 are intended to be conducted if a proposed change involves a new process or change to an existing process not bounded by existing process parameters, process inputs or process designs. This is to ensure that the technical basis of process changes are thoroughly understood and documented with sufficient technical detail to facilitate the risk and hazard assessments of such changes. The team noted that NFS-CM-004 only required NFS-TS-009 to be entered if a "Yes" is answered to the question "is this a change to process chemistry, operating methodology, or capacity (feed types, operating parameters, chemical concentrations, etc.)?" However, if the change involves an equipment change or facility change, NFS-TS-009 is not required to be implemented. The team was concerned that the criteria for entering NFS-TS-009 was too narrowly focused and could be confusing to personnel preparing ECRs resulting in NFS-TS-009 not being implemented when it was needed. In addition, the team was concerned that there could be circumstances where proposed changes could involve equipment changes or facility changes that are not bounded by existing process parameters, design basis, etc., but not involve changes to process chemistry, operating methodology, or capacity. The licensee initiated PIRCS # C11974 to review the criteria in NFS-CM-004 for entering NFS-TS-009 and to make appropriate revisions based on the results of this review.

The team reviewed several recently prepared process ECRs that were being reviewed at a CCB meeting. The team determined that these ECRs were prepared in accordance with NFS-CM-004 and the technical basis documentation contained the appropriate information detail to allow a thorough review. Based on interviews with the Configuration Management Engineer

responsible for coordinating the CCB and with CCB members, the level of detail and quality of technical basis documentation had significantly improved with the revisions made to the change process program. The Configuration Management Engineer and CCB members were found to be reinforcing the expectation for improved detail and quality by mentoring the ECR preparers and ECRs that did not meet their expectations were being returned to the preparer's for revision. The team noted that the licensee had developed quality standards and metrics with which to grade the quality of prepared ECRs being submitted to the CCB in order to trend the performance in this area.

In addition to ECRs, the team reviewed 15 safety and regulatory reviews of ECRs (documented in Safety and Regulatory Review Routing Forms) by the SSRC group for recent ECRs that were initiated under the new revisions to the change process program. The team verified the reviews were conducted in accordance with NFS-HS-A-67, "Documenting the Safety and Regulatory Review of Facility Changes," Rev. 6. The team determined that the basis for the conclusions was adequately supported by the documentation. During this review, the team noted that, typically, the same person (either the Safety Director or SSRC Chairman) answered the safety and regulatory management review questions and signed off for both positions. While the licensee indicated this was allowed by virtue of the facility organizational procedures describing their roles and authorities, the team was concerned that having the single individual conduct the reviews for both positions reduced the management oversight of the process. The licensee indicated that further review would be conducted to ensure this met the intent of the SSRC reviews of facility changes in accordance with NFS-HS-A-67.

The team interviewed fifteen process and project engineers involved with processing ECRs and verified the individuals had completed the required change process training on the revised procedures. Generally, the engineers were found to be knowledgeable of the revisions to the change process and had embraced the concept of providing more detailed technical basis reviews and documentation to support the processing of ECRs. Based on these interviews, the team determined that the licensee's training on the new change process program was effectively received, accepted, and understood. Noteworthy comments received from the interviews included the following:

- Some concerns were expressed over the clarity of the guidance regarding when enhanced technical basis reviews associated with NFS-TS-009 were necessary.
- Some concerns were expressed over the excessive amount of time needed to prepare ECRs which meet the expectations for CCB reviews; however each indicated that management had reinforced the need for quality and safety over production impact.
- Some concerns were expressed that the corrective action program was being inundated with low threshold issues that were taking their time away from more significant priorities.

Conclusions:

The team concluded that, generally, process change enhancements provided for adequate management oversight of the change process. The team determined that these enhancements were effective in addressing the causal factors identified from the licensee's investigation of the BCS event. A minor weakness was identified regarding the clarity of the criteria in NFS-CM-004 for initiating the enhanced technical basis reviews associated with the conduct of NFS-TS-009. The team determined that recent ECRs prepared under the enhanced program contained appropriate level of detail and technical basis documentation to allow for a thorough review.

Based on interviews with engineers responsible for preparing process change requests, the team determined that licensee training on the new change process program was effectively received, accepted, and understood.

2. Perceived Production pressures

Inspection Scope:

Production pressure, or the prioritization of production over safety, was cited as an NRC concern in the NFS CAL of January 7, 2010. In order to evaluate the licensee's response to this concern, the team conducted interviews with plant personnel and reviewed documented actions by the licensee. Eight interviews specifically addressing production pressure were conducted with site personnel, including upper level management, process engineering, first-line supervisors, and hourly operators. Selected personnel were from across all three production lines (Navy Fuel, BPF, and CDL). In general, personnel were asked to comment on their perception of production pressure prior to the bowl cleaning station event, and then provide their thoughts on NFS' subsequent actions taken to address those pressures. Additionally, during the course of other interviews conducted to address separate NRC concerns, site personnel were asked to provide their perceptions on production pressure within the facility.

Thirteen separate actions were documented by the licensee to address perceived production pressure. The team reviewed these actions to gauge their efficacy in reducing production pressures once the plant is returned to operation. Actions included numerous communications between site management and plant staff, the creation of a Conduct of Operations standard, and the organizational separation of Operations and Program Management.

Observations:

Many of the interviews confirmed that production pressures were present among the staff and within the upper management prior to the BCS event. However, management's current expectation that safety is the top priority was well documented in a number of separate communication efforts, including large group presentations, small group discussions, and the Conduct of Operations standard. Surveys were conducted which demonstrated that the message was widely accepted by the NFS staff. NRC interviews with NFS staff confirmed that they had acknowledged management's message. One widely held concern was that these communications took place during the shutdown period, and that during operations the philosophy might revert back to a production over safety mentality. A more accurate measure of both the management's commitment to the message, and the staff's acceptance of it, will come after the plant resumes operation and production again becomes a factor.

The licensee completed an organizational realignment such that responsibilities for Operations and Project Management are separated. The staff perceives the separation of these two competing interests as an important barrier to preventing production pressures. Prior to the separation, the Operations division was tasked with both operating the facility safely, and fulfilling contractual obligations which were closely tied to financial goals. With the creation of the Project Management division, fulfillment of contractual obligations is no longer an Operations division responsibility and production over safety questions, raised by Operations, would presumably move up to the President. The separation of the operations and project management functions is viewed as a positive step in reducing production pressure.

Conclusions:

Through the use of extensive communications and the separation of operations and project management functions, the licensee had instituted measures to provide a reasonable assurance that production pressures will be reduced during future operations.

3. Evaluate NFS' actions and progress toward fostering a questioning attitude by workers and management.

Inspection Scope:

The team interviewed seventeen NFS employees to evaluate the effectiveness of the licensee's efforts to cultivate a questioning attitude in their employees. The team selected five hourly workers, three engineers, four first line supervisors and five senior managers. Within each group, the team ensured a diverse range of experience by selecting employees with little or no NFS work experience to those employees who exceeded thirty years of NFS work experience. The selection was primarily concentrated on staff from the Navy Fuel line. The team also interviewed staff working on all three shifts. In addition, the team reviewed the materials presented at both the All Hands meeting as well as the small group meetings. The team reviewed a select group of revised procedures to verify the promotion of questioning attitude before proceeding when uncertain about a process or procedure.

Observations:

The team determined, through interviews, that the emphasis by management on the need for a questioning attitude was effectively conveyed to the staff. In general, employees from hourly workers to senior management staff agreed that the threshold for uncertainty as it relates to safe operations needed to be, and had been, lowered. This was not only discussed, it was observed and exemplified in several areas: 1) changes to procedures to emphasize caution/stop work authorization when unsure how to proceed safely, 2) "good catch" awards to those employees who identify, question, and report a safety issue, and 3) the statement from workers of assurance that there will be no retaliation against any employee for raising a safety concern. From hourly employees to upper management and from both new and experienced employees, this sentiment was reiterated. Small group meetings with management were one of the key initiatives to emphasize commitment to this. The majority of staff interviewed felt they had always had the ability to raise questions but there may have been more production pressure in the past. The team noted that, while there is a current emphasis placed on lowering the threshold for uncertainty and encouraging a questioning attitude, many interviewed were unsure if it would continue at the same level once operational and shared that concern with the team. The team discussed this matter with the licensee.

Conclusions:

The team concluded that, in general, the licensee had put in place appropriate processes, procedures, and personnel to effectively address the lack of questioning attitude that was previously prevalent in the organization. The team noted that this emphasis is an ongoing process, and that cultivation of a questioning attitude may take a while to permeate the organization.

4. Communications

Inspection Scope:

To evaluate the adequacy of the licensee's communication processes the team reviewed licensee procedure NFS-SO-09-006, "Enhanced Operations, Management and Communications." In addition the team conducted twelve interviews with licensee managers, supervisors, hourly employees, and contract personnel. The team also observed the licensee's communication processes in several situations, including a variety of meeting types as well as verbal and written exchanges between licensee managers, supervisors, hourly employees, and contract personnel.

Observations:

The team determined that NFS-SO-09-006 addressed certain aspects of communication within the licensee's organization. It did not, however, provide specific guidance regarding management expectations for the different methods of communications used within the licensee's organization. The team conveyed this to the licensee and noted that a Conduct of Operations procedure, which will include guidance regarding communications, is currently being drafted. The team determined that, in general, licensee employees and contract personnel at all levels felt that information was communicated to them in an appropriate quality and quantity, and using a method that was effective in meeting their needs. The team also determined that licensee employees and contract personnel, at all levels, felt free to communicate to those above them and were given suitable tools to do so effectively. The team noted that all employees detected a distinct, positive difference in the amount and quality of information they had received since the BCS event. Additionally, the team noted that employees, especially hourly employees, had observed a marked increase in management presence on the process floor. The team noted that most employees interviewed conveyed a strong sense of optimism that the licensee's organization was on the right path, however, they were skeptical of whether the changes will persist over the long term.

Conclusions:

No findings of significance were identified. Considering the above noted observations, the team concluded that the licensee had put in place appropriate processes, procedures, and personnel to effectively address the poor communications that were previously present within the organization. The team noted that this is an ongoing process that will need to be monitored.

C. READINESS TO RESTART NAVY FUEL LINE

To evaluate whether the issues identified by the NRC in late 2009, which led the issuance of the CAL have been sufficiently addressed, the staff further evaluated the Navy Fuel line in the areas of procedures, maintenance, corrective actions and investigations.

1. **Procedures**

Inspection Scope:

The team performed a detailed review of various procedures applicable to the Navy Fuel line. The team verified that required actions identified in the ISA Summary were correctly transcribed into written operating procedures and that these were available to operators. The team verified that IROFS were clearly identified within operational procedures. The team verified that limits needed to assure safety for selected controlled parameters were adequately described in the procedures. The team evaluated the procedures' content with respect to process operating limits, operator responses for upset conditions, safety systems and functions, precautions, and warnings. The team also evaluated procedures with respect to various operational aspects, including startup, temporary operation, and shutdown as required by license condition.

Observations:

The team's review showed that IROFS were clearly identified in the procedures. Procedure revisions adequately addressed issues identified by the operation staff. There were no outstanding procedure changes which the team assessed as having an impact on start up of the Navy Fuel line. During a review of procedure SOP 401 Section 2-302, "Bldg 302, Area 200," Rev. 36, the team became aware that future changes were planned for this procedure and that these changes would not be incorporated into the procedure until after the Naval Fuel line planned start up. The team verified that these changes were merely enhancements and would not have a significant effect on operations.

Conclusions:

No findings of significance were identified. The team concluded that the operating procedures for the Navy Fuel line would support safe operations.

2. **Maintenance**

Inspection Scope:

The team reviewed the licensee's maintenance work control program to determine if effective guidance existed for prioritizing and completing maintenance activities necessary to ensure the safe restart and operation of the Navy Fuel line. The team verified that the work control procedures included adequate provisions for appropriate controls and management oversight of work on equipment or processes important to plant safety and operation. The team reviewed the licensee's Navy Fuel line restart recovery plan associated with maintenance work activities that the licensee determined to be necessary for restart and interviewed selected maintenance, engineering, and operations personnel involved with the decision-making. The team conducted an independent review of all open work requests associated with the Navy Fuel line to ensure that plant issues necessary for the safe restart and operation of the line were properly identified as part of the licensee's restart recovery plan. The team conducted field walk downs of the Navy Fuel line operating areas and independently reviewed outstanding modifications and other outstanding equipment related work items to ensure the status of the work was consistent with the licensee's understanding.

Observations:

In accordance with SOP-392, "Work Request Procedure," Rev. 21, NFS work requests are initiated as either "Minor 1," "Minor 2," or "Major." There are three levels of priority including Emergency, High, or Normal, which are based on the urgency of the work to be performed. Minor 1 work requests are limited to the return of structures, systems, or components (SSC) to their "as-was" condition and cannot involve changes or modifications. Minor 2 work requests involve SCC that are to be repaired or replaced with a non-approved equivalent, or involve minor modifications to SCC that do not impact a process function. Major work requests are used to make modifications to existing SSC that involve potential impact to process functions. With increasing impact of the maintenance on the SSC, increasing levels of staff approvals are required. Based on review of SOP-392, the team determined that adequate work program controls and management oversight existed to properly prioritize and control maintenance activities associated with the safe restart and operation of the Navy Fuel line.

The licensee's Navy Fuel line restart recovery plan included provisions for evaluating work activities that needed to be completed for restart. The evaluations included input from engineering and operations related to modifications and items operation's personnel considered important. The team found that a formally structured evaluation that included specific criterion for review of all outstanding work and the associated rationale for deciding which items were to be completed had not been conducted at the time of the inspection. The licensee's informal lists of items considered by engineering, operations, and management necessary to be completed were not consolidated into any one database or list, nor designated by work request identification numbers versus by general topic areas. In addition, since the restart had been delayed, further work related items were being added; however, tracking of these additional items were not in all cases updated on the recovery plan lists, nor were the additional work request packages located on the operating floor marked as "Restart" as previous work packages had been. The team independently reviewed in detail the status of 12 of the 26 open Major work requests, 17 of the 46 open Minor 2 work requests, and 16 of the 94 open Minor 1 work requests associated with the Navy Fuel line. Based on this review, the team found that most Major and Minor 2 work requests were adequately identified for restart; although the licensee's decision-making process was poorly documented as mentioned previously. However, the team found that the licensee had focused little effort in evaluating open Minor 1 work requests, especially those that were initiated prior to NFS shutdown of the Navy Fuel line in late 2009. As a result, the team identified several Minor 1 work requests that either should have been identified as restart items but were not, or needed additional licensee review to confirm whether they were acceptable for post-restart completion. The most notable item identified by the team included the calibration of important plant equipment associated with work request number M141767. This work request was not identified by the licensee's screening as necessary for restart when it should have been.

Based on the team's observations, the licensee initiated actions to address the aforementioned weaknesses in their initial evaluation of open work items. These actions included the development of specific restart evaluation criterion for reviewing all open work request items, with the review conducted by specific work request identification number vice a general topic item description. The subsequent review using the developed evaluation criteria would document the decision-making process and be maintained in a consolidated evaluation database up to and including restart of the Navy Fuel line to ensure new work items would be properly evaluated and documented. The licensee indicated that this evaluation methodology would be used for the restart of the remaining NFS product lines. The team concluded that the actions proposed by the licensee were comprehensive and adequately addressed the concerns.

The team discussed the implementation status of outstanding Navy Fuel line modifications with managers in the process engineering department and conducted field walk downs of the operating area where the modifications were being implemented. The team was told that most modifications had been completed to the point where post-modification testing was the next stage in the process. However, from a review of the work request packages that were posted at the job locations, the team noted that none of the modifications selected had been inspected by the process engineers responsible for the modifications. This inspection ensures that the field modification work was performed in accordance with the work requests and to identify any rework that might be necessary due to work installation errors or problems. This phase of the modification process has to be completed before any post-modification testing can be conducted. The team noted that many of the modifications had been waiting for these engineering inspections between one and two weeks. While this issue was not considered significant to the proper implementation of the outstanding modification work, the confusion as to status of the modifications indicated a lack of engineering management oversight in the modification process.

Conclusions:

The team determined that adequate maintenance work controls and management oversight existed to ensure the proper priority and attention was placed on maintaining important equipment necessary for the safe restart and operation of the Navy Fuel line. However, the team identified that the licensee had not conducted a detailed evaluation of all outstanding maintenance work items resulting in some items being overlooked. Actions proposed to address this concern involving enhanced open work evaluation reviews provided confidence that appropriate evaluations would be performed prior to restart. A similar, improved open work evaluation methodology would be implemented as part of the restart of the remaining NFS product lines. Also, the team identified a weakness in the engineering management oversight of outstanding Major modifications associated with the Navy Fuel line, in that, engineering management was not cognizant that completed modification field work had not been inspected and accepted by the assigned process engineers to ensure any modification rework had been addressed.

3. Corrective Action Program

Inspection Scope:

The team reviewed licensee procedures, NFS-GH-922, "The NFS Problem Identification, Resolution, and Correction System," Rev. 9, and NFS-GH-918, "Directed Investigation Program," Rev. 7. To evaluate the adequacy with which the licensee prioritized open items, specific to the Navy Fuel Line, within their CAP, the team reviewed multiple PIRCS items. Specifically, the team reviewed 93 open PIRCS entries, dating from January 1, 2009, of which 13 warranted further evaluation. For the 13 items requiring further evaluation, the team assessed the adequacy of the problem description, assigned priority, assigned risk(s), proposed or completed investigations, proposed or completed corrective actions, and associated due dates. The team also assessed the licensee's review of open CAP items, specific to the Navy Fuel line, and their evaluation of the assigned prioritization. The team noted that this review encompassed open PIRCS entries dating from March 2000. Additionally, the team evaluated the licensee's processing of two open PIRCS entries, # P22851 and # C11379, which were identified as directly affecting startup of the Navy Fuel line. The team assessed the adequacy of the problem description, assigned priority, assigned risk(s), proposed or completed investigation, proposed or completed corrective action, and associated due dates.

Observations:

The team determined that the licensee had properly prioritized all open items, specific to the Navy Fuel line, within their CAP. The team concluded that the items requiring further evaluation were adequate in their problem description, assigned priority, assigned risk(s), proposed or completed investigations, proposed or completed corrective actions, and associated due dates. The team determined that the licensee's review of open CAP items, specific to the Navy Fuel Line, and their evaluation of the assigned prioritization were adequate. The team also determined that the licensee's processing of PIRCS entries, P22851 and C11379 were adequate in their problem description, assigned priority, assigned risk(s), proposed or completed investigation, proposed or completed corrective action, and associated due dates.

4. InvestigationsInspection Scope:

The licensee had an event on February 19, 2010, which caused an inadvertent criticality alarm and evacuation (PIRCS # P23389). The licensee conducted a Human Performance Event Evaluation in response to the event which led to a root cause evaluation. Although these investigations were not completed prior to the end of the inspections, the team reviewed the progress and interviewed those involved to evaluate the licensee's ability to apply lessons learned from the BCS event to their investigations.

Observations:

The individuals involved in the investigations were adequately trained in root cause evaluation techniques. The investigation applied a systematic method to identify appropriate causal factors. Some of the causal factors related to this event showed a continued need for improvement in questioning attitude and management oversight. Although the corrective actions had not been approved, the recommendations appeared to be sufficient to preclude reoccurrence.

Conclusions:

The team noted an improved ability to identify causes and develop effective corrective actions. The licensee held individuals accountable for their performance and developed adequate corrective actions.

D. EXIT MEETING

During the course of the inspection, the team provided members of the plant staff and management with summaries of inspection observations on a daily basis. During these discussions, licensee representatives identified some material examined during the inspection relating to as proprietary. All proprietary information was returned to the licensee. The team presented the inspection results to members of the plant staff and management at a public meeting conducted on April 22, 2010, in Erwin, TN. The plant staff acknowledged the findings presented.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

D. Amerine, President, Nuclear Fuel Services
E. Athon, Director Applied Technology/Principle Scientist
R. Dailey, Director, Engineering
T. Lindstrom, Vice President Operations
M. Moore, Director, Safety and Regulatory Affairs
J. Nagy, Chief Nuclear Safety Officer
D. Ward, Interim Director, Safety and Regulatory
J. Wheeler, Licensing and ISA Manager

NRC

J. Shea, Director Division of Fuel Facility Inspection (DFFI) Region II (RII)
E. Cobey Deputy Director, DFFI, RII
S. Vias, Chief, Fuel Facility Branch 1, DFFI, RII

LIST OF ITEMS OPEN CLOSED AND DISCUSSED

Discussed

70-143/2009-011-08	URI	Failure to identify engineered or administrative controls as IROFS required by 10 CFR 70.61(e) (Section A.7)
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LIST OF DOCUMENTS REVIEWED

Procedures

ENG-EPS-A-003, Setpoint Verification and Design Parameter Documentation, Rev. 0,1
ENG-EPS-A-005, Baseline Design Criteria for IROFS, Rev 0
LOA-2111P-031, "V804 Cleanout," Rev. 0
LOA-MISC-08-044, Periodic Verification of Setpoint Analysis, Rev 1
LOA-MISC-09-066, Enhanced Change Control, dated October 26, 2009
LOA-MISC-09-074, Enhanced Change Control – Deviation from NFS-CM-004, dated November 23, 2009
LOA-MISC-09-074-1, Modification of Urgent Status (Enhanced Change Control – Deviation from NFS-CM-004), dated December 7, 2009
LOA-MISC-09-083, Modification of Urgent Status (Enhanced Change Control – Deviation from NFS-CM-004), dated December 9, 2009
NFS-CM-004, NFS Change Control Process, Rev. 3 - 6
NFS-CM-005, NFS Change Control Board (CCB) Review, Rev. 2
NFS-GH-56, Management Measures Identification and Implementation for IROFS, Rev 6
NFS-GH-900, Safety and Safeguards Review Council (SSRC) Program, Rev. 15
NFS-GH-901, Configuration Management Program, Rev. 14

NFS-GH-911, Integrated Safety Analysis (ISA) Program, Rev. 4
 NFS-HS-A-50, Guidelines for Government Agency Notification, Rev. 18
 NFS-HS-A-67, Documenting the Safety and Regulatory Review of Facility Changes, Rev. 6
 NFS-SO-09-06, Enhanced Operations, Management and Communications.
 NFS-TS-009, Configuration Management of Process Change, Rev. 0, 1 and 2
 NFS-TS-012, Status and Release of Process Starting Materials, Rev. 0
 SOP 355, "Handling of Bulk Chemicals, Rev. 14
 SOP 392, Work Request Procedure, Rev. 21
 SOP 401 Section 19, Water Systems – 300 Complex, Rev. 9
 SOP 401 Section 9A, Area 900A Sublot Preparation, Rev. 40
 SOP 401 Section 8, Area 800, Rev. 9
 SOP 401 Section 2-302, Area 200 – Bldg 303, Rev. 17
 SOP 401 Section 22-303, Area B - 303, Rev. 12
 SOP 401 Section 4-303, Area 400/500-303, Rev. 13
 SOP 401 Section 27, Second Pass Solvent Extraction, Rev. 17
 SOP 401 Section A, General Information for the Fuel Manufacturing Facility, Rev. 27
 SOP 401 Section 22-302, Bldg 302, Area B, Rev. 18
 SOP 401 Section 12, Cooling Water, Rev. 11
 SOP 401 Section 6-303, Area 600 - 303, Rev. 26
 SOP 401 Section 6-302, Area 600, Bldg 302, Rev. 39
 SOP 401 Section 2-302, Bldg 302, Area 200, Rev. 36
 SOP 401 Section 25A-303, Area E Tray Dissolver, Rev. 19
 SOP 401 Section 26A, Area F Accountability Storage Columns, Rev. 14
 SOP 401 Section 21-302, Area A, Bldg 302, Rev. 16
 SOP 401 Section 26, First Pass Solvent Extraction" Rev. 15
 SOP 401 Section 11, Monitoring and Servicing of Area Process Ventilation Systems, Rev. 17
 SOP 401 Section 25-302, Area E, Bldg 302, Rev. 19
 SOP 401 Section 24-302, Area D-302, Rev. 17
 SOP 401 Section 04-302, Bldg 302, Area 400/500, Rev. 135
 SOP 401 Section 23-302, Area C-302, Rev. 18
 SOP 409 Section 10, Uranium Aluminum Dissolution, Rev. 28, 29
 SOP 409 Section 27, Centrifuge Bowl Cleaning Process, Rev. 16, 17

Miscellaneous Documents

21T-10-0127, HEA-21, Risk Assessment for Bldg 333 U-Aluminum Dissolution NOx Scenarios, Rev 7
 21T-10-0030, HEA-13, Blended Low-Enriched Uranium Preparation Facility Integrated Safety Analysis Summary, Rev 7
 56T-08-0063, QAS-01-02-06, QA-08-21, JBP-08-006, Audit of the Configuration Management process since the implementation of NFS-GH-901, Revision 11.
 56T-09-0079, QAS-01-02-06, QA-09-32, JBP-09-0021, Audit of the Configuration Management process since implementation of NFS-GH-901, Revision 12
 SNM-124, Special Nuclear Materials License, Section 2.12, Management Measures Relied on for Safety

Problem Identification, Resolution, and Correction System Reports (Identification Number)

P21448, P23499, P22793, P23388, and P23389
 I10037, 10038, 10059, I10071, I10073, I10153, I10184, I10252, I10389, I10408, I10445, and I10446

C10679, C10683, C11384, C10616, C10617, C10622, C10682, C10683, C10720, C10781, C10792, C10793, C10794, C10795, C10798, C10799, C10800, C10801, C10802, C10803, C10804, C10805, C10807, C10810, C10949, C10950, C10953, C10954, C10957, C10966, C11061, C11062, C11103, C11113, C11114, C11115, C11117, C11228, C11129, C11227, C11216, C11172, C11174, C11334, C11347, C11381, C11512, C11380, C10953, C11271, C11329, C11289, C11383, C11971, C11972, C3154, C10980, C10617, C11061, C11062, C11111, C11487, and C11489

Enterprise Change Requests (ECRs)

20091148, 20100011-03, 20100159, 20100335, 20100353, 20100360

Work Orders (Work Requests)

(Major) - M135525, M136124, M137840, M138565, M138977, M138998, M139576, M139631, M139633, M139644, M139665, and M144202

(Minor 2) - M139294, M139295, M139296, M139342, M139565, M140059, M140373, M140833, M140893, M140978, M141001, M141941, M142141, M142145, M142584, M144159, M144163, and M144201

(Minor 1) - M117666, M118967, M119995, M121142, M131363, M132669, M133799, M134499, M139342, M139729, M141767, M141850, M142193, M142635, M142636, and M142647

LIST OF ACRONYMS

ACE	Apparent Consequence Evaluation
AIT	Augmented Inspection Team
B&W NOG	Babcock and Wilcox Nuclear Operations Group
BCS	Bowl Cleaning Station
BLEU	Blended Low Enriched Uranium
BPF	BLEU Preparation Facility
CA	Corrective Action
CAL	Confirmatory Action Letter
CAP	Corrective Action Program
CARB	Corrective Action Review Board
CC	Contributing Cause
CCB	Change Control Board
CDL	Commercial Development Line
CF	Causal Factor
ECP	Employee Concerns Program
ECR	Enterprise Change Request
HEU	Highly Enriched Uranium
INPO	Institute of Nuclear Power Operations
IROFS	Items Relied On For Safety
IRT	Independent Review Team
ISA	Integrated Safety Analysis
LL	Lessons Learned
NOx	Nitrogen Compound Gas
LOA	Letter of Authorization
NRC	Nuclear Regulatory Commission
NFS	Nuclear Fuel Services

OE	Operating Experience
PIRCS	Problem Identification, Resolution, and Correction System
PRG	Problem Review Group
QA	Quality Assurance
RCA	Root Cause Analysis
RRAT	Restart Readiness Assessment Team
Rev.	Revision
SCIR	Safety Culture Implications Review
SEW	Senior Engineering Watch
SME	Subject Matter Expert
SOP	Standard Operating Procedure
SOW	Statement of Work
SSC	Structures, Systems, or Components
SSRC	Safety and Safeguards Review Council
U-Al	Uranium-Aluminum
U-ox	Uranium-oxide
URI	Unresolved Item